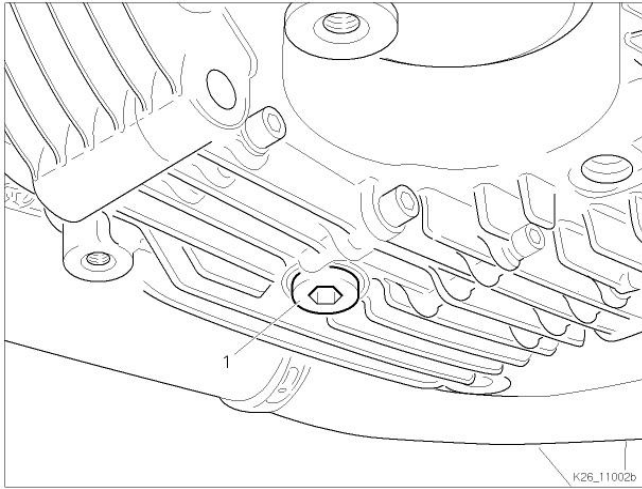


2005-2013 BMW R1200RT SERVICE AND REPAIR MANUAL



 **11 00 050 Removing and installing engine**

(-) Draining engine oil



Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the engine.
- Remove oil drain plug (1) and drain the oil.
- Dispose of used oil in an environmentally friendly manner.
- Remove the old sealing ring from the drain plug.

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



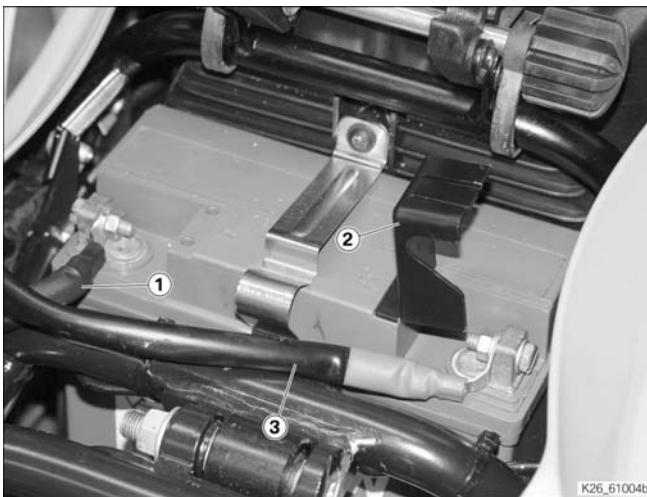
(-) Disconnecting battery

- Switch off the ignition.

! Attention

Nature: Disconnection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.



- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.

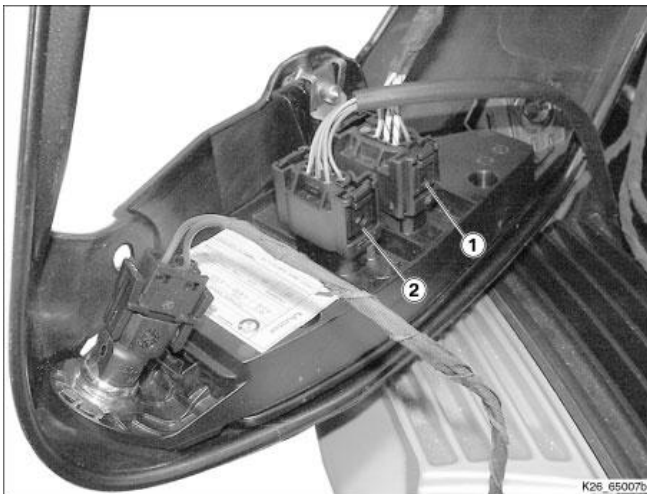


(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



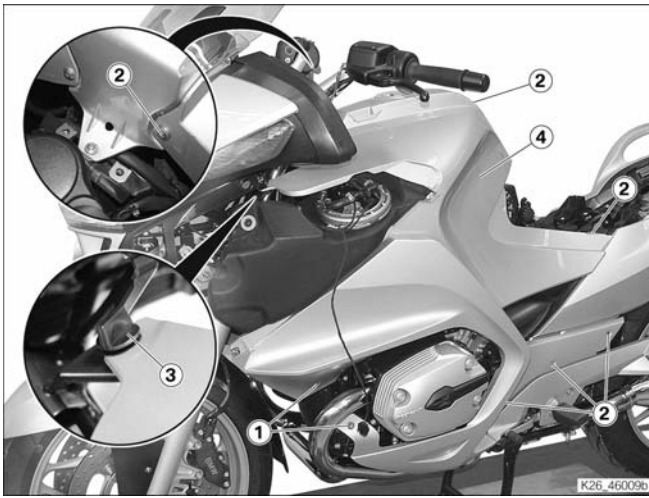
Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

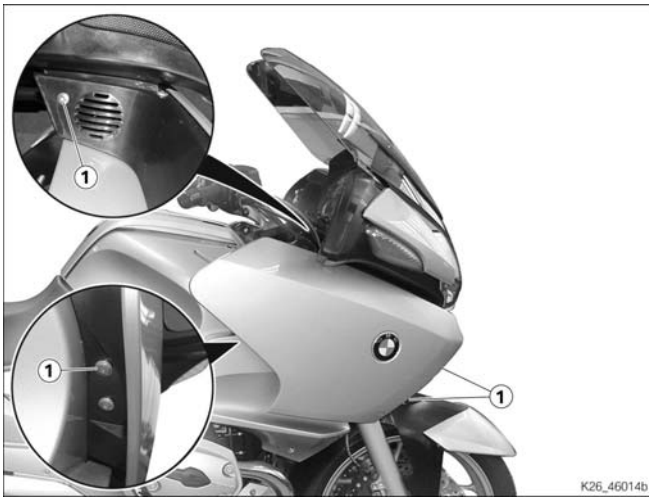
(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



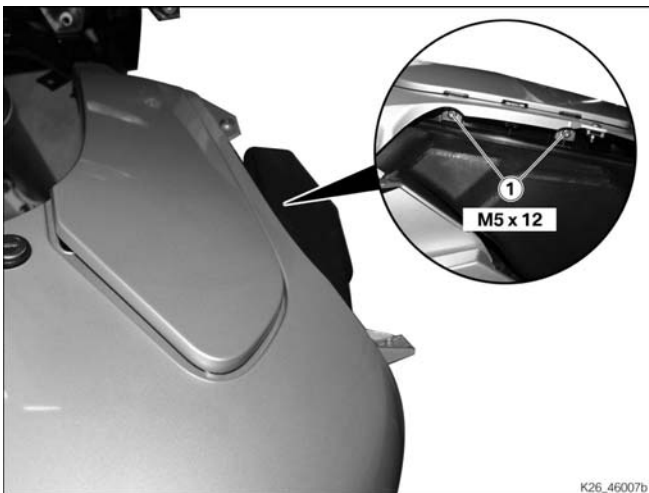
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



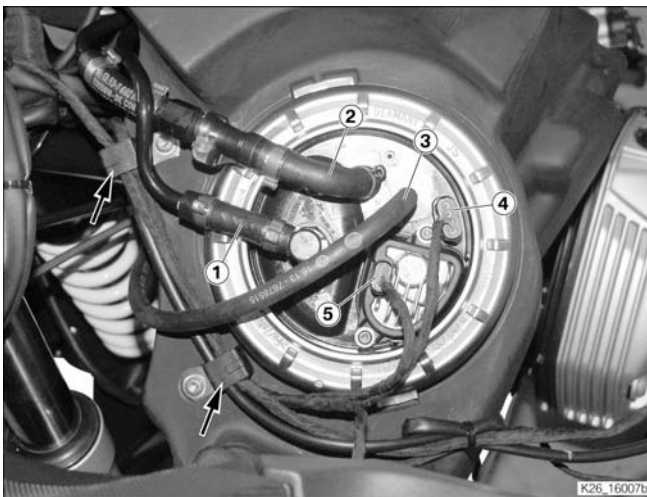
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

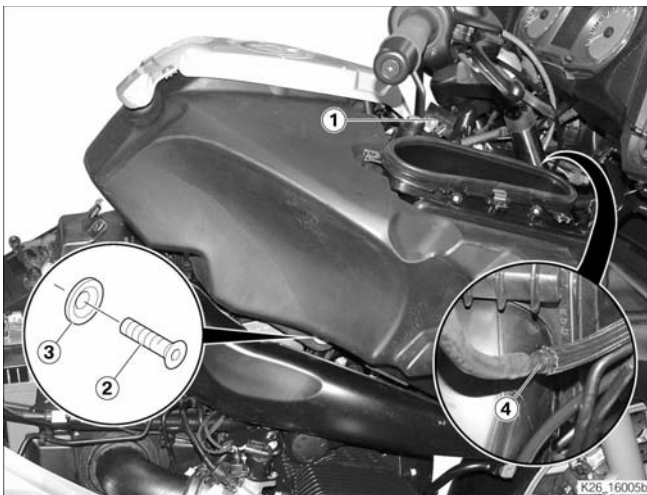


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

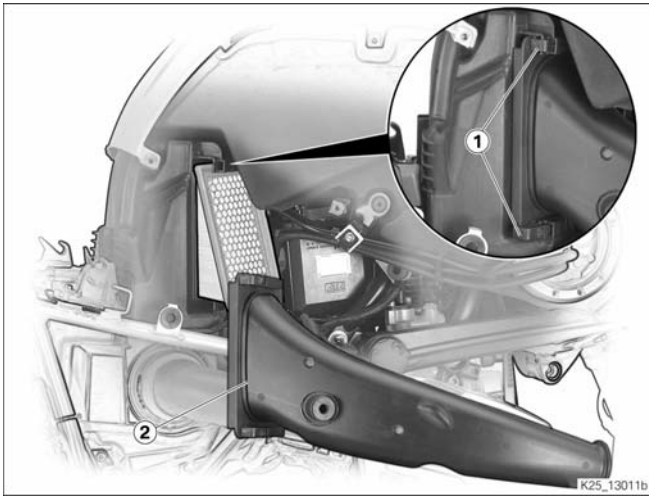


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



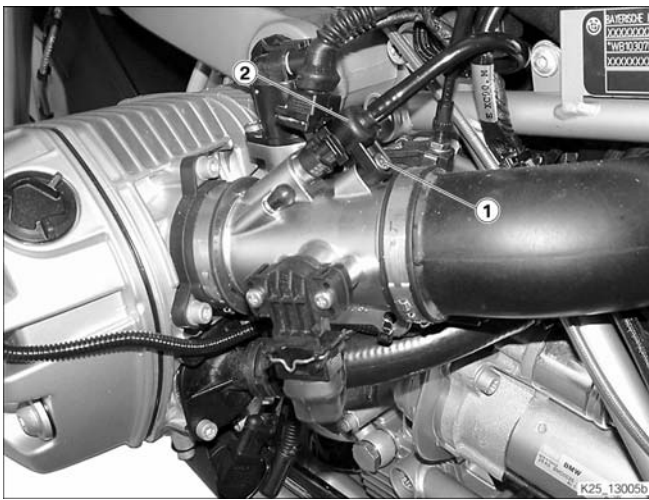
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



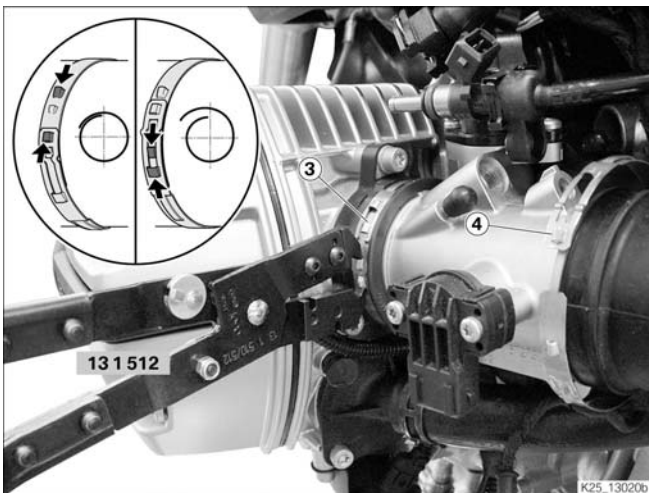
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.

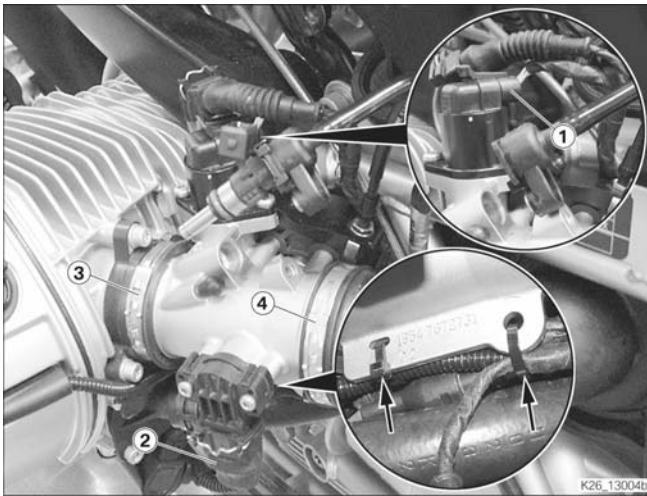


(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
-



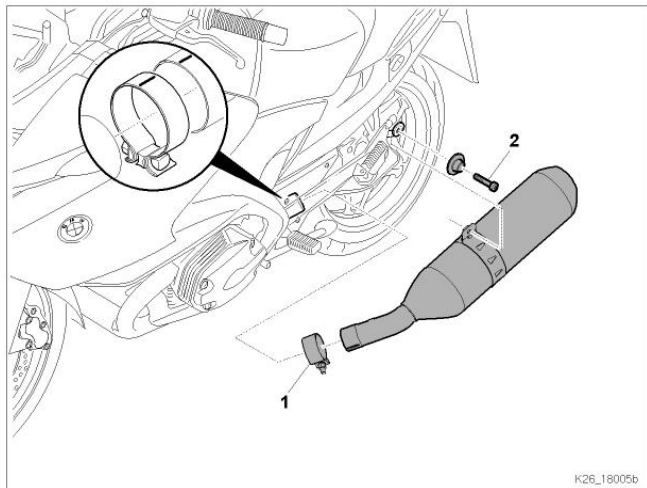
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

(-) Securing throttle valve stub with cable divider



- Tie up throttle valve stub and cable divider with cable tie (arrow).

(-) Removing silencer

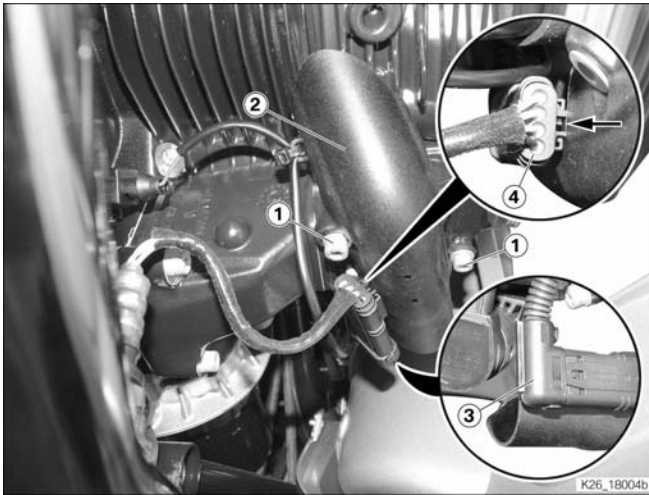


- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

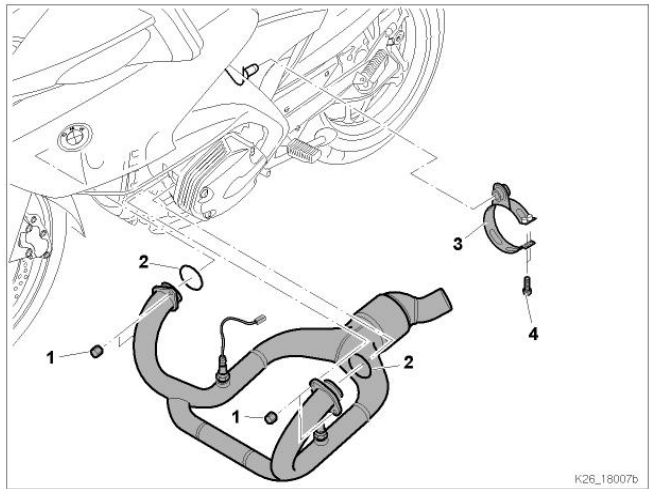
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

- Undo front screw (1) from both bottom sections of the fairing.



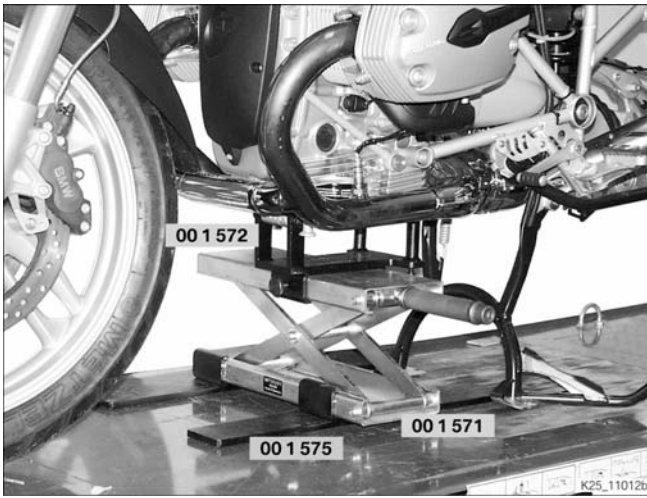
- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.

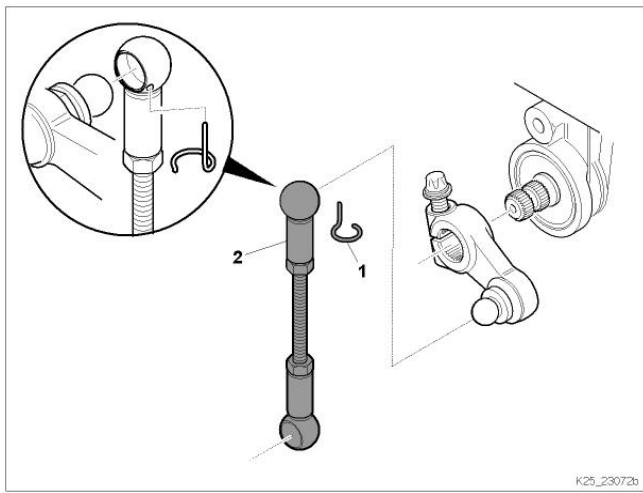
(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



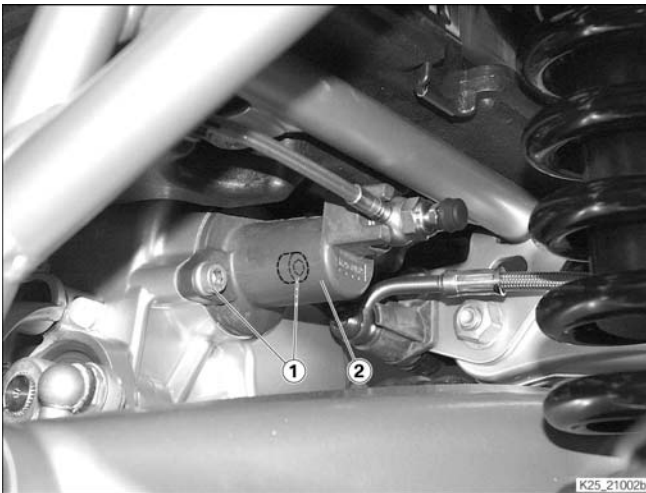
(-) Disengaging selector rod from shift lever

- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.



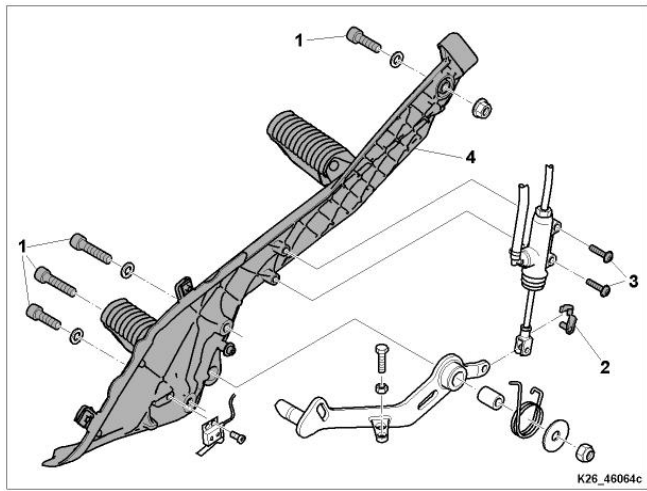
(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.




(-) Removing right footrest plate

- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.

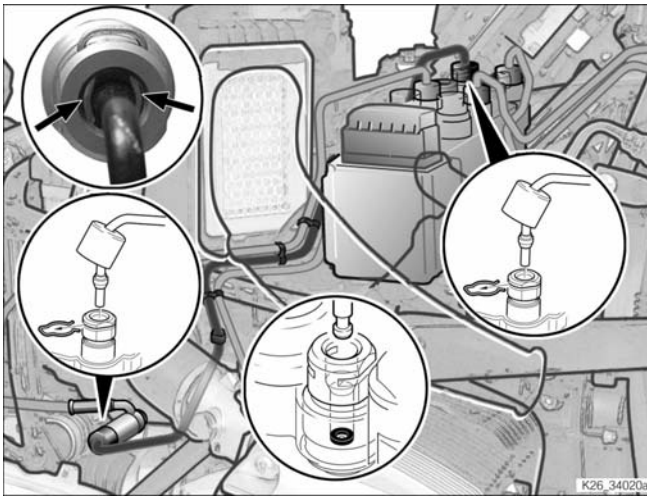
 Technical data			
Release temperature, screws for rear brake master cylinder		100 °C	

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.



(-) Disconnecting brake pipe for rear wheel circuit from pressure modulator

- Push the protective cap up.
- Remove the spring clip.



! Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap the area around the connector in a cloth.
- Open the retaining clips, lift the brake pipe out of the pressure modulator and catch escaping brake fluid with a cloth.
- Seal the open end of the brake pipe to prevent brake fluid from dripping.

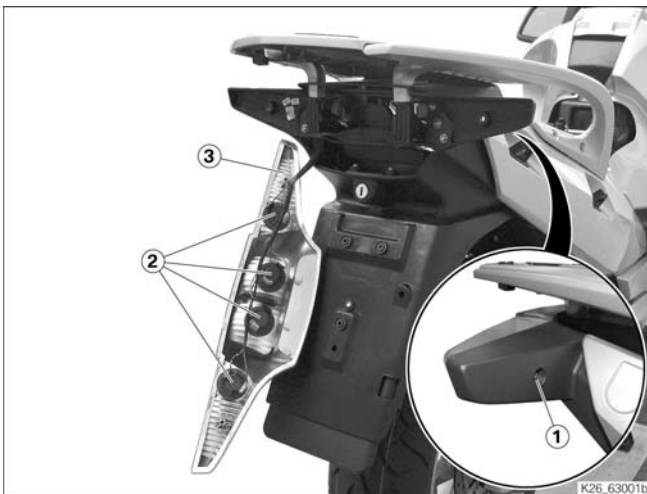


Note

Use the protective cap from a bleed screw to seal the brake pipes.

(-) Removing rear-light unit

- Remove screws (1).
- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).



(-) Disengaging wiring harness at rear

Variant, On-board computer

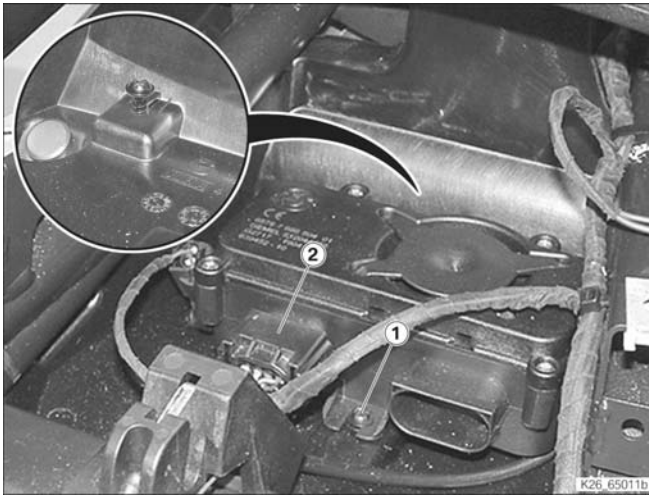
- Disconnect plug (1) of the temperature sensor.



K26_46048b

Variant, Anti-theft alarm

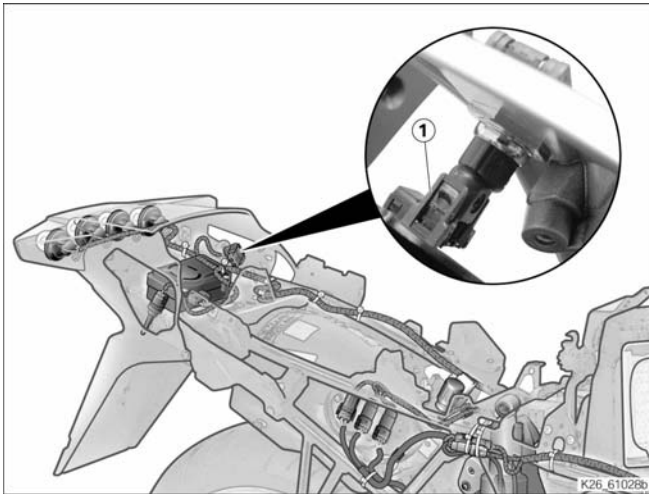
- Disconnect plug (2) of the anti-theft alarm.



K26_65011b

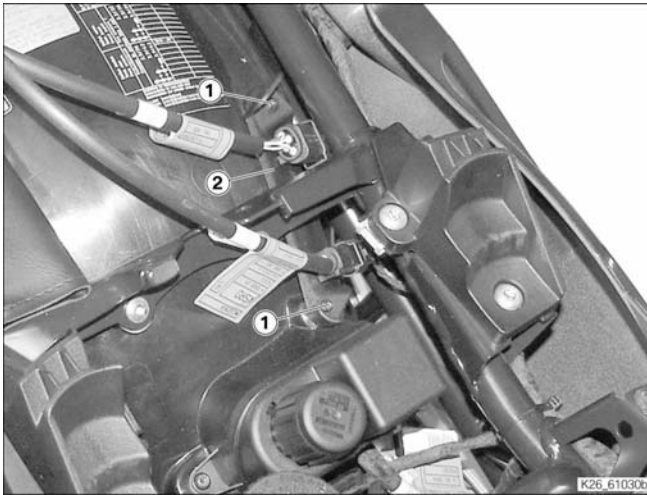
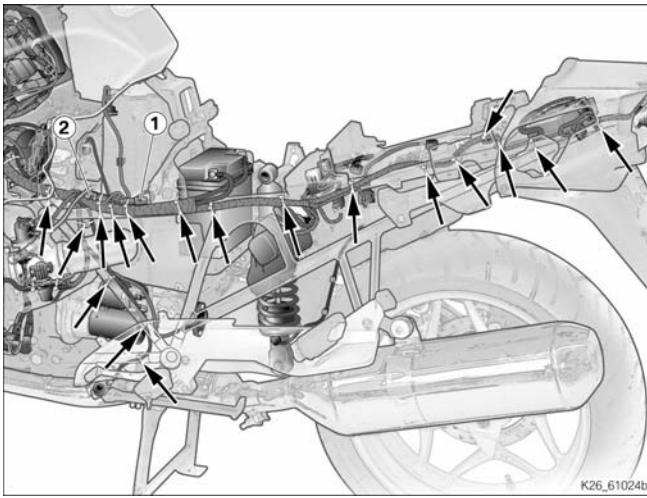
Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.



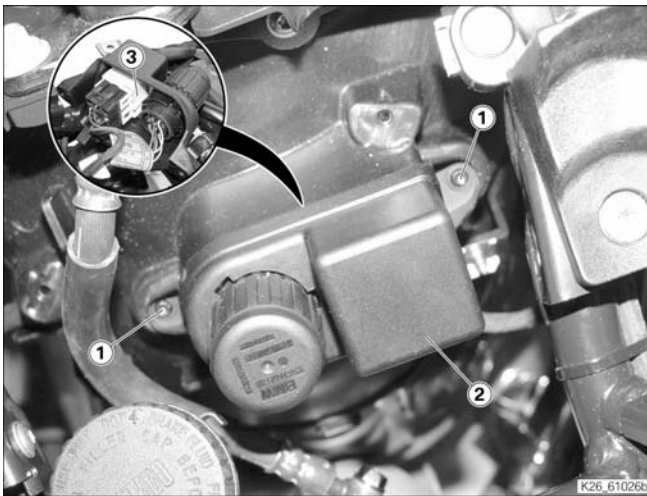
K26_61028b

- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.



Variant, Seat heating

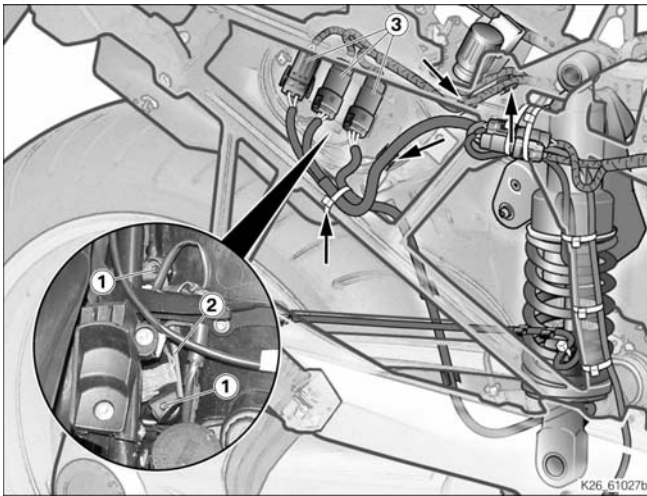
- Remove screws (1).
- Pass holder (2) forward with the cables.



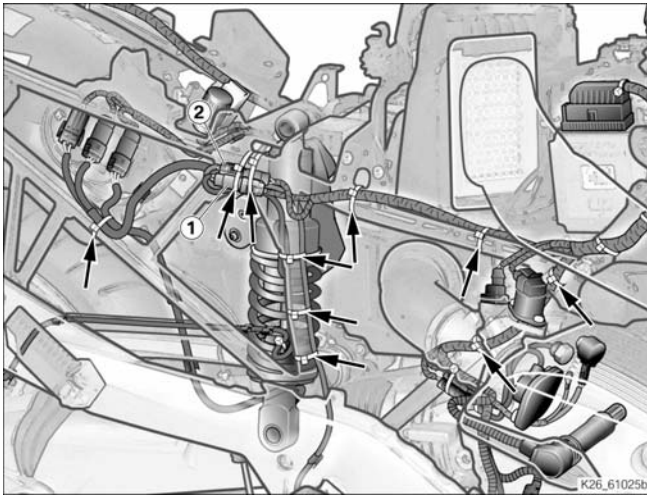
- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.

Variant, ESA

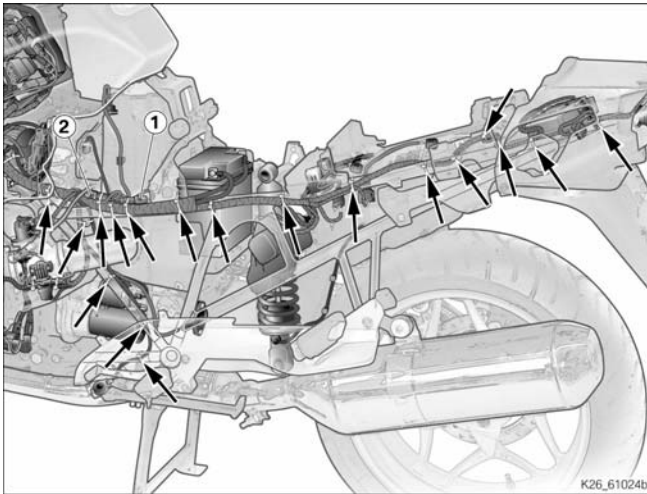
- Remove screws (1).
- Pass holder (2) forward with the cables.
- Disconnect plug (3) of the spring strut.



- Disconnect plug (1) of the speed sensor.



- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.



(-) Removing rear section of motorcycle

- Open hose clip (1).
- Disconnect the hose from the intake air silencer.



- Secure the front wheel on the lifting platform.
- Using straps, secure the rear section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.



► **Releasing threaded fastener on rear frame**

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.

⚠ Attention

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

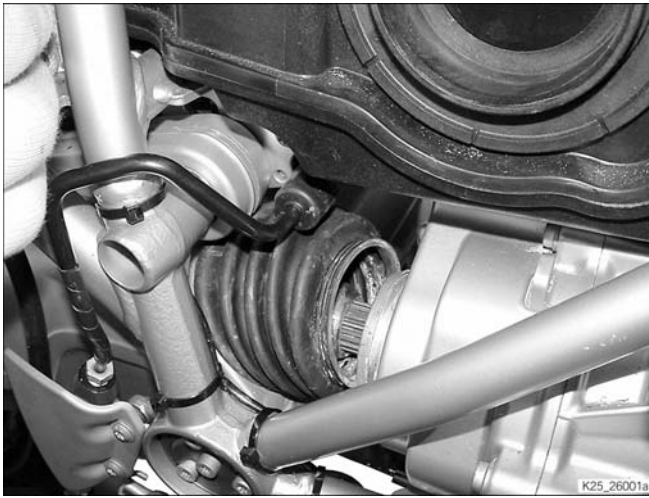
Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

Apply masking tape to the part of the swinging arm that could be damaged.

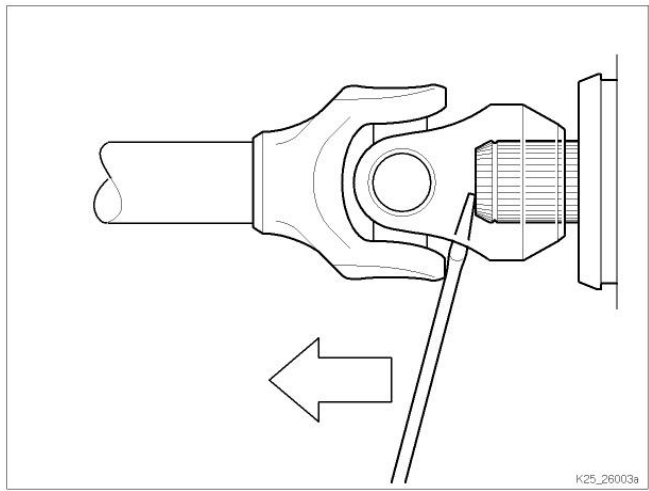
- Slacken screw (4), but do not remove it at this point.

► **Pressing universal shaft off gearbox output shaft**

- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the



gearbox housing.



- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the shaft in this position.
- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Remove screw (4).



- Thread the fuel-tank breather hose out of the rear frame.
- Disconnect the fuel pressure regulator from the intake air silencer.
- Using crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) , carefully lift the rear section clear of the motorcycle, using a suitable tool to push the universal shaft completely out of the gearbox



output shaft.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Pass the control-circuit line with the brake master cylinder forward out of the way.

- Carefully set down the rear section where it will not be damaged.

(-) Removing gearbox potentiometer



- Disconnect plug (1) of the gearbox potentiometer.
- Release the cable from the cable clips.
- Remove screws (2) from the gearbox potentiometer.
- Remove the gearbox potentiometer, noting the O-ring.

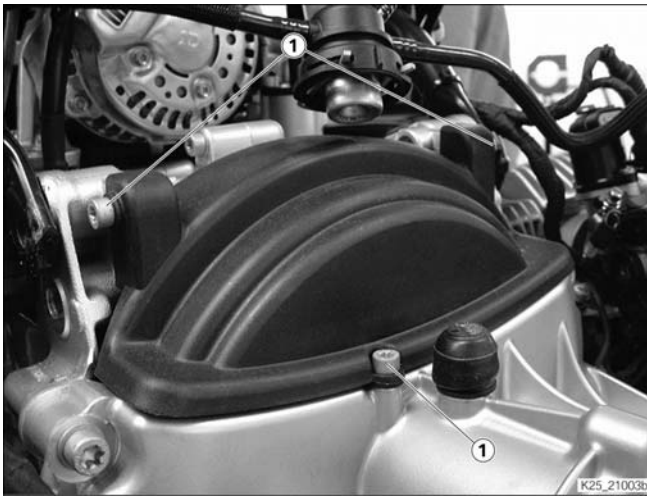
(-) Removing starter



- Disconnect "starter positive" cable (1) (terminal 30).
- Disconnect "starter start signal" plug (2) (terminal 50).
- Remove screws (3).
- Remove the starter.

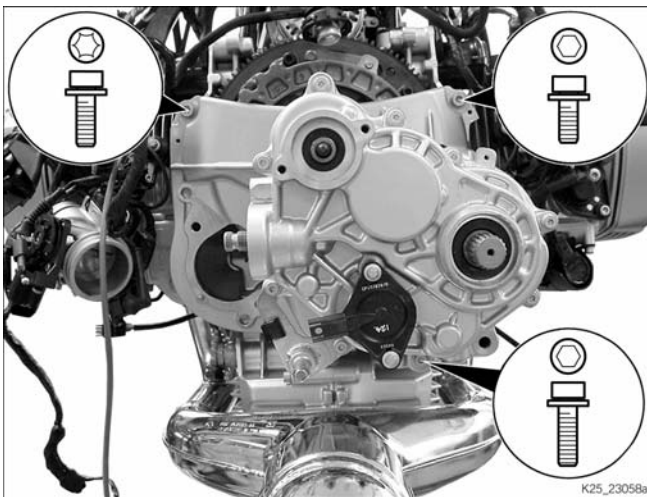
(-) Removing cover for clutch

- Remove screws (1).
- Carefully slip the clutch cover to the rear underneath the pressure modulator and remove.



- Install screws to hold the pressure modulator in position.

(-) Removing gearbox



- Remove 3 screws.
- Pull the gearbox straight to the rear to remove.
- Keeping it straight to ensure that oil does not escape through the breather, place the gearbox on a smooth, level surface.

(-) Removing both primary spark plug ignition coils

Precondition

- Ignition is switched OFF

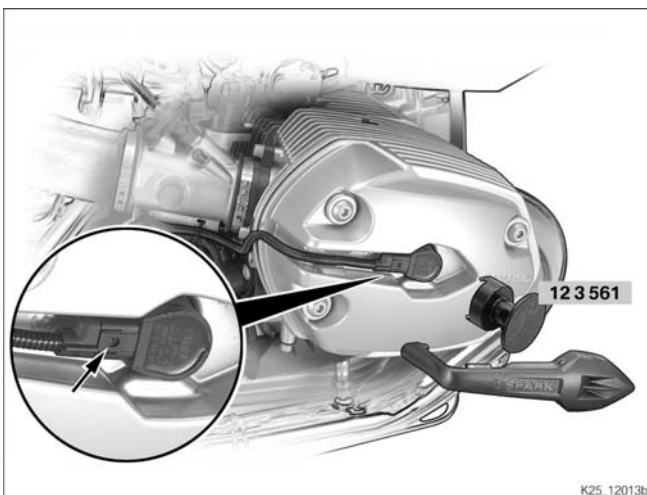


- Remove primary spark plug covers.

⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push plug (arrow) away from the latching tabs and carefully pull the cable to disconnect the plug.
- Use the puller for direct ignition coils (No. 12 3 561) to remove the primary spark plug direct ignition coils.

(-) Removing secondary spark plug ignition

coils

Precondition

- Ignition is switched OFF



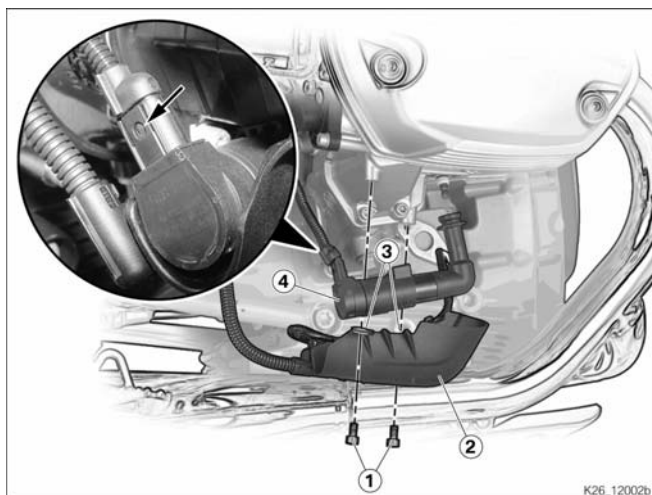
- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

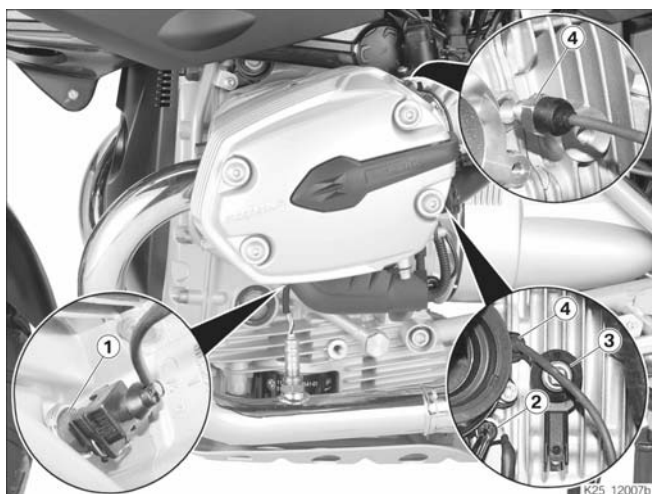
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).

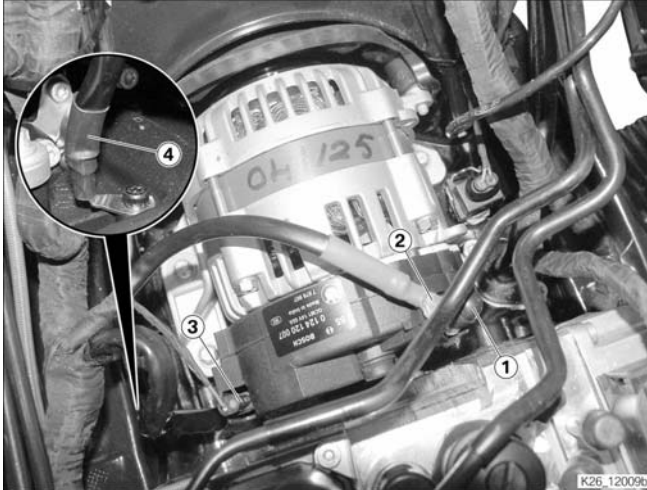


(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).



(-) Disconnecting cables of alternator



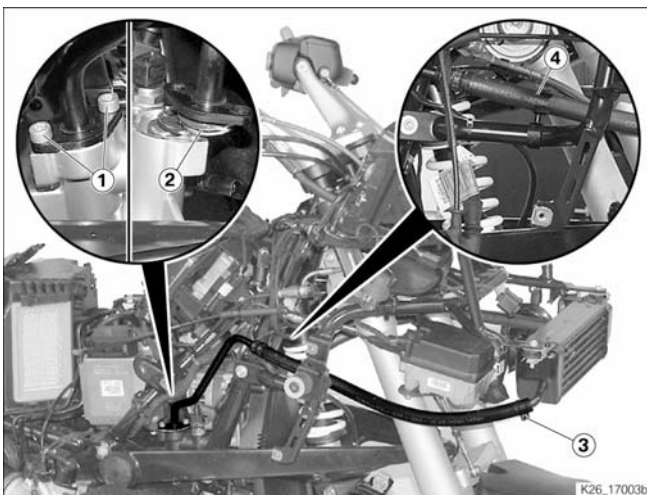
- Remove cap (1).
- Disconnect "alternator positive" cable (2).
- Disconnect plug (3).
- Disconnect the earth lead from engine block (4).

(-) Disconnecting plugs of engine sensors



- Disconnect oil temperature sensor (1).
- Disconnect TDC sensor (2) and release the cable from the front frame section.

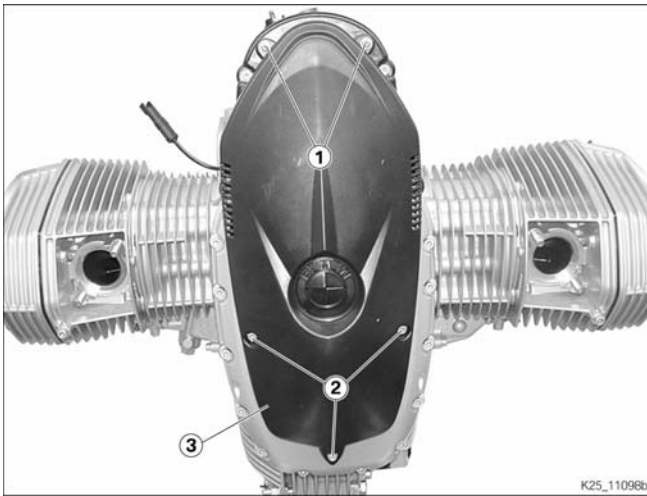
(-) Disconnecting oil cooler line, feed, from engine



- Remove screws (1) from the crankcase.
- Catch the escaping oil.

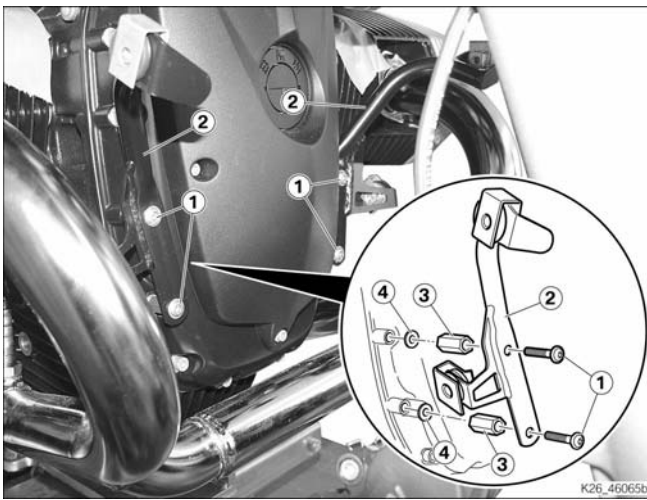
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



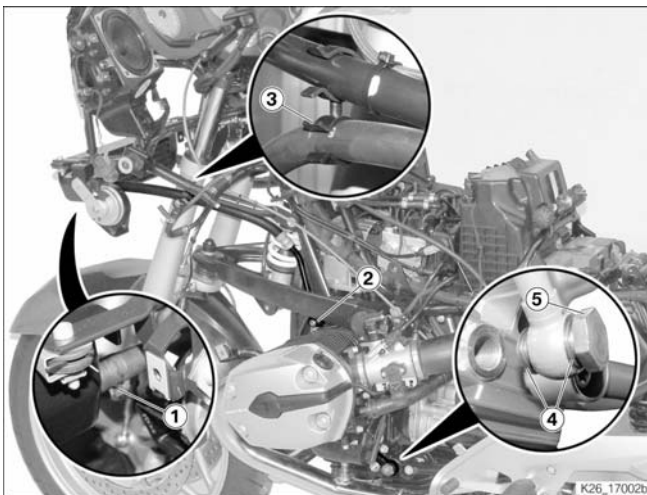
(-) Removing left and right fairing bracket

- Remove screws (1).
- Remove fairing bracket (2) with sleeves (3) and washers (4).



(-) Disconnecting oil cooler line, return, from engine

- Remove banjo bolt (5) from the crankcase.
- Catch the escaping oil.
- Remove screw (2) from the engine block.
- Unclip the oil cooler line from hose holder (3).

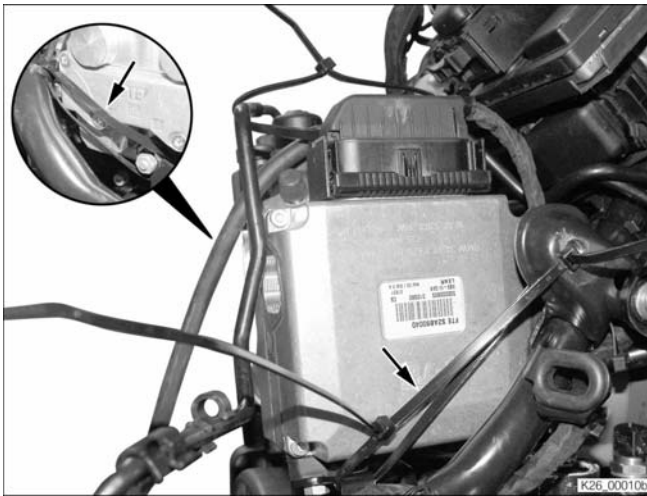


(-) Releasing pressure modulator



Attention

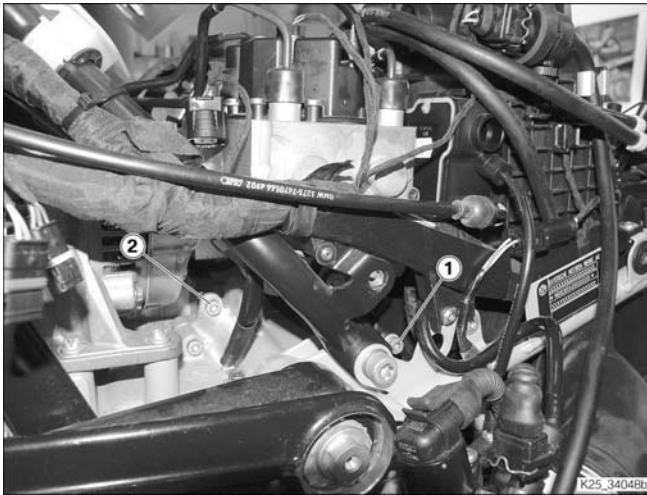
Nature: Bent or badly routed brake lines can chafe and leak.



Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

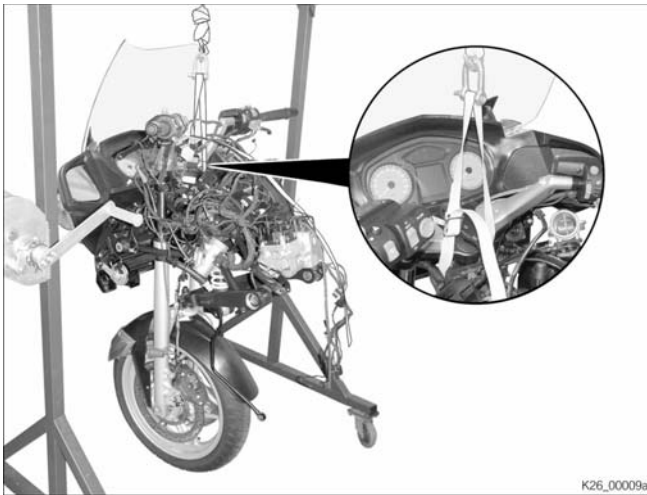
When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Use cable ties (arrows) to attach the pressure modulator to the frame in such a way that the brake lines are not bent and that the pressure modulator is secure.



- Remove screws (1) on left and right.
- Remove screw (2).
- Check the security of the pressure modulator; tighten the cable ties if necessary.

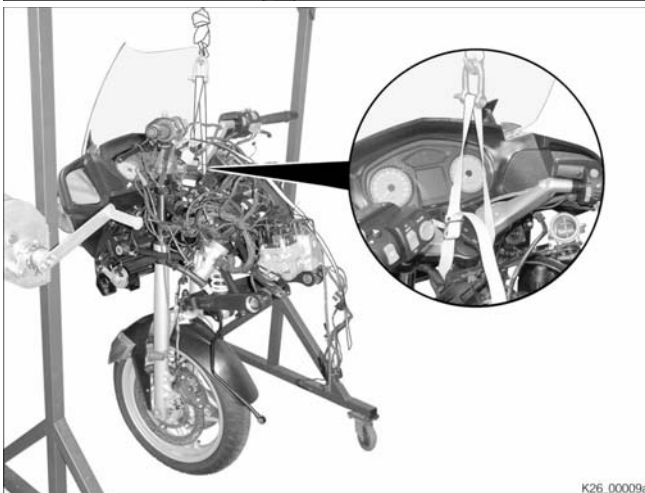
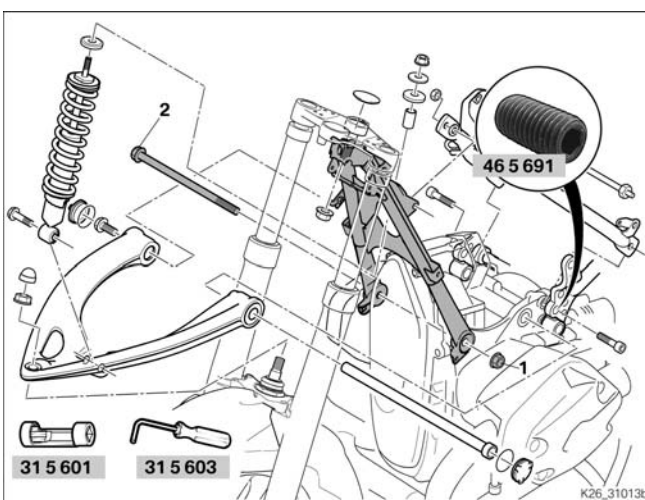
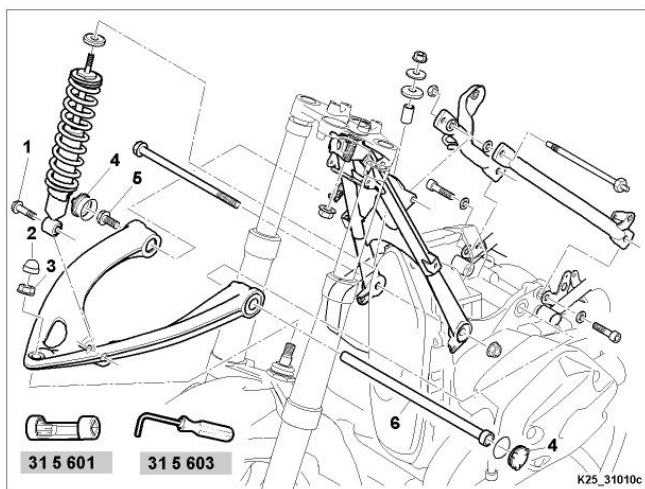
(-) Removing front section of motorcycle




- Using straps, secure the front section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.
- Remove front wheel locating and locking element.

► Releasing leading link from engine

- Remove caps (4).
- Mask off the cooling ribs of the cylinders in the vicinity of the leading link.
- Remove screw (5) and pull shaft (6) out to the left.



- Remove retaining screws (No. 46 5 691) from the struts on left and right.
- Heat nut (1).

 Technical data		
Release temperature, microencapsulated threaded fasteners	80 °C	

- Remove pin (2).
- Lift the front section of the motorcycle up and forward until it is clear of the propulsion unit.

(-) Removing alternator drive belt

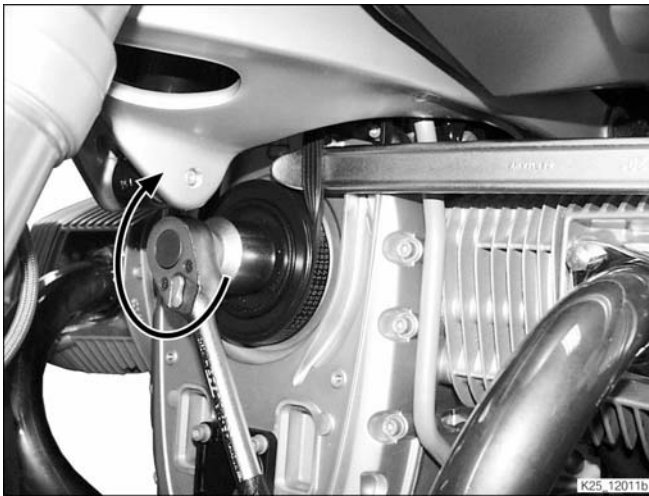
Precondition

- Gearbox in neutral.



Warning

Nature: Take care not to trap your fingers



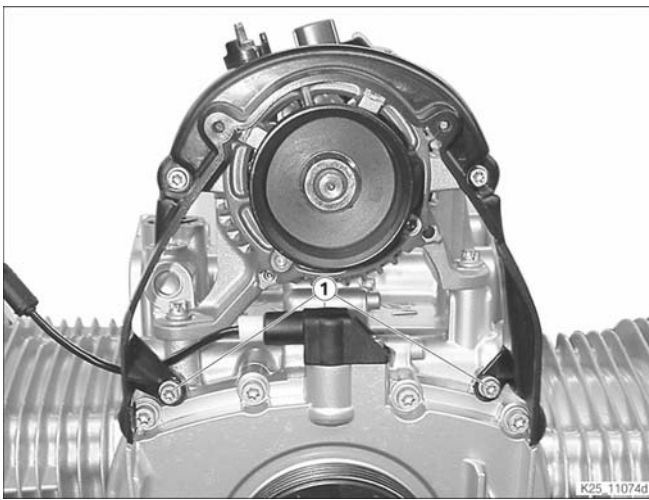
between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.

- Turn the engine in the normal direction of rotation (**arrow**) by means of the crankshaft belt pulley and, using a blunt instrument such as a tyre lever, for instance, carefully ease the drive belt forward until it slips off the pulley.

(-) Removing belt cover, rear, from engine

- Remove screws (1).



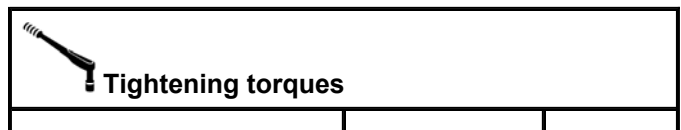
(-) Removing alternator

- Remove screws (1) and (2) and lift alternator from engine block.



(-) Securing alternator

- Fit alternator in position from front and install screws (1) and (2).






Alternator to crankcase, M8	18 Nm	
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(-) Securing belt cover, rear, to engine

- Install screws (1).



 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.



⚠ Attention

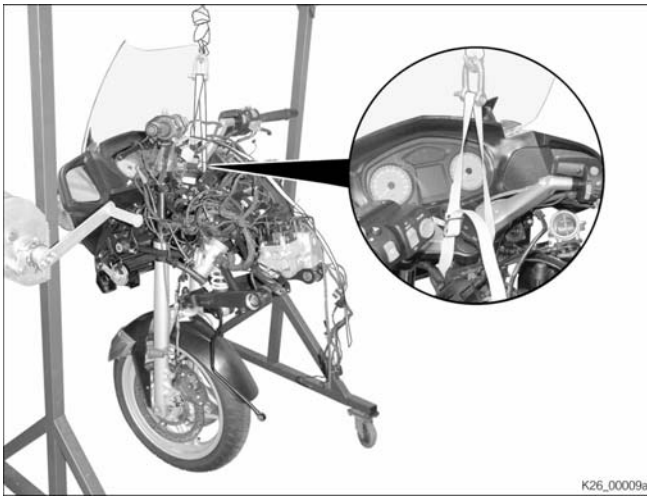
Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.

Avoidance: Make sure the belt is installed right way round.

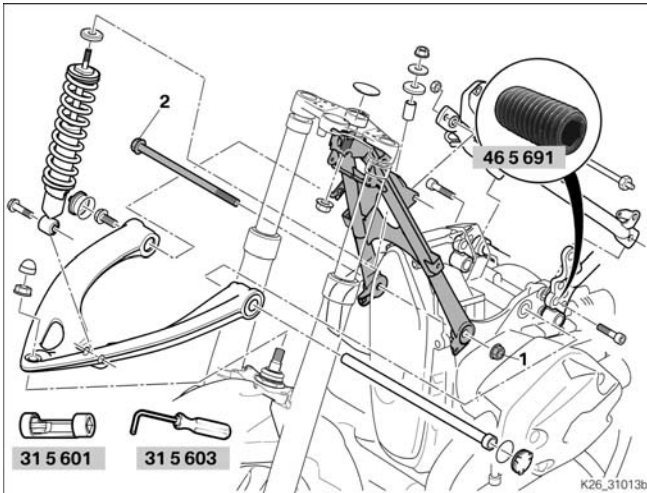
- Check that the drive belt is correctly seated on both pulleys.

(-) Installing front section of motorcycle


- Manoeuvre the front section into position relative to the propulsion unit.



- Align the front section of the motorcycle so that the frame fasteners slip easily into position and the belt cover is behind the frame.



- Install pin (2).
- Install new nut (1).

 Tightening torques		
Front frame to engine, M12 x 210 - 10.9, Replace nuts Micro-encapsulated	130 Nm	


- Install retaining screws (No. 46 5 691) on left and right.

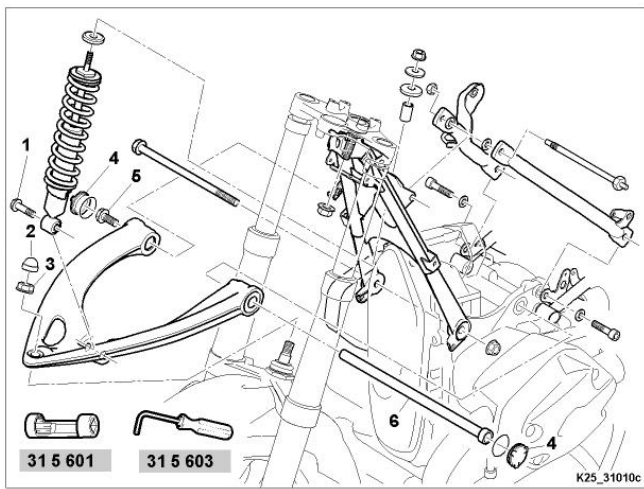


- Secure the oil cooler line, return, to the frame front section by means of screw (1).

► **Securing leading link to engine**

- Carefully manoeuvre the leading link into position, noting the cooling ribs of the cylinders.
- Introduce shaft (6) from the left and secure it by tightening screw (5).

 Tightening torques		

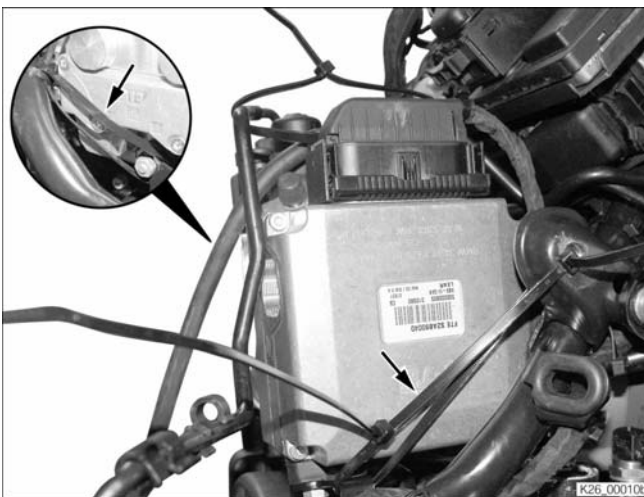


Leading link to engine	Initial torque, 45 Nm	
	Final torque, 72 Nm	

- Remove the tape masking the cooling ribs of the cylinders in the vicinity of the leading link.
- Install caps (4).

- Lower crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 673) , (No. 46 5 674) until the straps can be disengaged from the front section of the motorcycle and removed.
- Install the front wheel locating and locking element.

(-) Securing pressure modulator



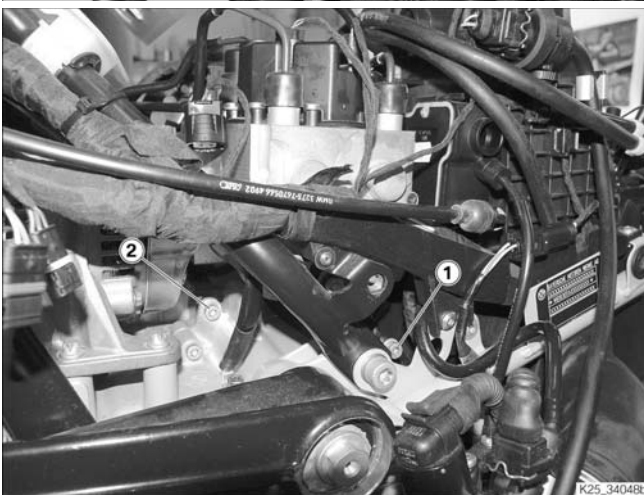
⚠ Attention


Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

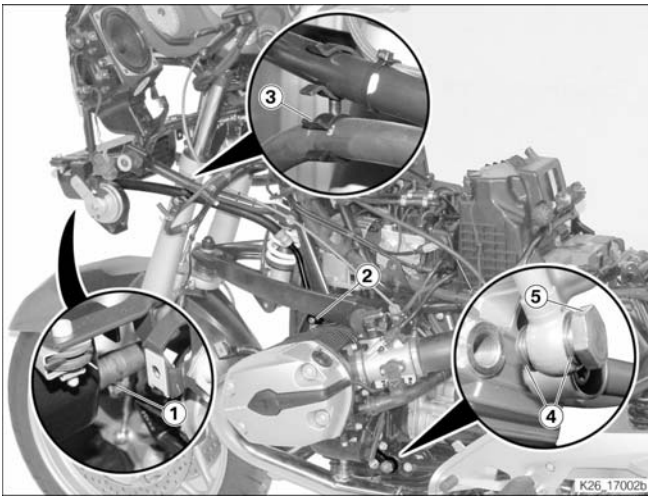
- Open cable ties (arrows).
- Install screws (1), but do not tighten.
- Install screw (2).




 Tightening torques		
ABS pressure modulator with bracket to engine, M6 x 16	8 Nm	

(-) Connecting oil cooler line, return, to engine


- Replace sealing rings (4).



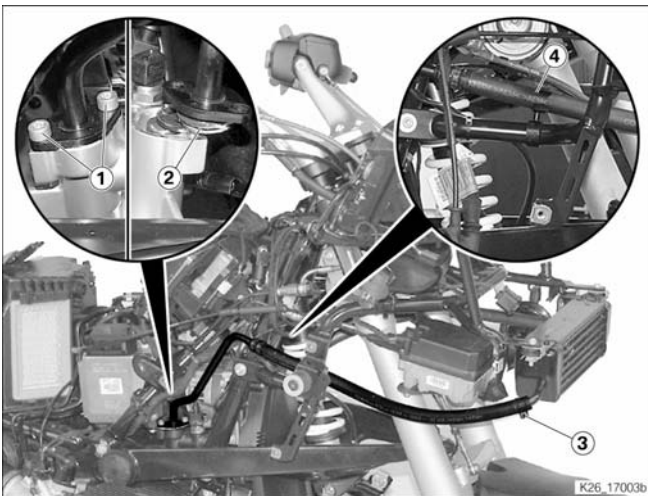
- Secure the oil cooler line with banjo bolt (5) and sealing rings (3) to the engine.

 Tightening torques		
Banjo bolt	35 Nm	


- Secure the oil cooler line to the crankcase with screw (2).

 Tightening torques		
Fastener for oil cooler line, return line, M6 x 12	5 Nm	

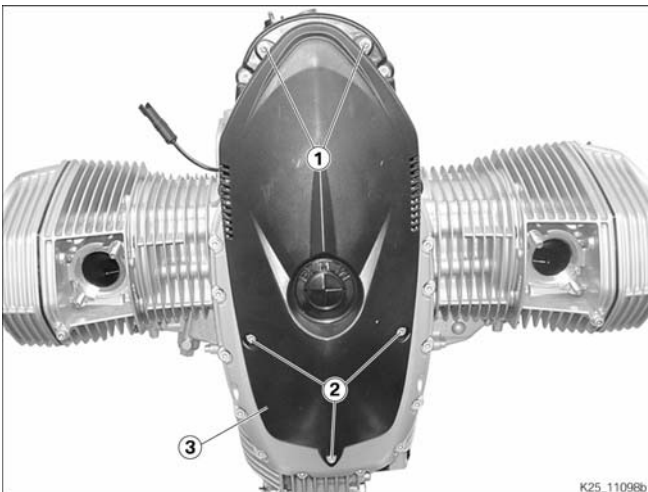
(-) Connecting oil cooler line, feed, to engine




- Check sealing ring (2) for damage. Replace the sealing ring if it is damaged.
- Push the thermostat into the crankcase and install the oil cooler line with screws (1).

 Tightening torques		
Oil cooler line, flow line, to crankcase, M6 x 16	8 Nm	

(-) Installing belt guard

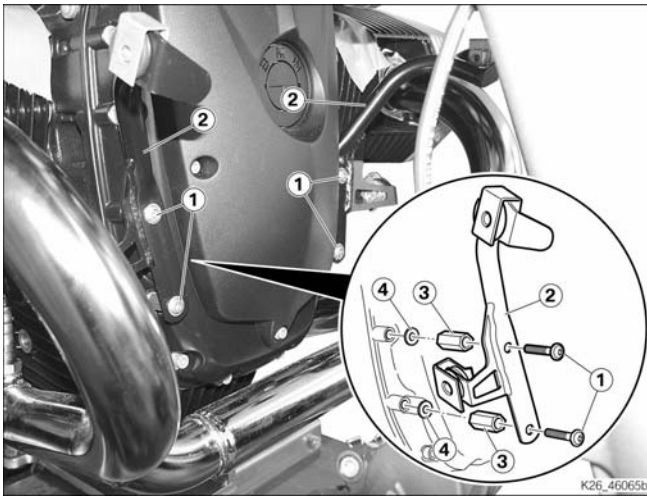


- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing fairing bracket on left and right

- Hold fairing bracket (2) with sleeves (3) and washers (4) in position.
- Install screws (1).



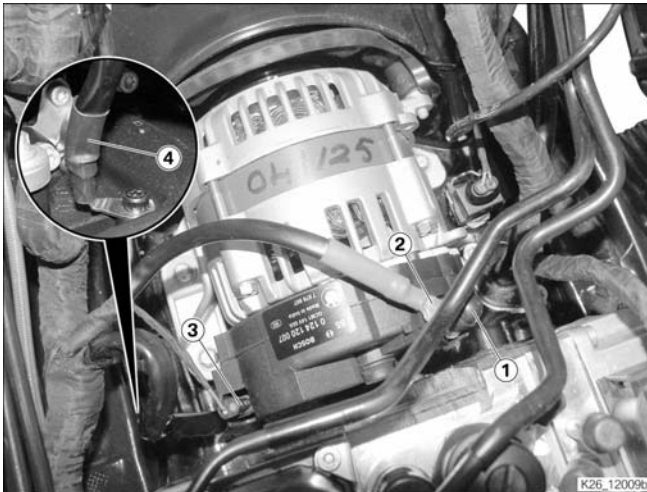
(-) Connecting plugs of engine sensors


- Connect oil temperature sensor (1).
- Connect TDC sensor (2) and secure the cable to the front frame section.



(-) Connecting cables of alternator

- Connect "alternator positive" cable (2).




 Tightening torques		
Flange nut, M6	6 Nm	

- Install cap (1).
- Connect plug (3).
- Connect the earth lead to engine block (4).

(-) Connecting plugs of engine sensors, right

- Secure earth lead (1) to the cylinder head.

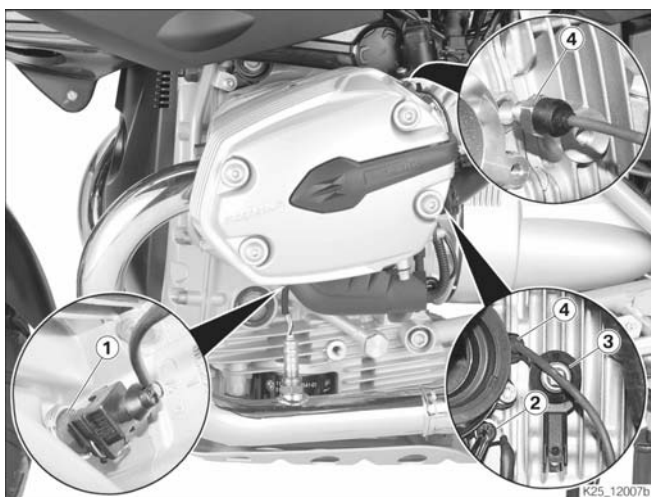
 Tightening torques		




left and right, M6 x 10	8 Nm	
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- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

(-) Connecting plugs of engine sensors and switches, left

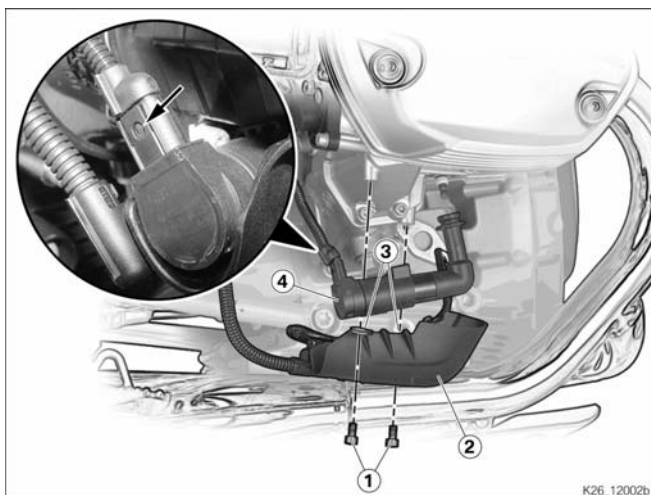


- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.


 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (3).
- Connect temperature sensor (4).


(-) Installing secondary spark plug coil



- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.

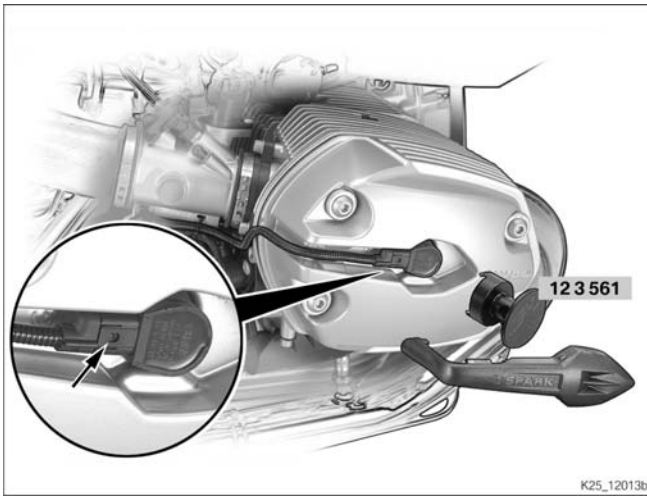
 Consumables/lubricants		
Talcum powder	Assembly aid	

- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	

(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to




install the direct ignition coil, making sure that the coil is correctly seated.

- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Installing gearbox

- Remove dirt and old lubricant from the splines of the clutch hub and the gearbox input shaft.
- Lubricate the splines of the clutch hub and the gearbox input shaft.

 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

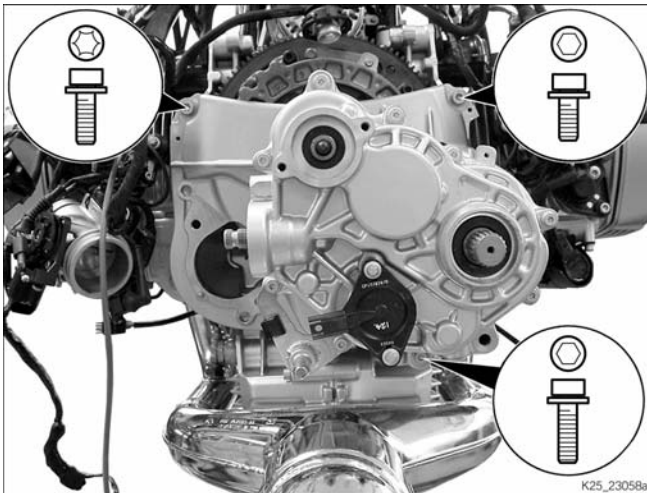
- Position the gearbox with the gearbox input shaft just introduced into the hub of the clutch plate.




Note

You will find it easier to introduce the splined end of the gearbox input shaft into the clutch hub if you engage a gear and turn the gearbox output shaft.

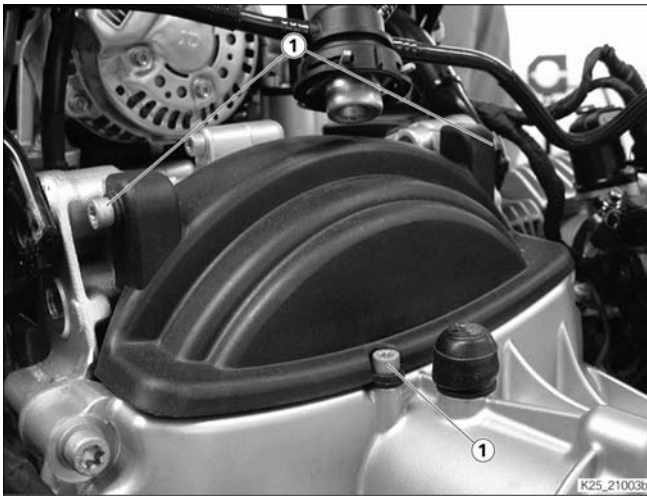
- Slide the gearbox over the reamed sleeve until it mates with the crankcase.
- Install 3 screws.




 Tightening torques		
Gearbox to engine block, M8 x 35	19 Nm	
Gearbox to engine block, M8 x 70	19 Nm	
Gearbox to engine block, M8 x 50	19 Nm	

(-) Installing cover for clutch

- Remove screws (1).
- Carefully fit clutch cover under the pressure modulator




- and align.
- Install screws (1).

 Tightening torques		
Clutch cover to engine, M6 x 16	8 Nm	


(-) Installing starter



- Install the starter.
- Install screws (3).

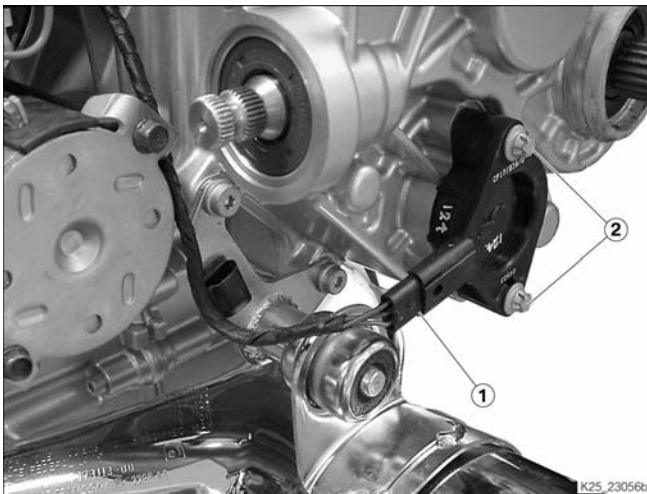
 Tightening torques		
Starter with gearing to engine, M8 x 60	19 Nm	

- Connect "starter positive" cable (1) (terminal 30).


 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).

(-) Installing gearbox potentiometer



- Install the gearbox potentiometer, noting the O-ring.
- Install screws (2).

 Tightening torques		
Gear potentiometer to gearbox	9 Nm	

- Connect plug (1) to the gearbox potentiometer.
- Clip the cable into the cable clips.

(-) Installing rear section of motorcycle

- Remove dirt and old lubricant from the splines of the gearbox output shaft.
- Lubricate the splines of the gearbox output shaft.



Consumables/lubricants

Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476
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- Carefully manoeuvre the rear section of the motorcycle into position at the front section, making sure that the wiring harness is correctly positioned.
- Mate the universal shaft with the gearbox output shaft and align the rear frame with the anchorages.



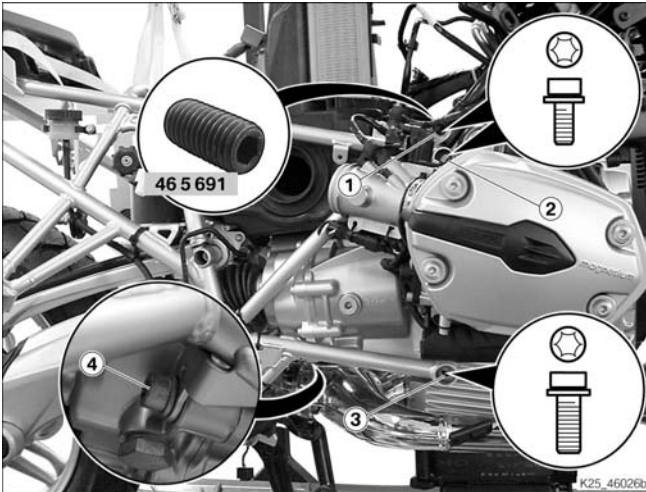
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Carefully turn the rear wheel to check that the universal shaft is still correctly positioned.
- Position the fuel pressure regulator on the intake air silencer.

► **Securing rear frame to motorcycle**

- Install screw (4), **but do not tighten it at this point.**
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert screws (1) on left and right.
- Tighten screw (4).
- Tighten screws (1), (2) and (3).

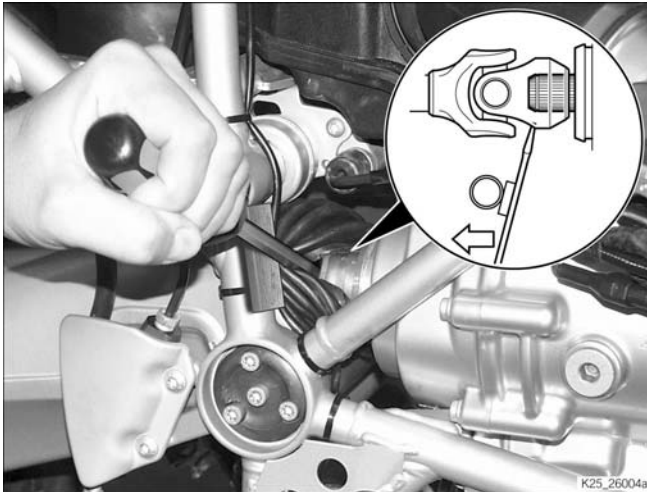


Tightening torques

Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	

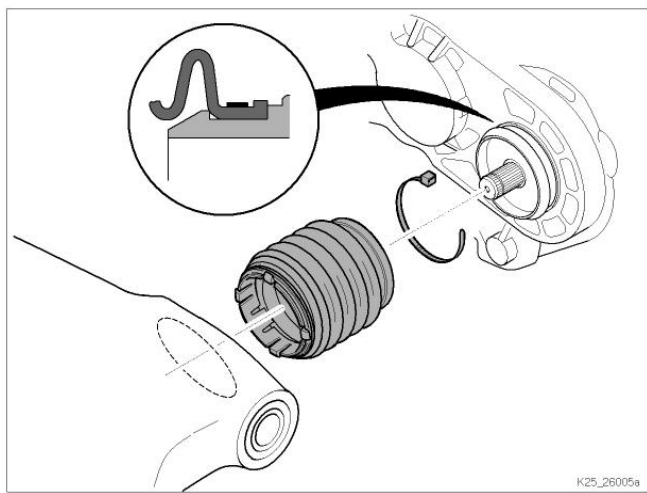


► **Pressing universal shaft onto gearbox output**




shaft

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.

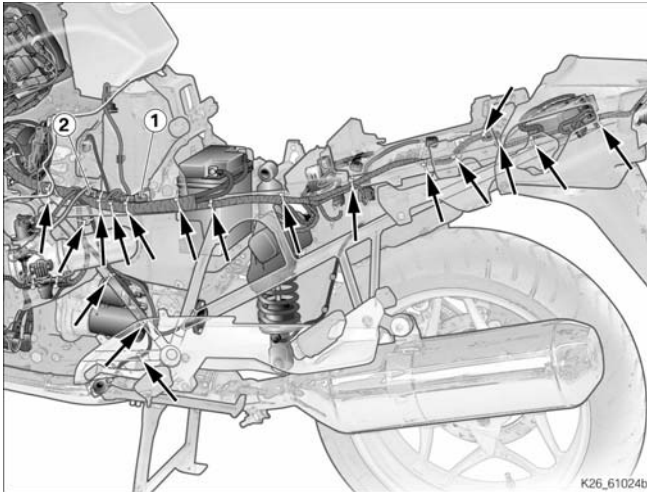
 Consumables/lubricants		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.

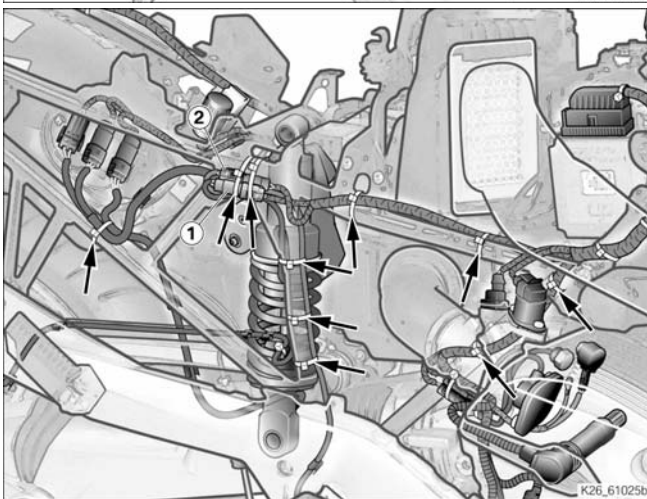
- ◀
- Release the straps securing the front wheel and disengage crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) with the straps from the rear section of the motorcycle.
- Release the control-circuit line complete with the brake master cylinder and pass it through to the rear.
- Route the fuel-tank breather hose into position along the rear frame.
- Connect the hose of the crankcase breather to the intake air silencer.
- Slide hose clamp (1) into position.



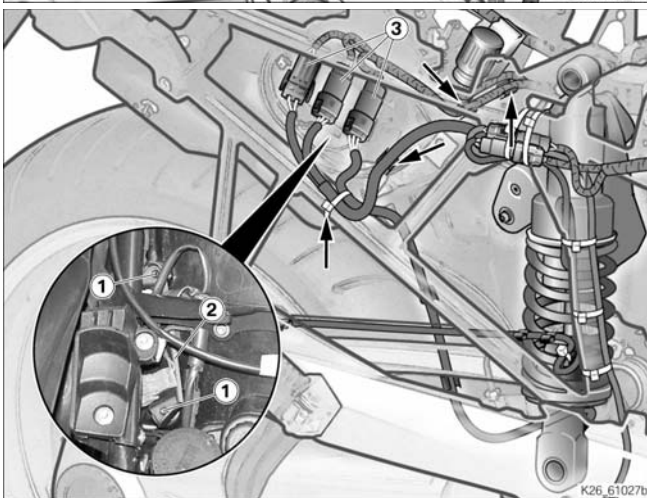
(-) Securing wiring harness at rear



- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.



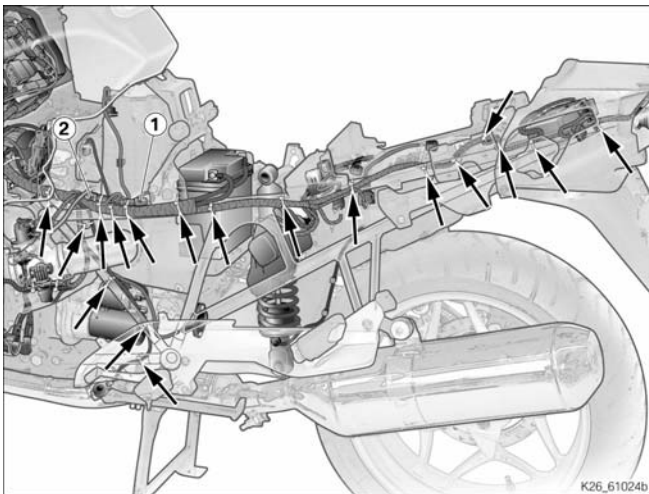
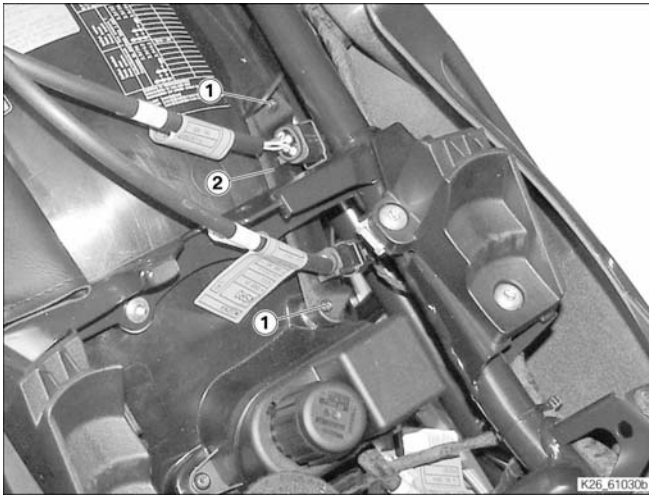
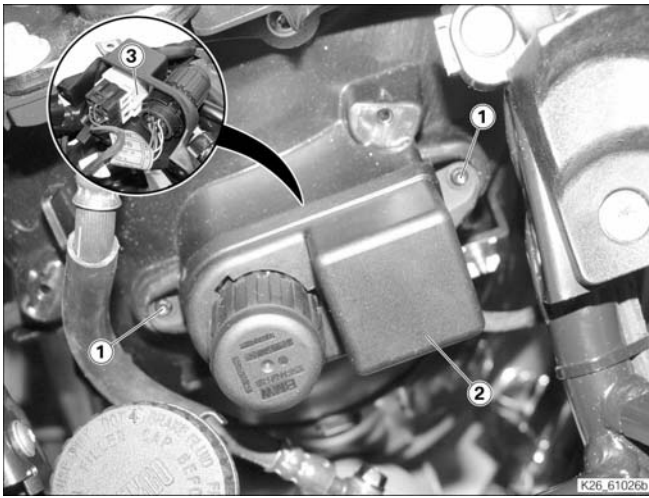
- Connect plug (1) of the speed sensor.



Variant, ESA

- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Secure holder (2) with screws (1).

- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).



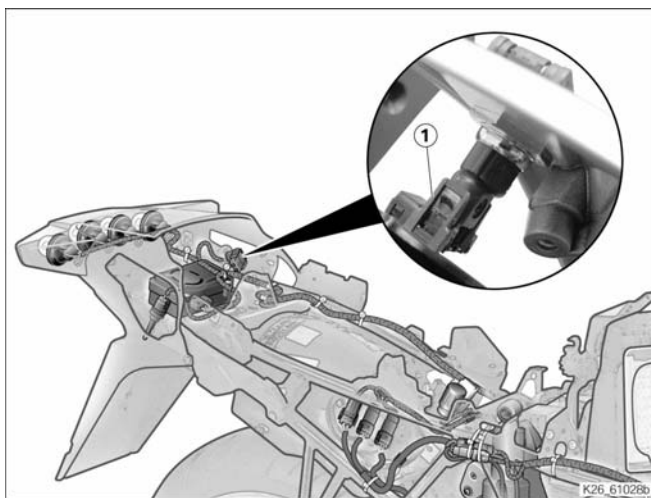
Variant, Seat heating

- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

- Secure the wiring harness to the rear frame with cable ties (arrows).

Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



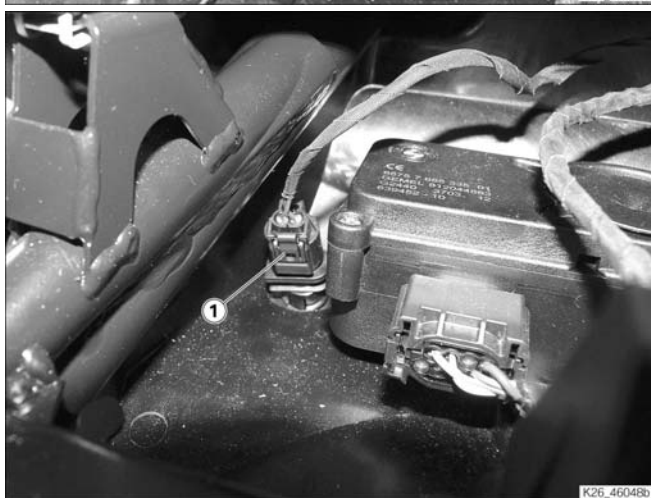
Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



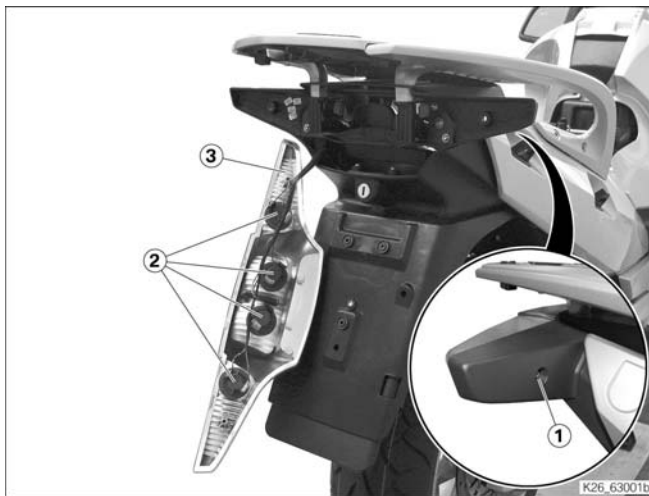
Variant, On-board computer

- Connect plug (1) of the temperature sensor.

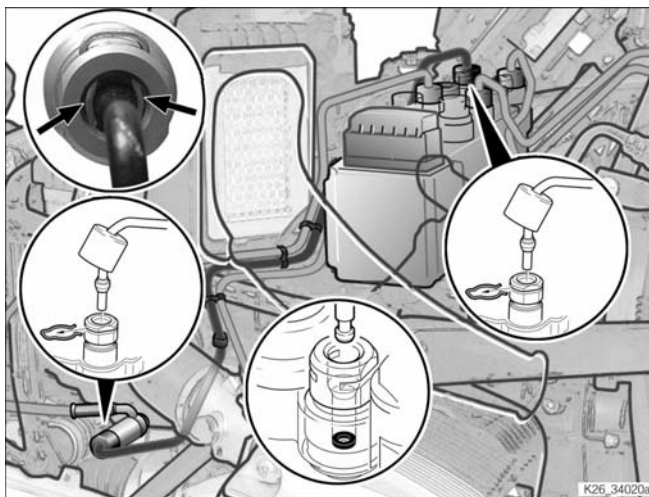


(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



(-) Connecting brake pipe for rear wheel circuit to pressure modulator



Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.



Warning

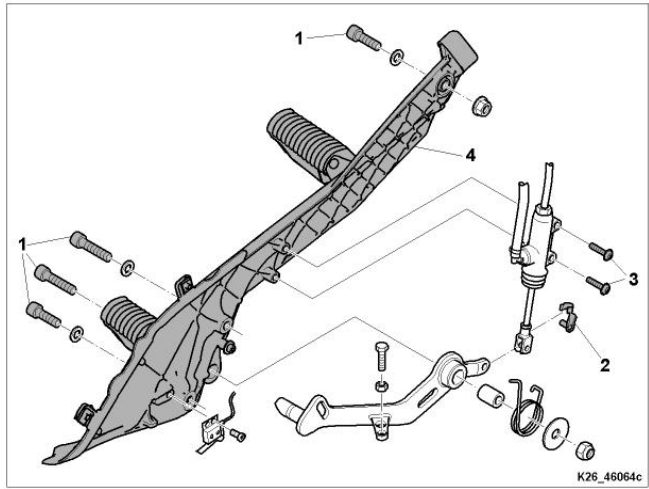
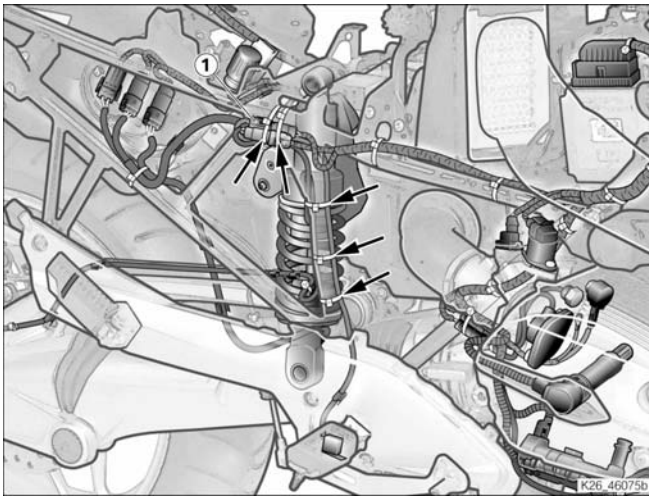
Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.


- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Installing right footrest plate


- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

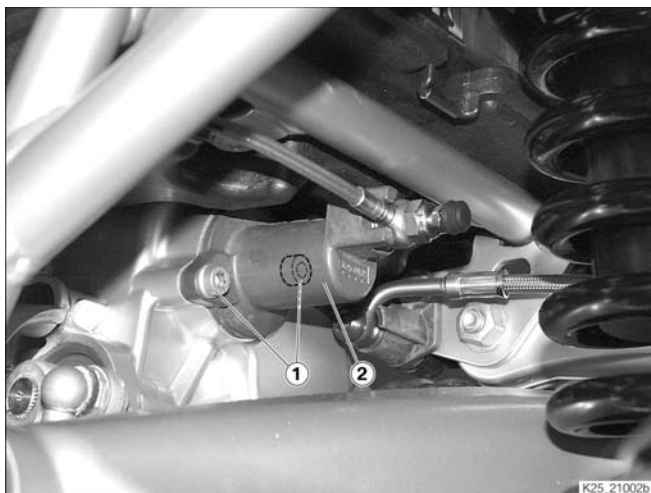
- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.

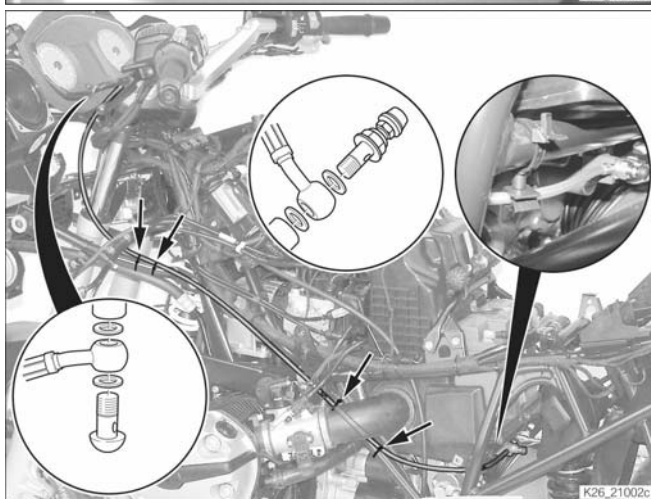


(-) Installing clutch slave cylinder



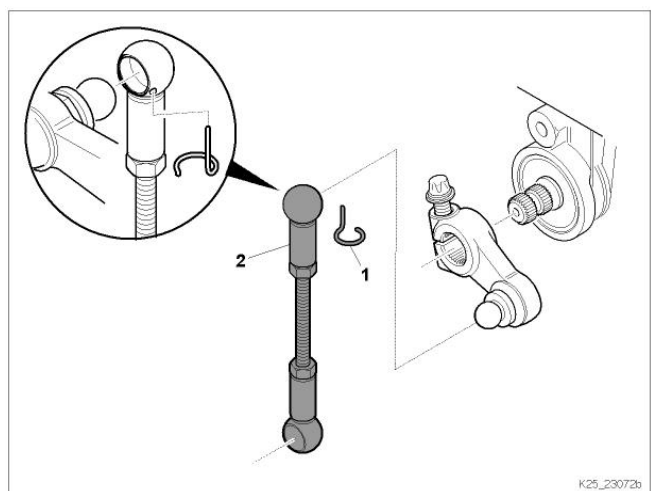
- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.

 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	




- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.

(-) Securing selector rod to shift lever



- Grease the ball head of the shift lever and the ball socket of selector rod (2).

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

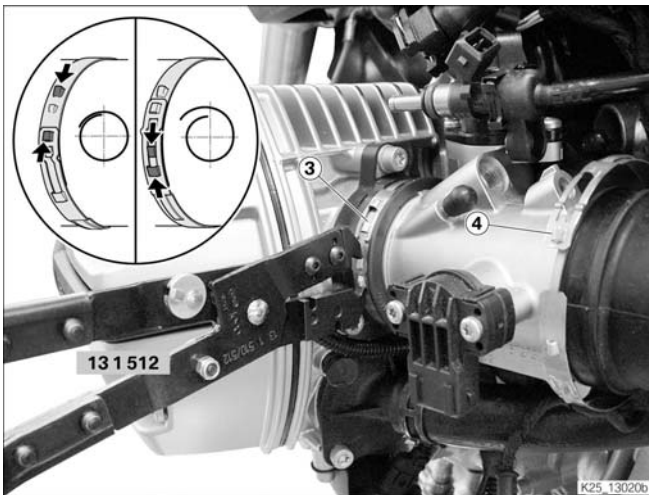
(-) Releasing throttle valve stub with cable divider

- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.

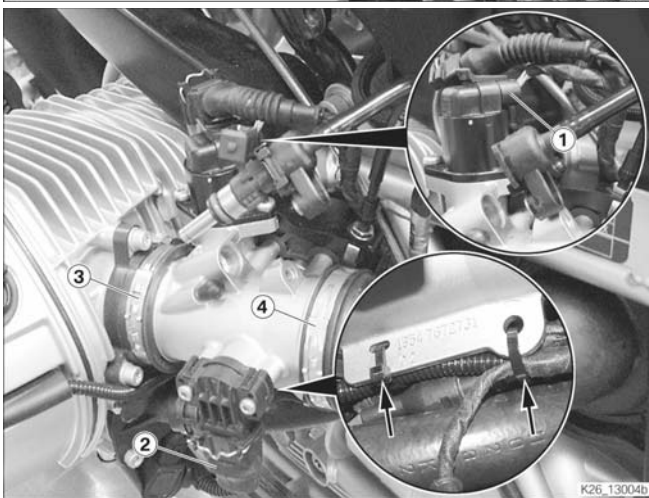


(-) Installing throttle-valve stub

- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .

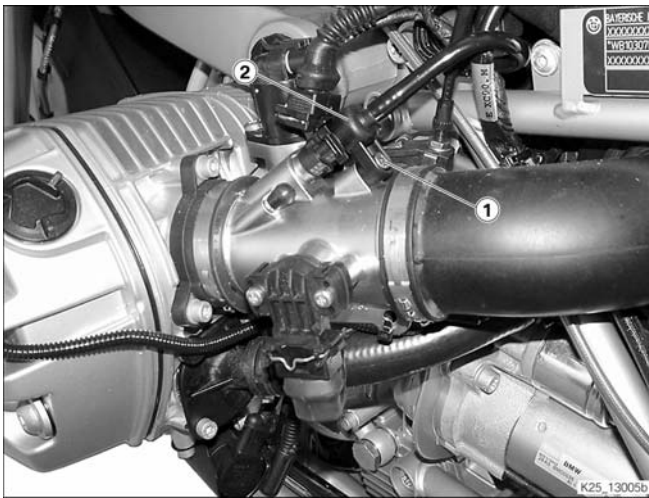


- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.




(-) Installing right and left injection valves

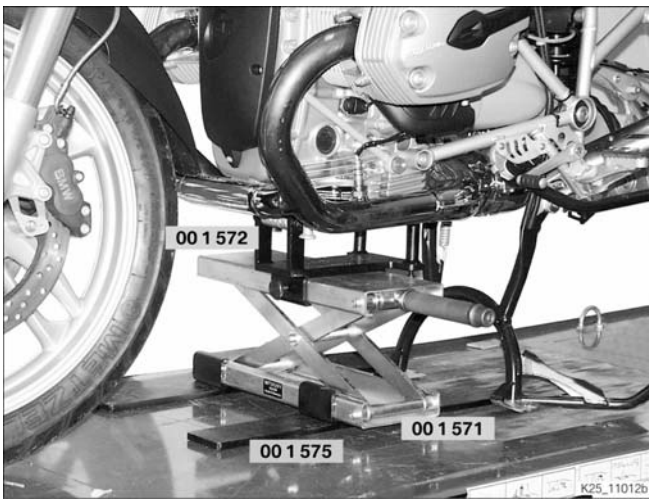
- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure



with screws (2).

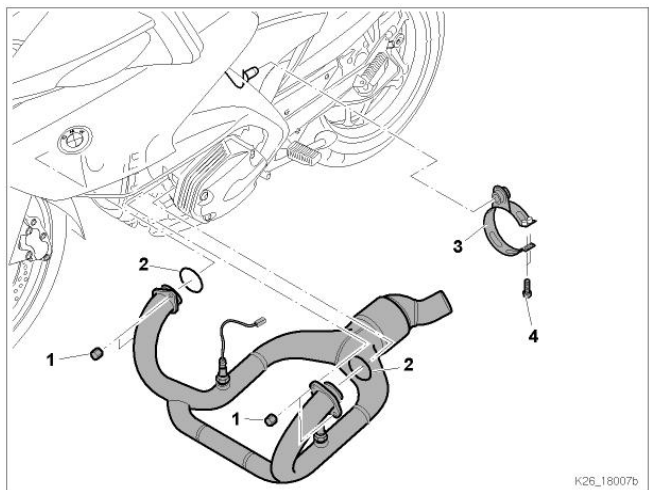
 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.




(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .




(-) Installing exhaust elbow

- Replace seals (2), apply thin layer of grease and fit in cylinder head.


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).



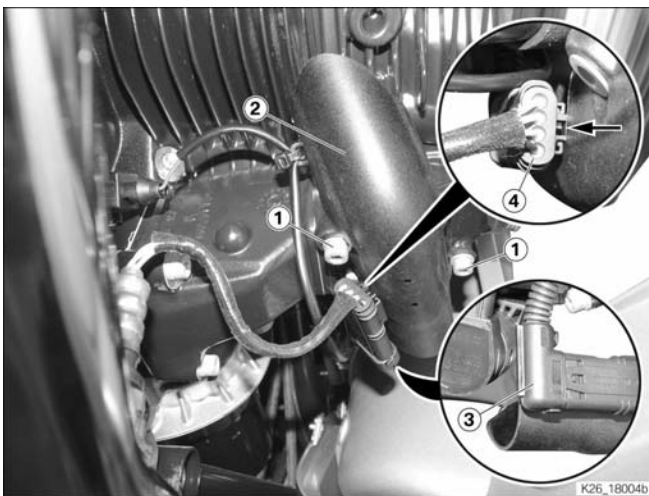
 Tightening torques		
Manifold to cylinder head, Acorn nut M8	21 Nm	


- Align the clamp (arrow) on the manifold and tighten screws (1).

 Tightening torques		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	

► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).



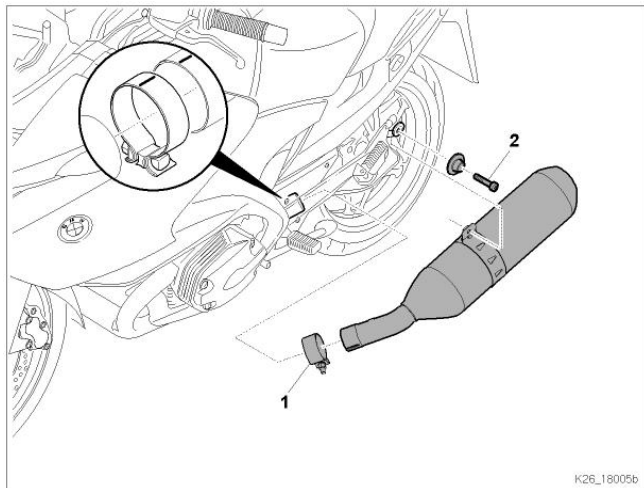
 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	


- Install front screw (1) in both bottom sections of the fairing.




◀ (-) Installing silencer

- Grease the inner face of Torca clamp (1).




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

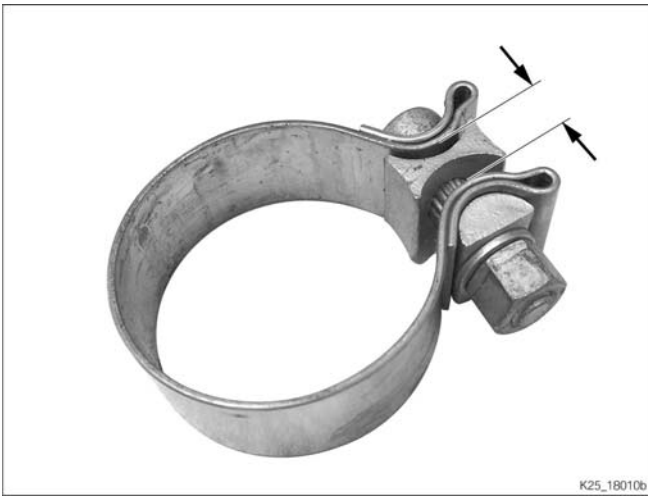
 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


▶ Checking Torca clamp on silencer



- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




▶ Checking distance between silencer and rear wheel



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ Adjusting silencer

- Undo Torca clamp.
- Remove screws (1).

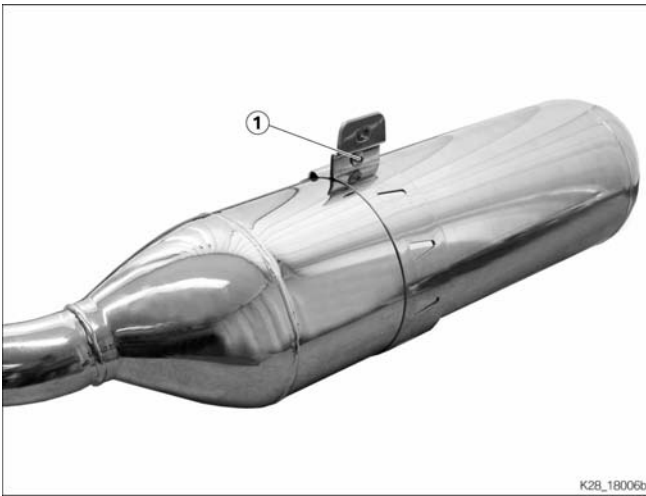


Attention


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.


Open the clamp far enough and grease it lightly.




- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

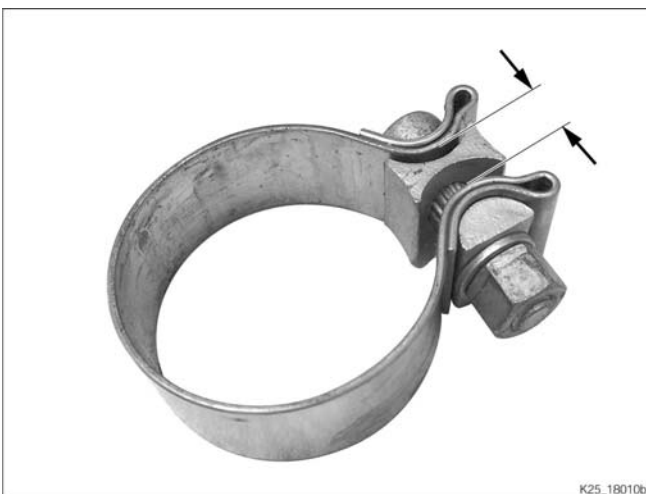



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.



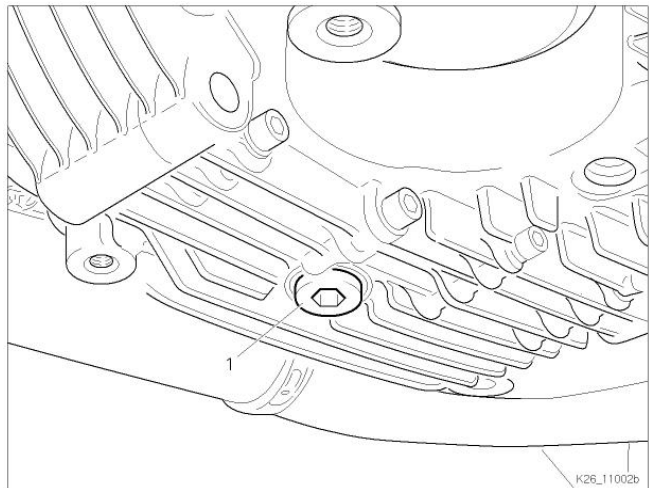
Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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(-) Pouring engine oil into engine

- Replace the sealing ring of oil drain plug (1).
- Screw in oil drain plug.



Tightening torques

Oil drain plug, M16 x 1.5	Initial torque, 23 Nm	
	Final torque, 32 Nm	



- Open oil filler plug using spanner from toolkit.
- Pour engine oil into the engine until the level reaches the MAX mark.



Technical data

Oil capacity, engine	with filter change	max. 4 l	
	Difference between Min. / Max. marks	0.5 l	

Consumables/lubricants

Engine oil, 20W-50

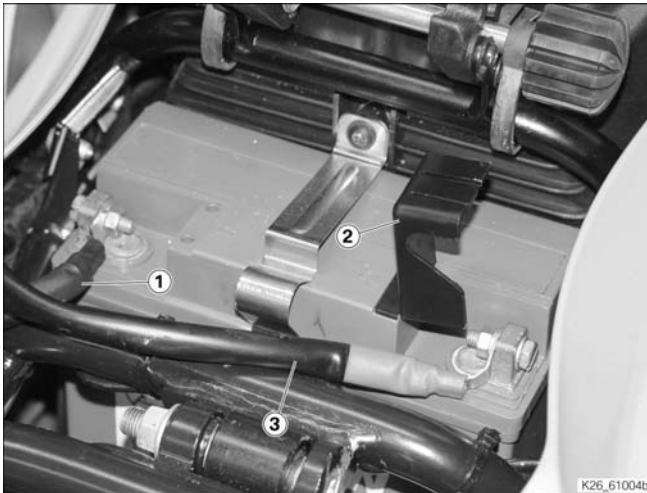


Consumables/lubricants

--	--	--

Engine oil, 20W-50

Engine oil

81 22 9
407 685

(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would

escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

 **Attention**

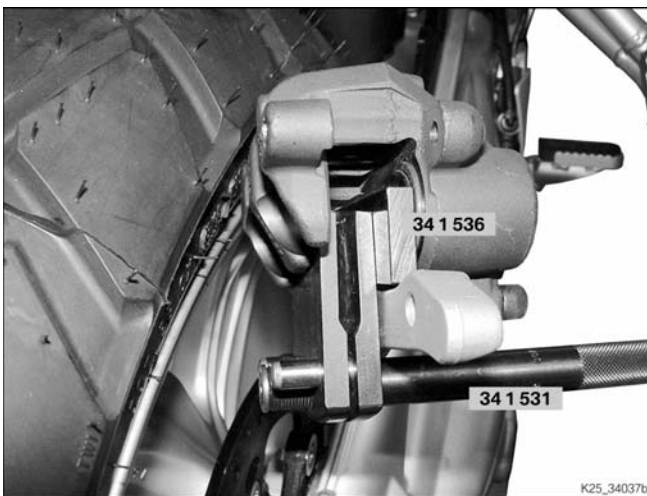
Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

 **Attention**


Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

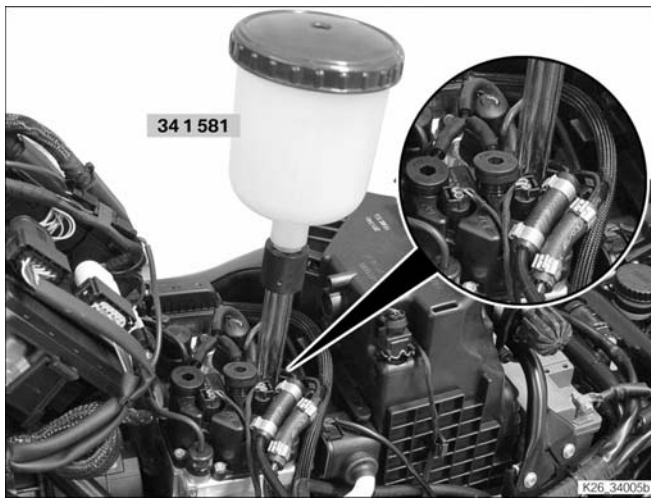
Avoidance: Do not disconnect the plugs from the pressure modulator.



- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.

- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0



	139 897
--	---------

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 <p>Consumables/lubricants</p>		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.

- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.




Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

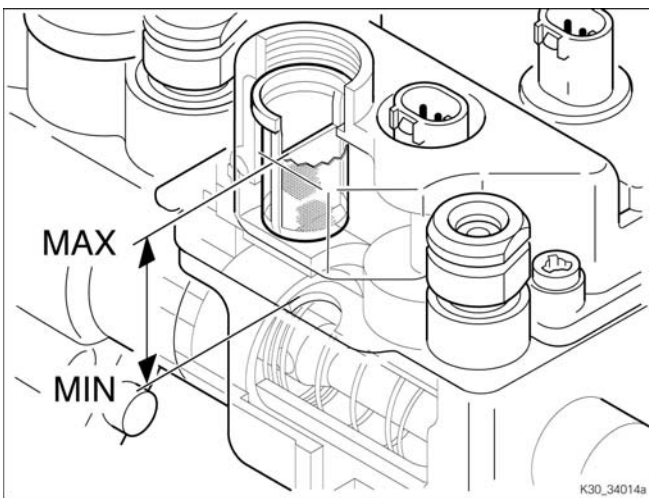
- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the

container just disappears from view.

- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



 **Warning**

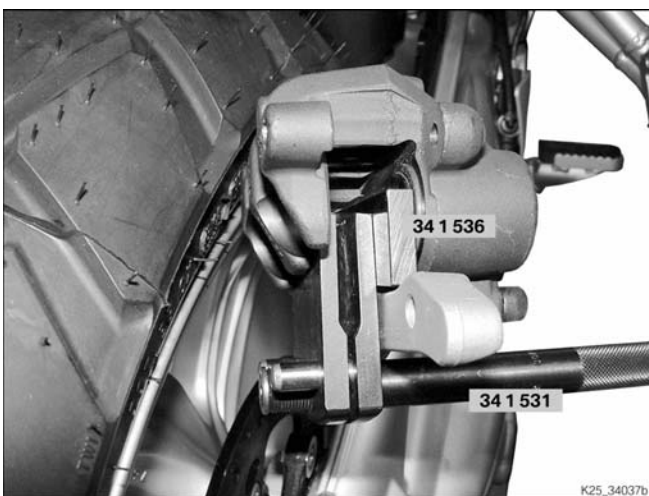
Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.

► **Instructions for filling rear wheel circuit reservoir**

- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536) , in the rear brake caliper.

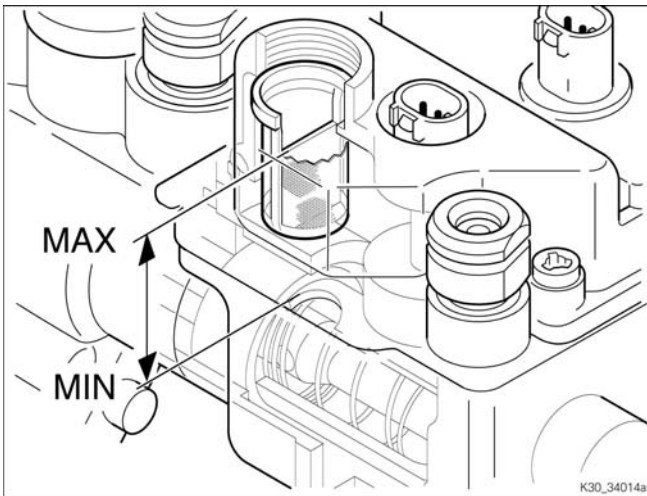


 **Warning**


Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.

- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching



the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Hand-tighten the cap of the rear wheel-circuit reservoir.

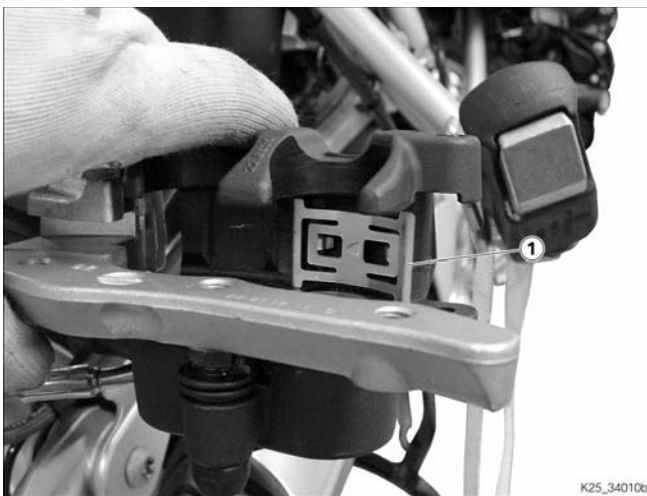
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .

- Replace the rear brake pads after removal, if necessary

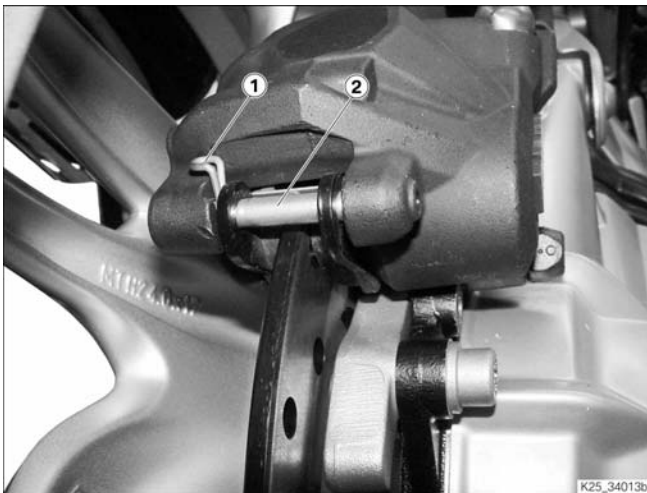
▷ **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.

» Arrow points in direction of travel.

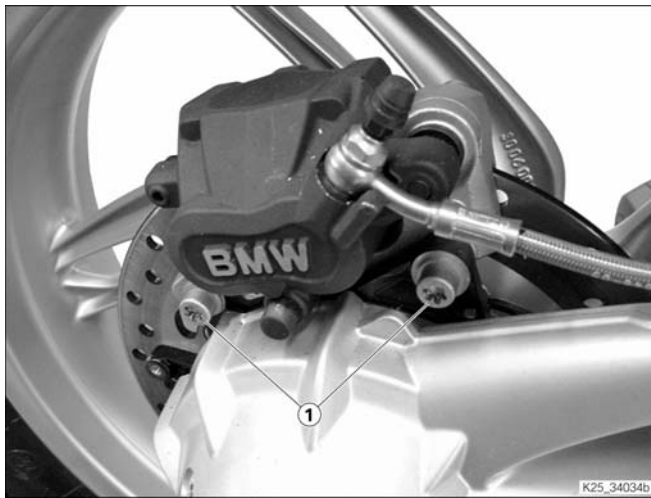


- Install the brake pads.
- Manually install retaining pin (2).



▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).



Tightening torques

Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	
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Warning

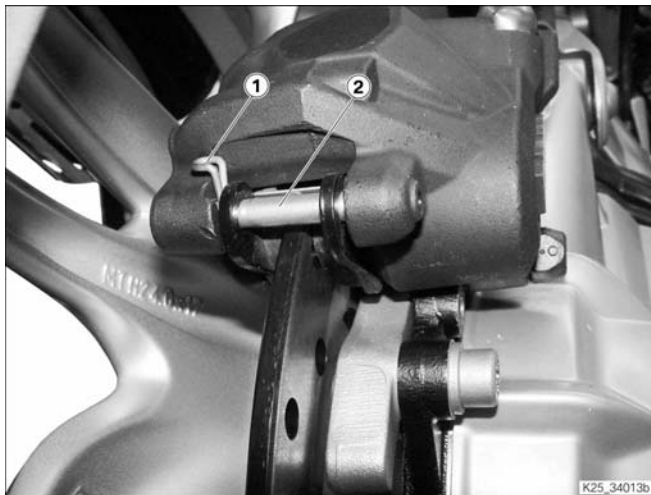
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure

to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.

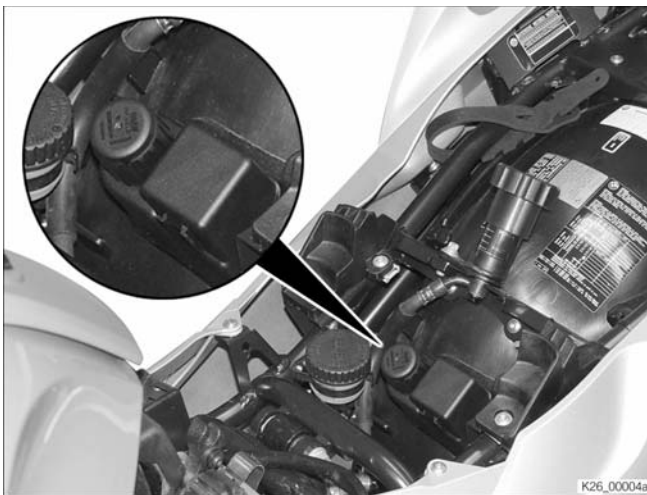


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



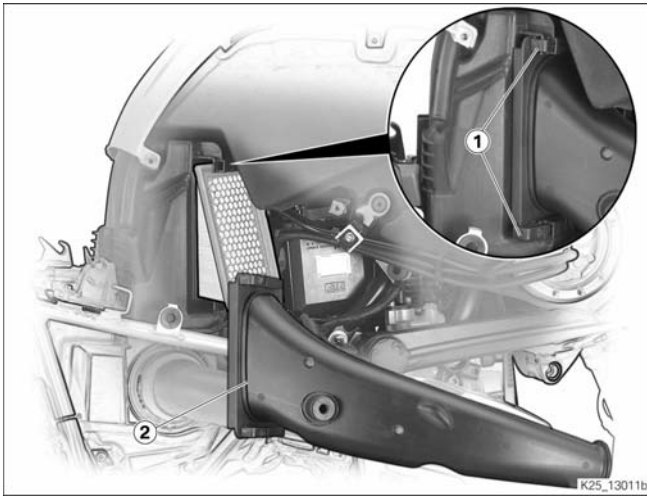
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

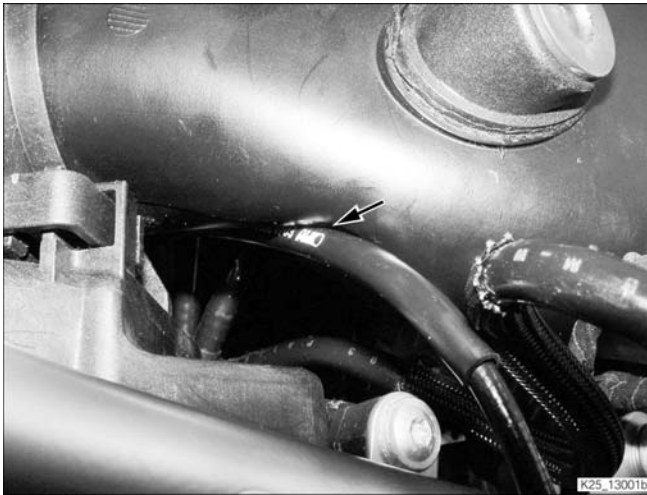
Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

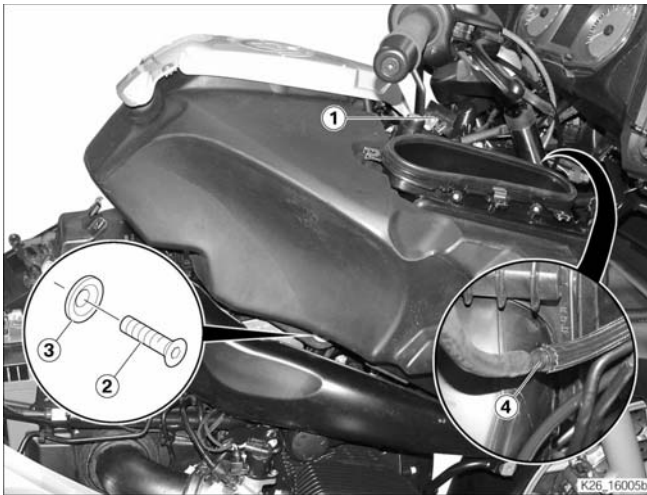
(-) Installing intake air pipe



- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.




- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

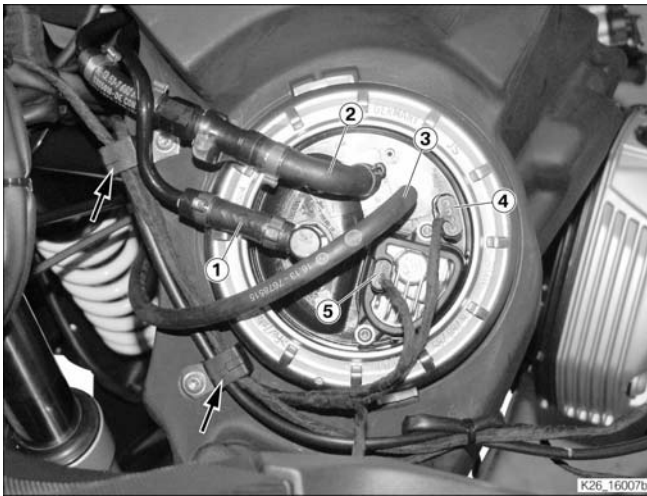


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).



- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

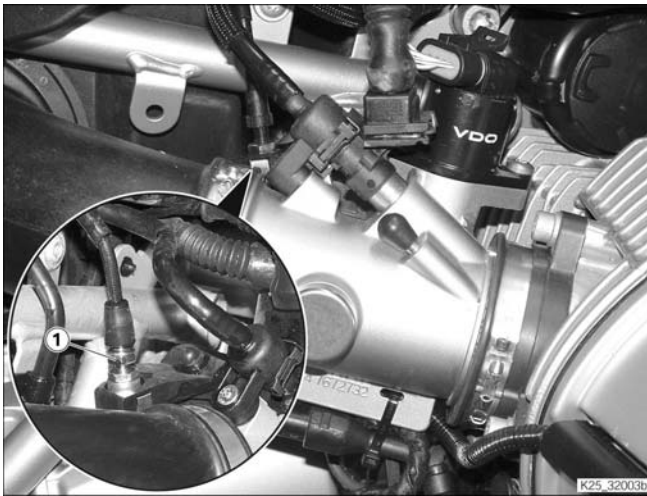
Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.


In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.



- >> Both throttle valves reach the idle stops.
- >> Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

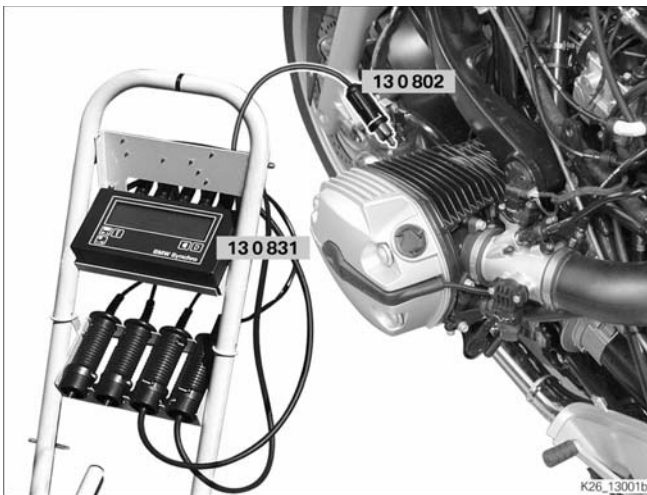
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

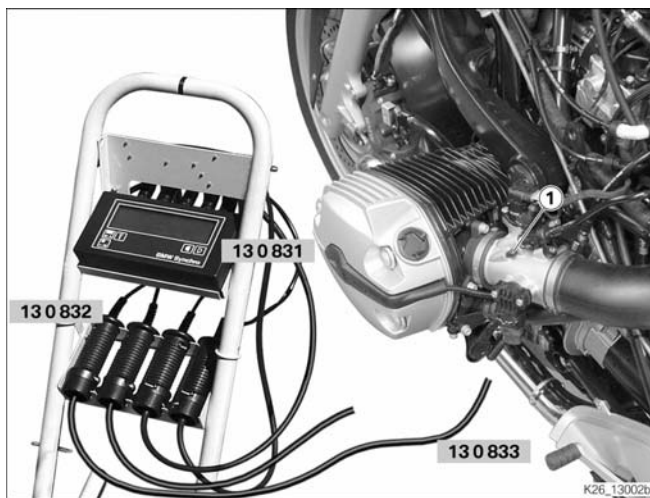


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- >> The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



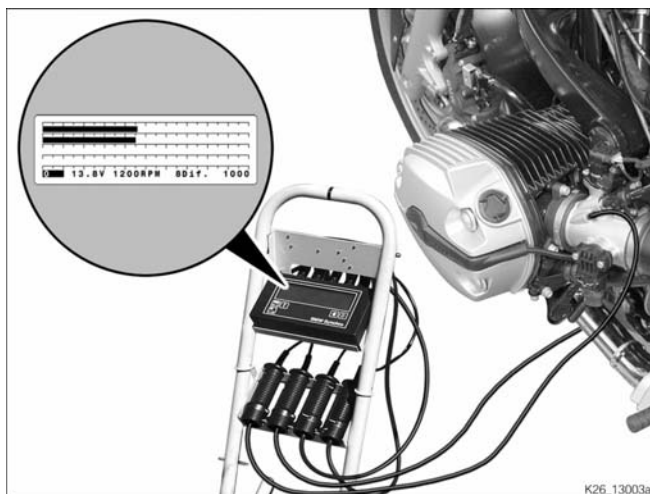
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
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Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

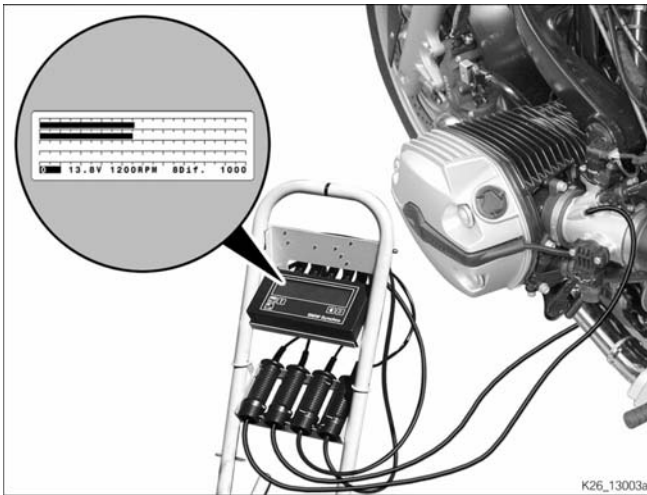
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmetered air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

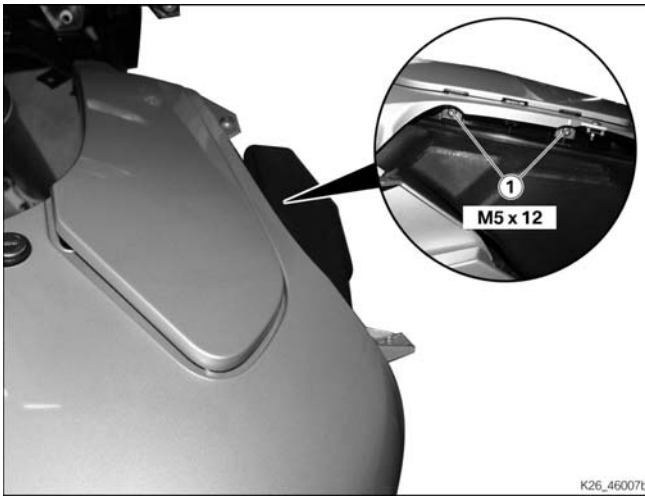
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



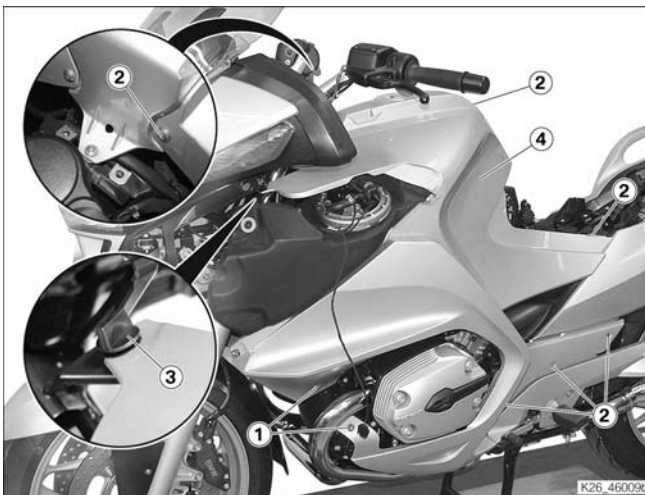
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

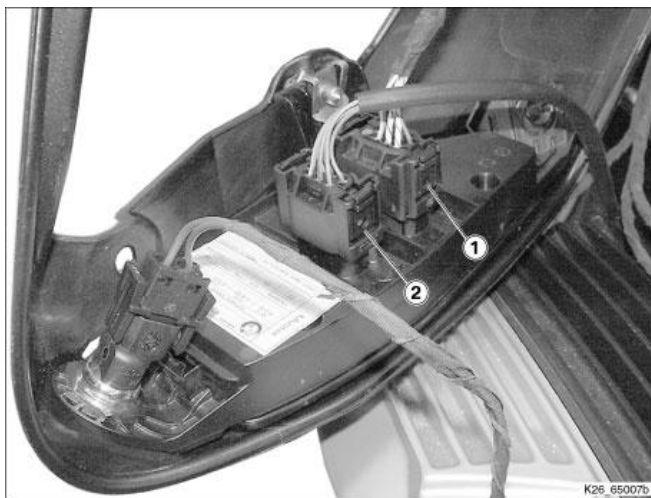
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



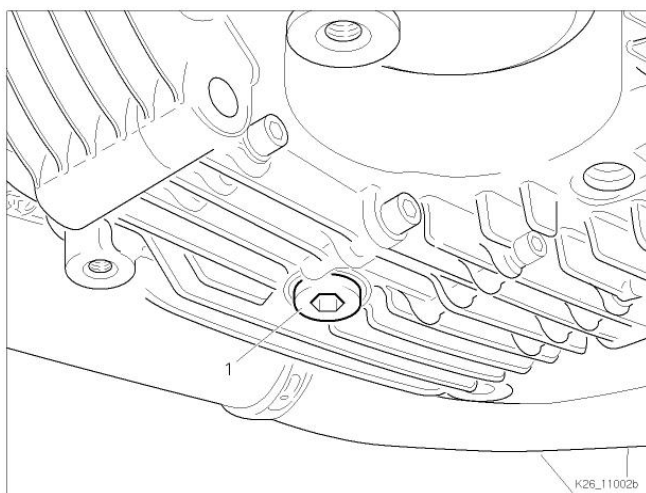
 **11 00 209 Engine-oil change, with filter**

(-) Engine-oil change, with filter



Note

Change oil, warmed to normal operating temperature.



► Draining engine oil

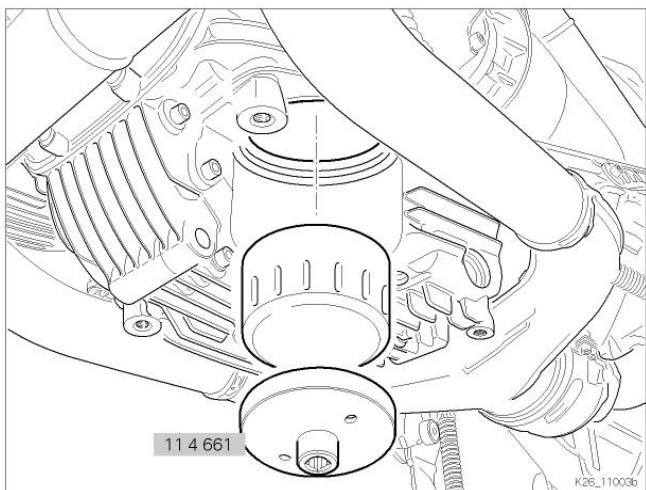


Warning

Nature: Parts of the exhaust system can be hot.


Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the engine.
- Remove oil drain plug (1) and drain the oil.
- Dispose of used oil in an environmentally friendly manner.
- Remove the old sealing ring from the drain plug.




► Changing oil filter

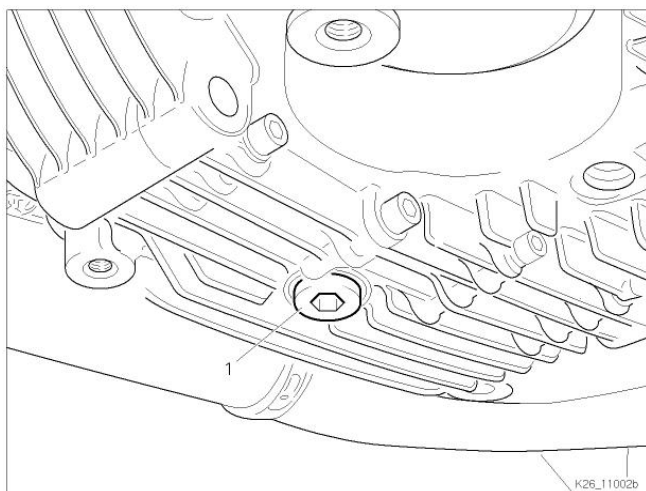
- Use wrench (No. 11 4 661) to remove the oil filter.
- Dispose of the oil filter in an environmentally friendly manner.
- Coat the sealing ring for the new oil filter with engine oil.
- Use wrench (No. 11 4 661) to install the oil filter.

 Tightening torques		
Oil filter, Sealing ring wetted with engine oil	11 Nm	

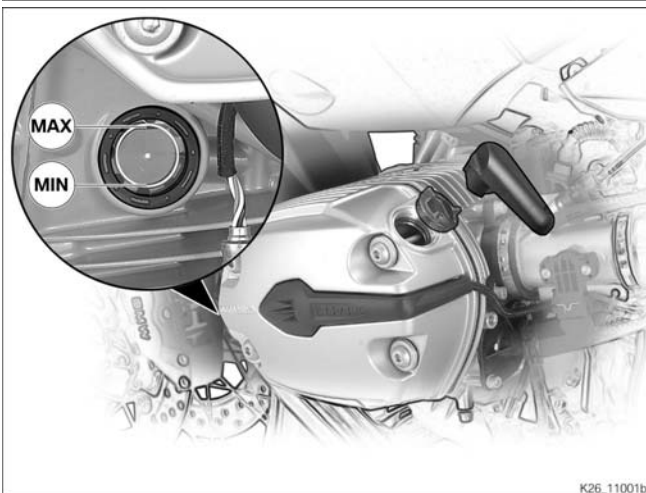
► Pouring engine oil into engine

- Replace the sealing ring of oil drain plug (1).
- Screw in oil drain plug.

 Tightening torques		
Oil drain plug, M16 x 1.5	Initial torque, 23 Nm	
	Final torque,	




K26_11002b




K26_11001b

	32 Nm	
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- Open oil filler plug using spanner from toolkit.
- Pour engine oil into the engine until the level reaches the MAX mark.


 Technical data		
Oil capacity, engine	with filter change Difference between Min. / Max. marks	max. 4 l 0.5 l
Consumables/lubricants		
Engine oil, 20W-50		

 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685



▶ **Correcting engine oil level**

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data		
Oil level, engine		Maximum = top ring mark on sight glass
Consumables/lubricants		
Engine oil, 20W-50		



		Minimum = bottom ring mark on sight glass	
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 **11 00 550 Replacing engine (engine removed)**

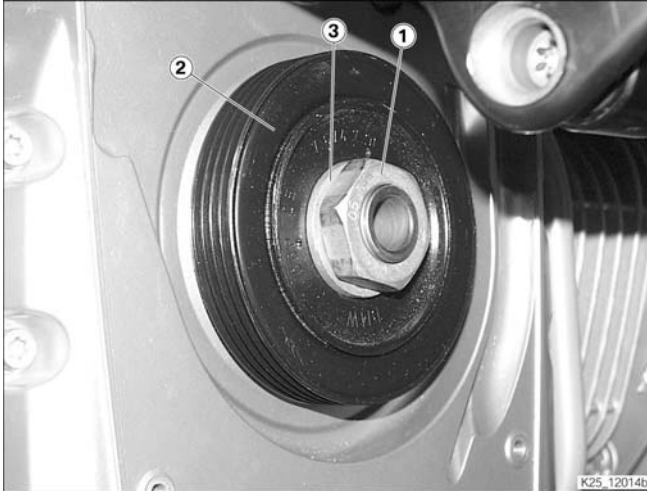
(-) Removing crankshaft belt pulley

Precondition

- Engine locked.

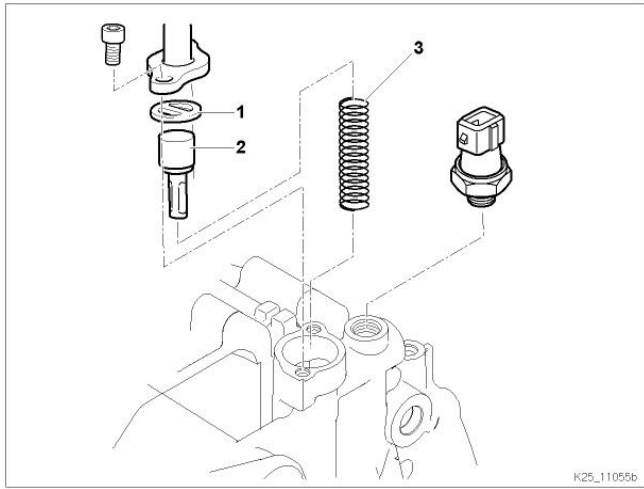


- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.



(-) Removing oil thermostat

- Remove supporting plate (1), control element (2), and spring (3).



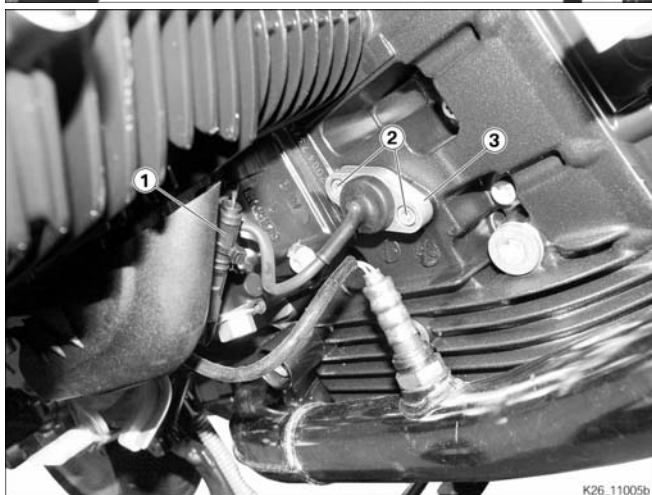
(-) Removing oil-level sensor

- Remove screw (1).



K26_46062b

- Disconnect plug (1).
- Remove screws (2).
- Remove oil-level sensor (3).



K26_11005b

(-) Removing both air intake stubs


- Remove screws (1).
- Remove both air intake stubs.



K25_13022b

(-) Installing both air intake stubs

- Place the air intake stubs in position.
- Install screws (1).

 Tightening torques		
Air intake to cylinder head	8 Nm	



left/right, M6 x20

(-) Installing oil-level sensor

- Install oil-level sensor (3).
- Install screws (2).
- Connect plug (1).

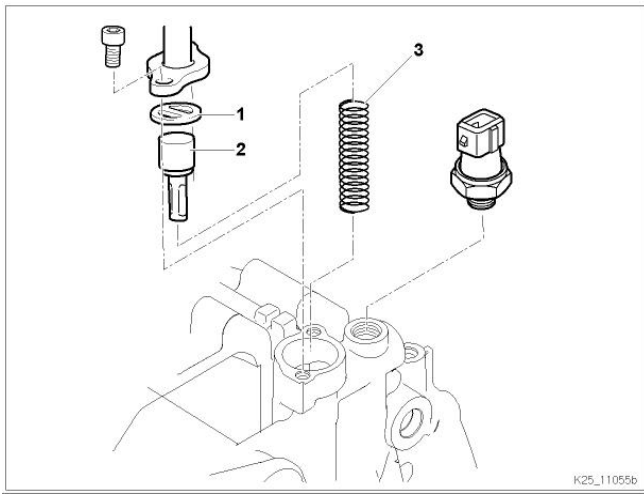


- Install screw (1).



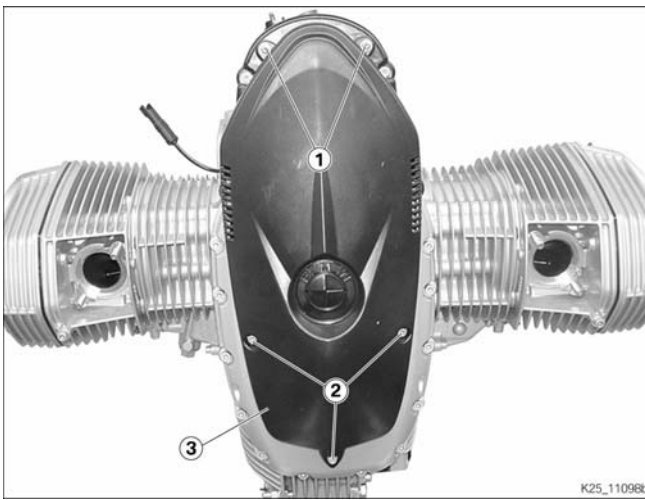
(-) Installing oil thermostat

- Install spring (3), control element (2), and supporting plate (1).



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



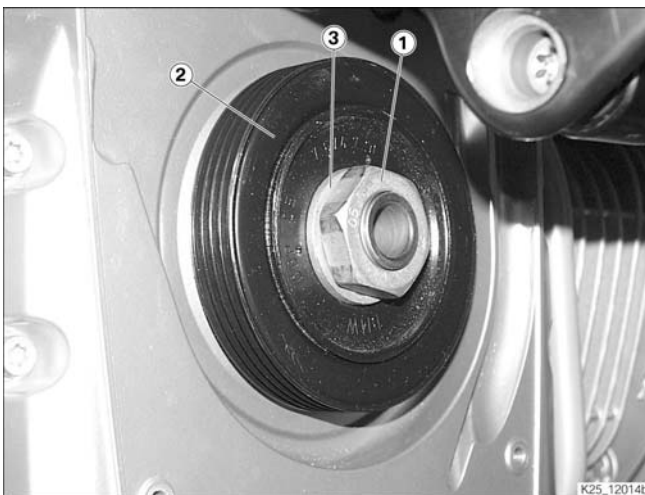
(-) Installing crankshaft belt pulley

Precondition

- Engine locked.

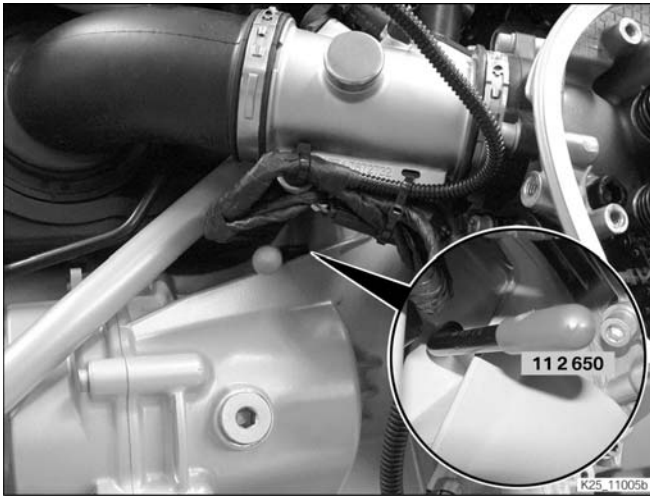


- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.



Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	

- Remove TDC locating pin (No. 11 2 650) .



 **11 11 023 Replacing rotary shaft seal, crankshaft, output side**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



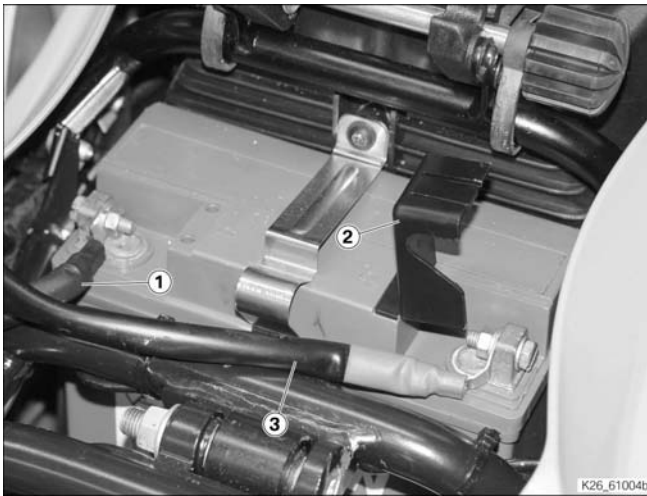
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel

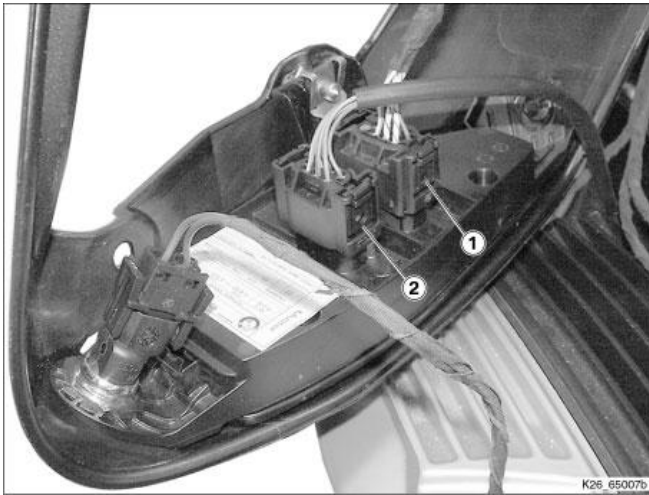


- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

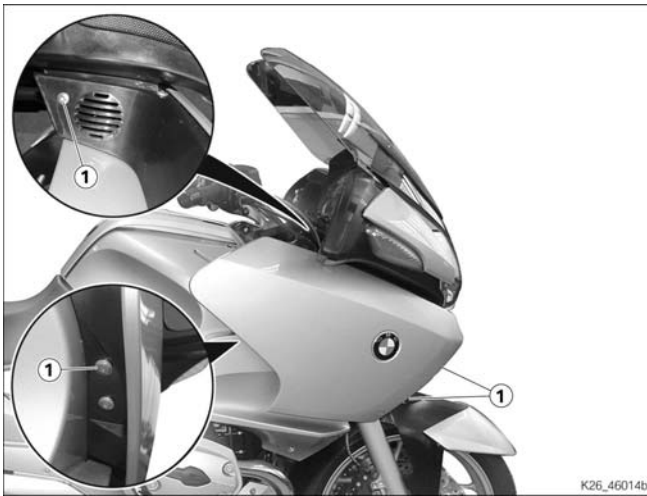
- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

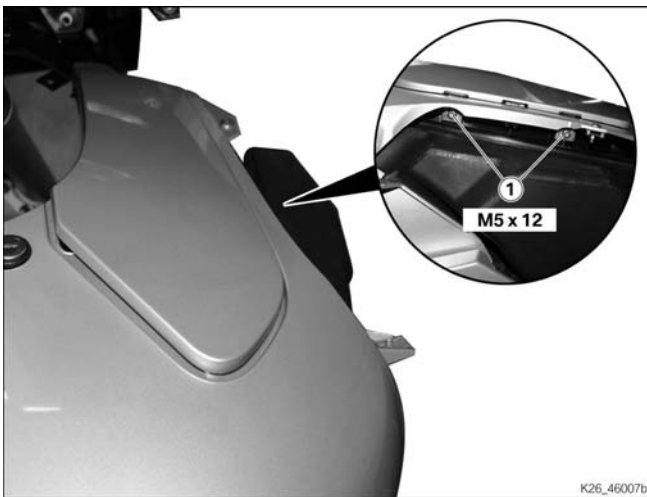
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



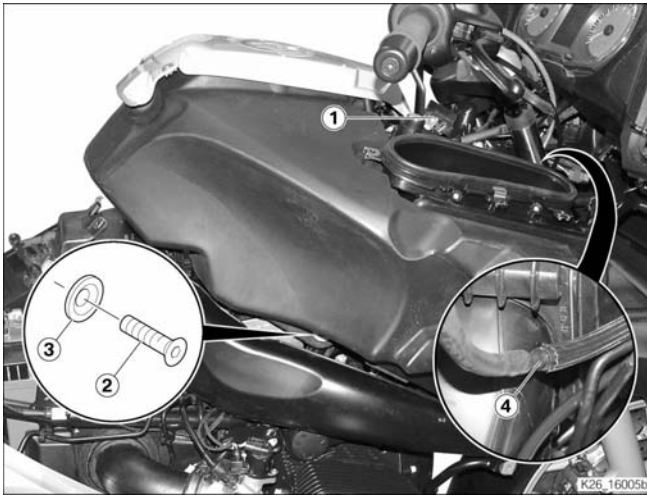
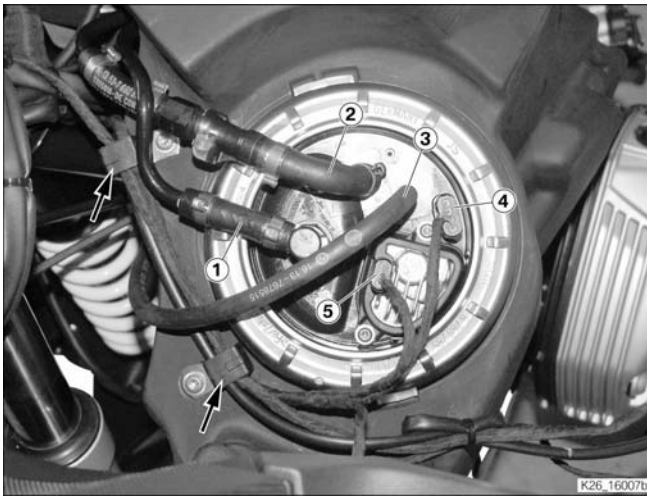
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

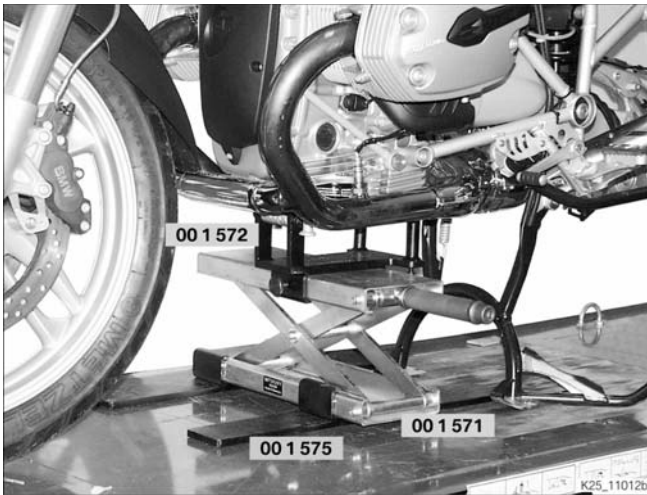


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

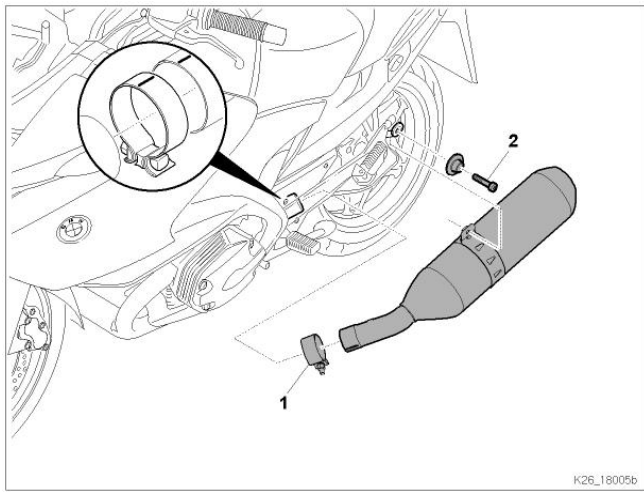


(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

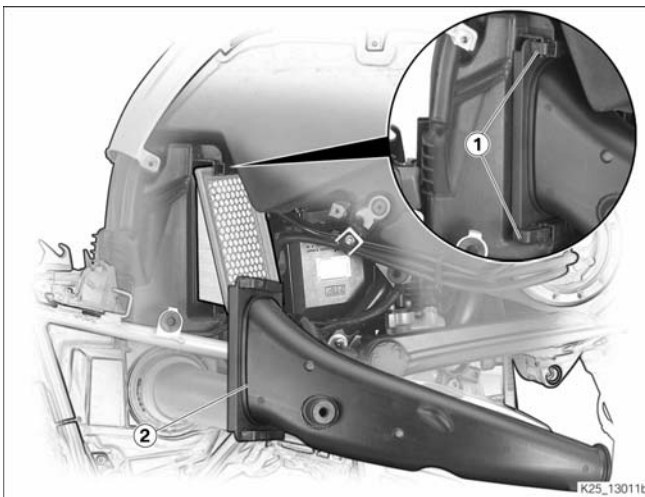
(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



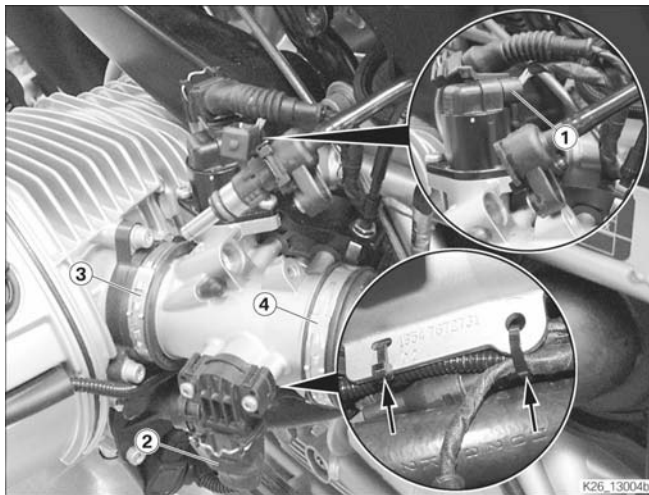
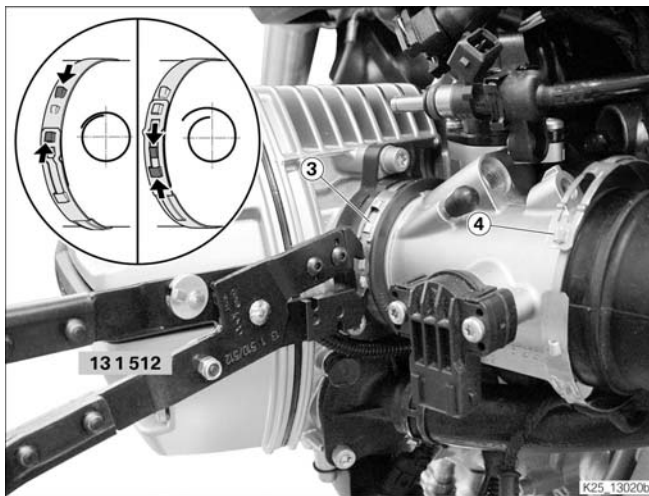
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.



(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

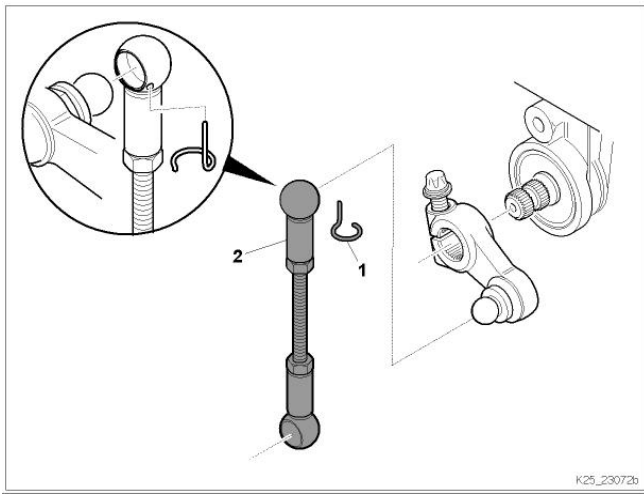
(-) Securing throttle valve stub with cable divider

- Tie up throttle valve stub and cable divider with cable tie (arrow).



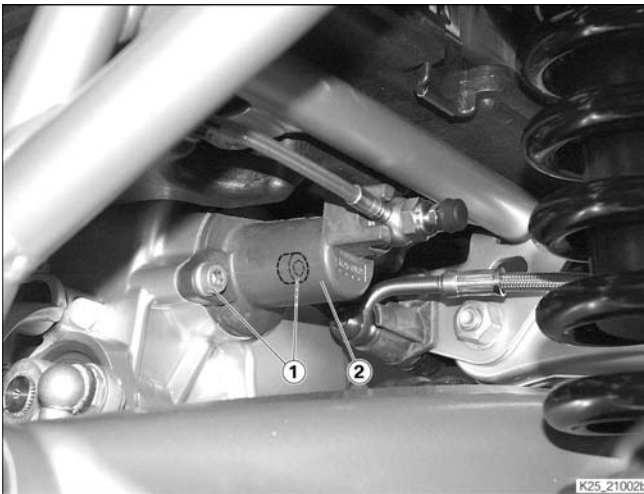
(-) Disengaging selector rod from shift lever

- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.



(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.

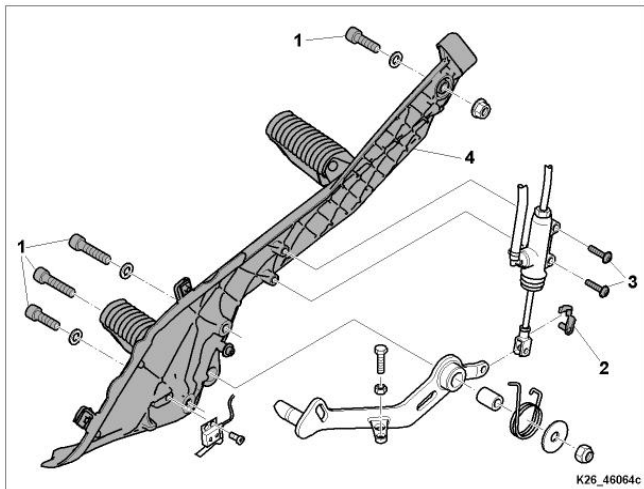


(-) Removing right footrest plate

- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.



Technical data

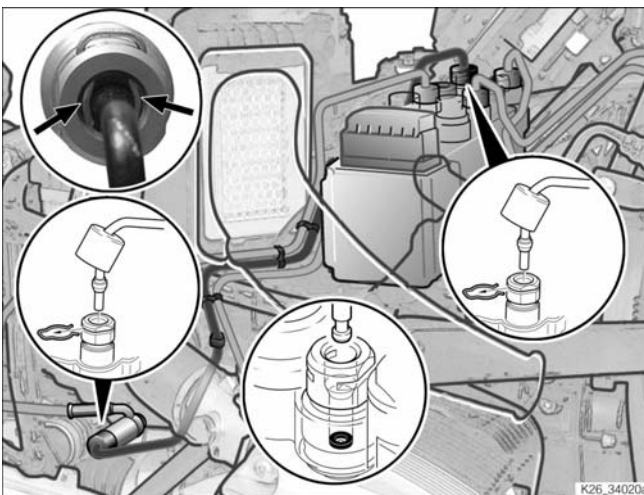
Release temperature, screws for rear brake master cylinder		100 °C	
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- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.



- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.

(-) Disconnecting brake pipe for rear wheel circuit from pressure modulator



- Push the protective cap up.
- Remove the spring clip.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap the area around the connector in a cloth.
- Open the retaining clips, lift the brake pipe out of the pressure modulator and catch escaping brake fluid with a cloth.
- Seal the open end of the brake pipe to prevent brake fluid from dripping.

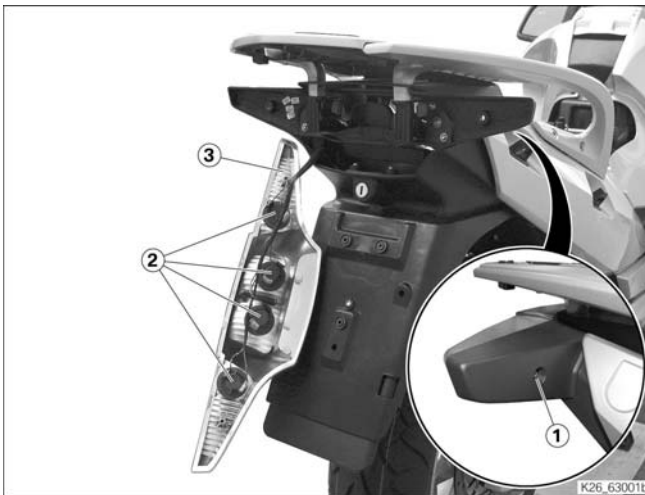


Note

Use the protective cap from a bleed screw to seal the brake pipes.

(-) Removing rear-light unit

- Remove screws (1).
- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).



(-) Disengaging wiring harness at rear

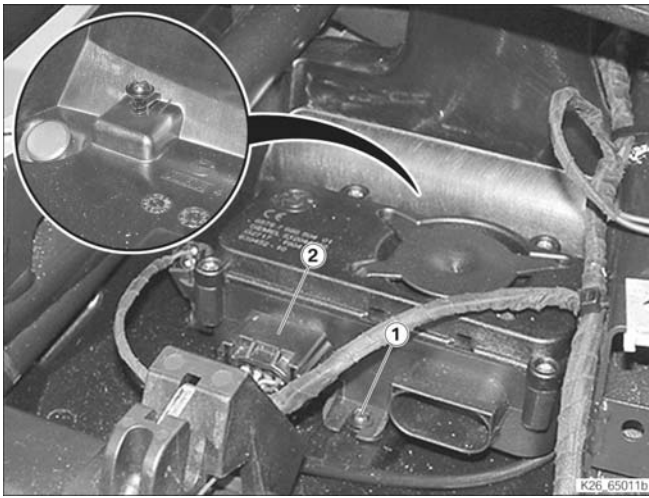
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



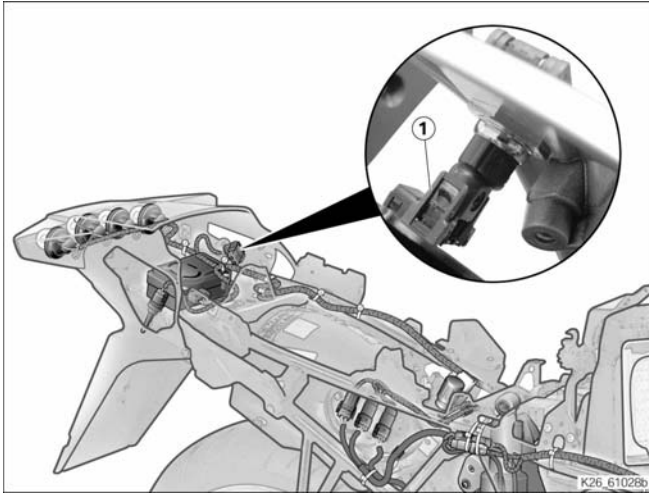
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

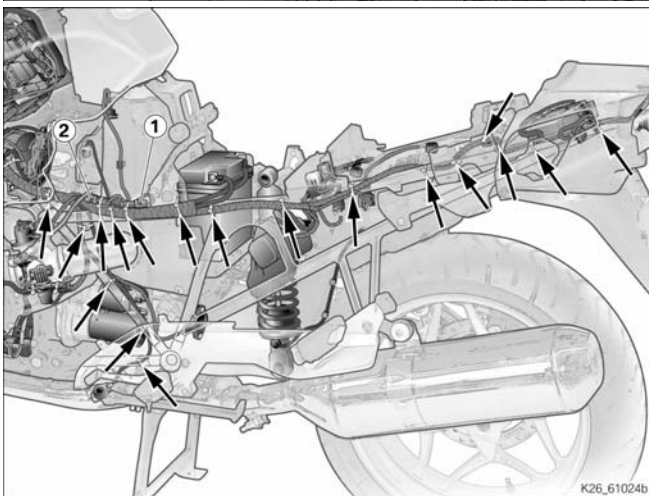


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.

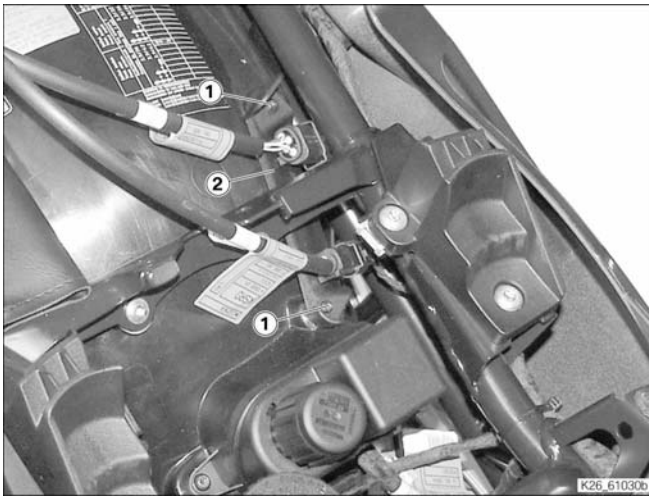


- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.

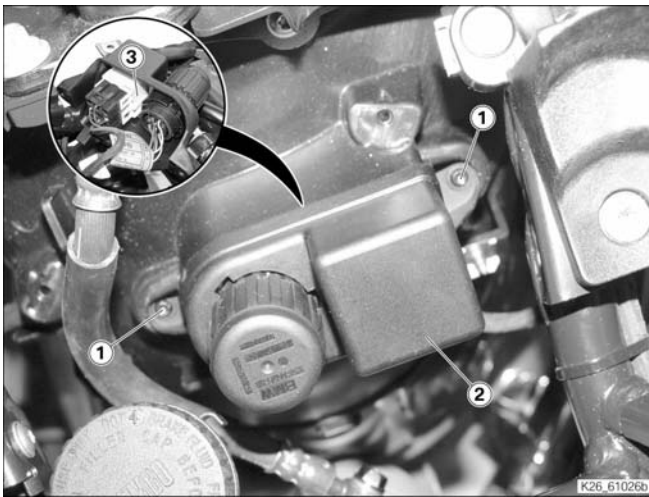


Variant, Seat heating

- Remove screws (1).
- Pass holder (2) forward with the cables.

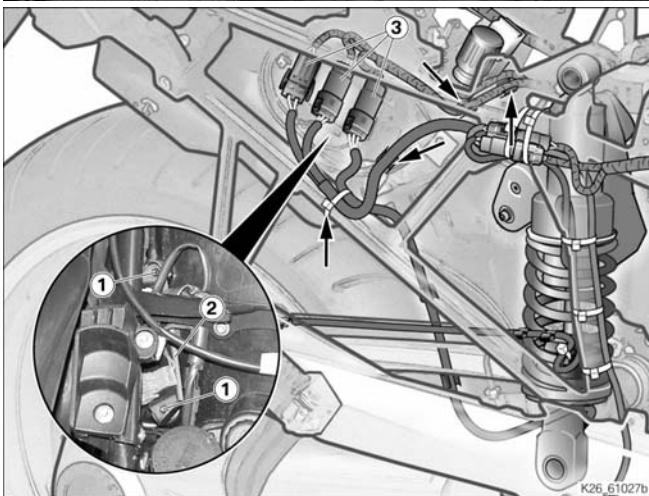


- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.

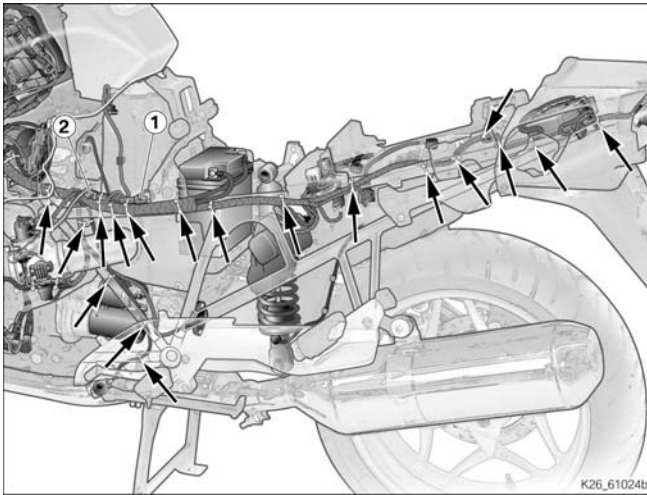
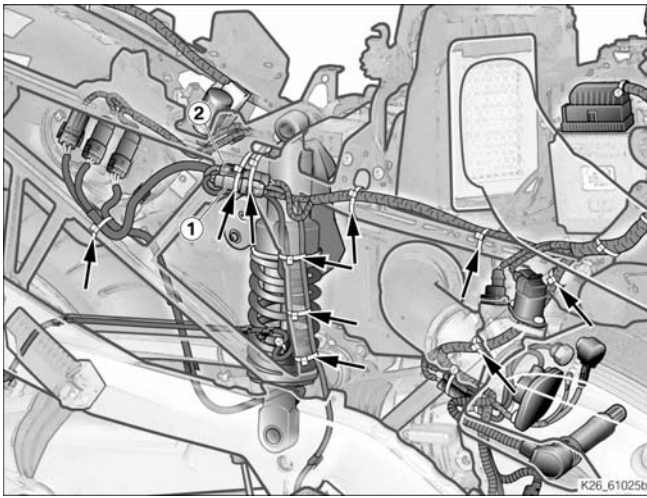


Variant, ESA

- Remove screws (1).
- Pass holder (2) forward with the cables.
- Disconnect plug (3) of the spring strut.



- Disconnect plug (1) of the speed sensor.



- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.

(-) Removing rear section of motorcycle



- Open hose clip (1).
- Disconnect the hose from the intake air silencer.

- Secure the front wheel on the lifting platform.
- Using straps, secure the rear section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.



► **Releasing threaded fastener on rear frame**

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.

! **Attention**

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

Apply masking tape to the part of the swinging arm that could be damaged.

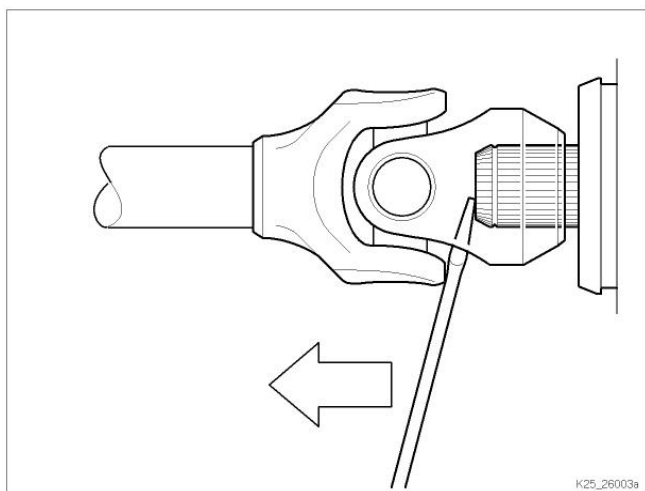
- Slacken screw (4), but do not remove it at this point.

▷ **Pressing universal shaft off gearbox output shaft**

- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.



- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the



shaft in this position.

- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Remove screw (4).



- Thread the fuel-tank breather hose out of the rear frame.
- Disconnect the fuel pressure regulator from the intake air silencer.
- Using crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) , carefully lift the rear section clear of the motorcycle, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.



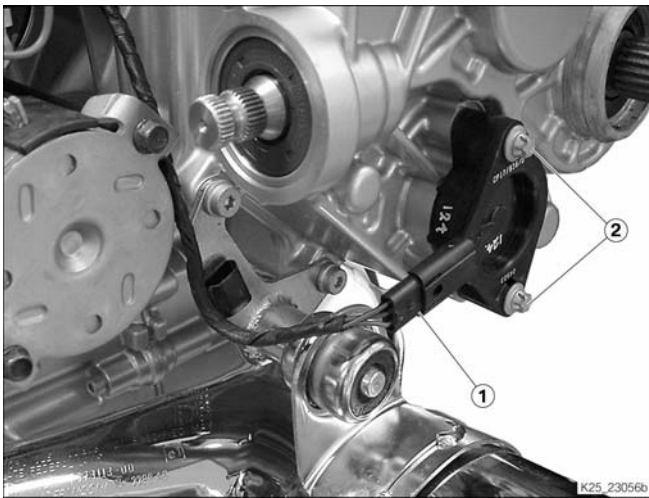
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Pass the control-circuit line with the brake master cylinder forward out of the way.
- Carefully set down the rear section where it will not be damaged.

(-) Removing gearbox potentiometer



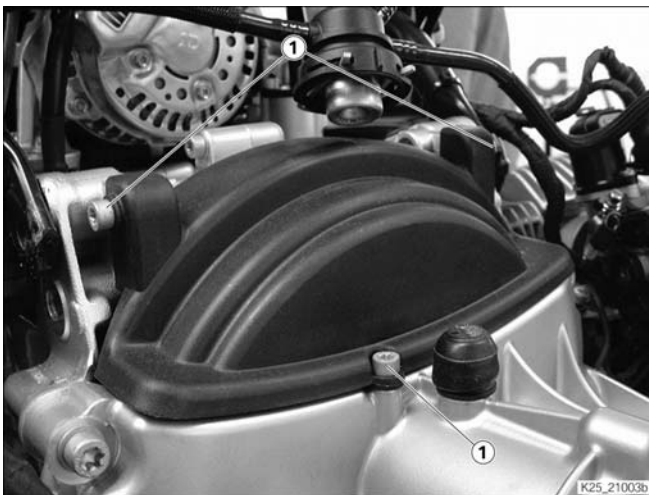
- Disconnect plug (1) of the gearbox potentiometer.
- Release the cable from the cable clips.
- Remove screws (2) from the gearbox potentiometer.
- Remove the gearbox potentiometer, noting the O-ring.

(-) Removing starter



- Disconnect "starter positive" cable (1) (terminal 30).
- Disconnect "starter start signal" plug (2) (terminal 50).
- Remove screws (3).
- Remove the starter.

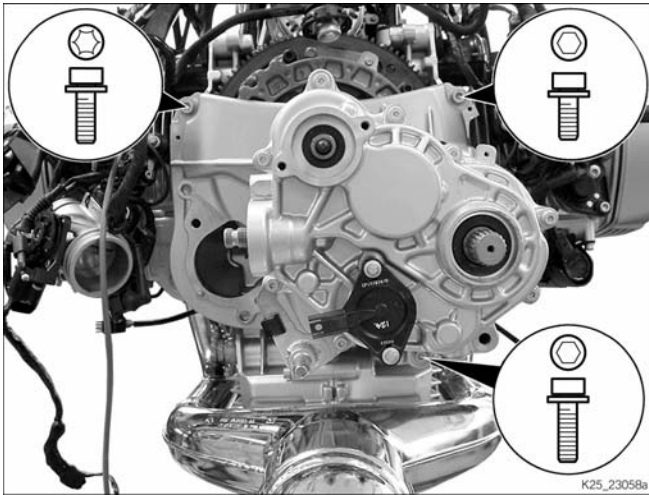
(-) Removing cover for clutch



- Remove screws (1).
- Carefully slip the clutch cover to the rear underneath the pressure modulator and remove.
- Install screws to hold the pressure modulator in position.

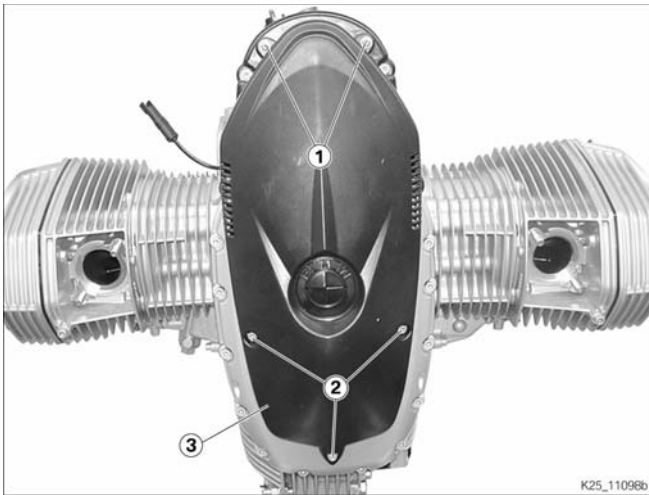
(-) Removing gearbox

- Remove screws (1) of the clamps on the exhaust manifold.
- Pull clamp (arrow) off the bracket.



- Remove 3 screws.
- Pull the gearbox straight to the rear to remove.
- Keeping it straight to ensure that oil does not escape through the breather, place the gearbox on a smooth, level surface.

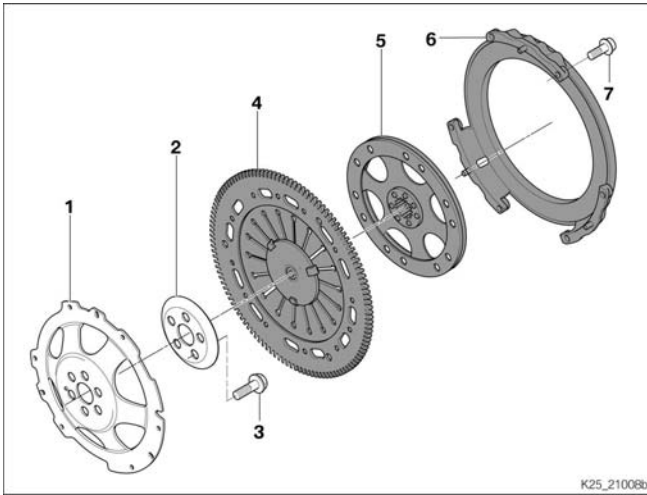
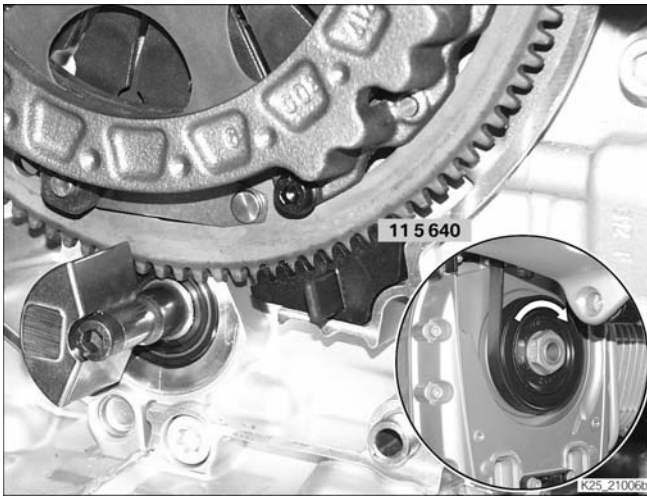
(-) Removing belt guard



- Remove screws (1) and (2).
- Remove belt guard (3).

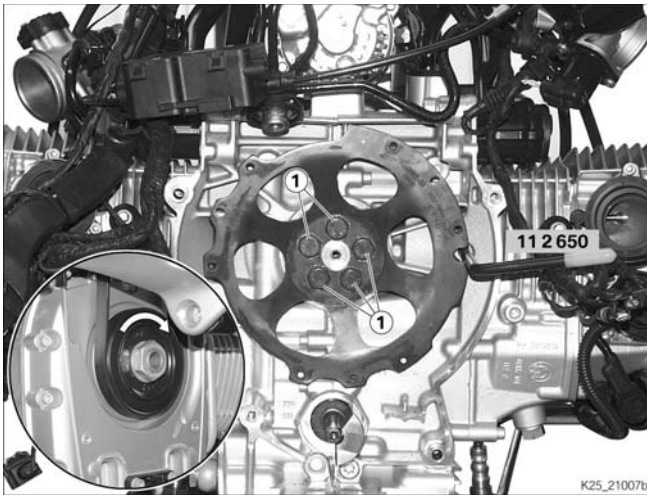
(-) Removing clutch

- By means of the belt pulley, turn the engine in the normal direction of rotation until the engine locking device can be inserted.
- Insert engine locking device (No. 11 5 640) .



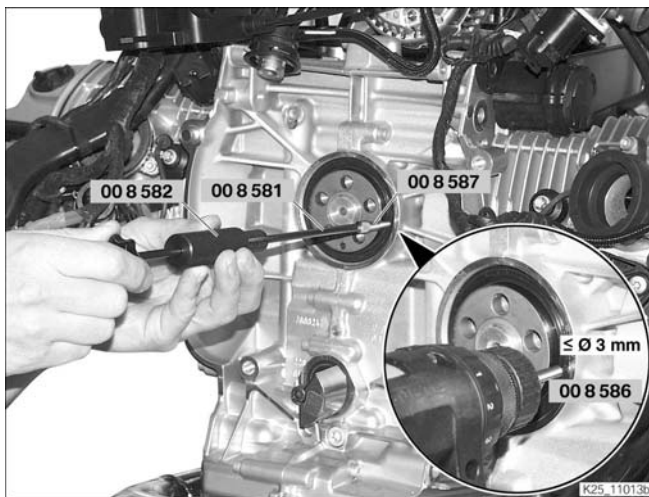
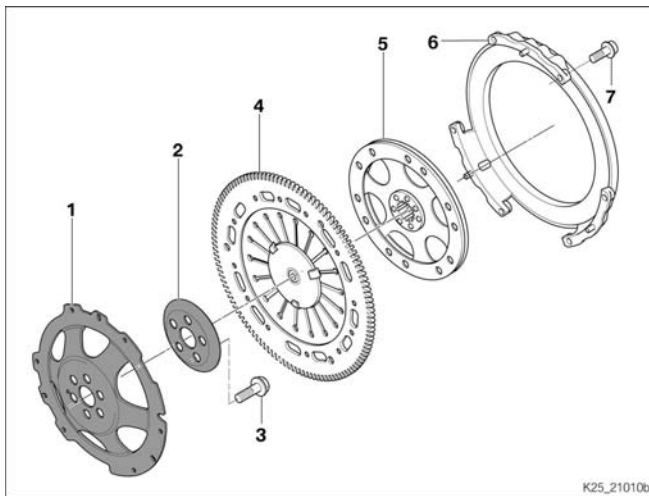
- Working in diagonally opposite sequence, loosen screws (7) in stages.
- Remove engine locking device (No. 11 5 640) .
- Remove the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6).

(-) Removing clutch housing



- By means of the belt pulley, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .

- Remove screws (3).
- Remove clutch housing (1) and reinforcing plate (2).
- Remove TDC locating pin (No. 11 2 650) .



(-) Removing rotary shaft seal, crankshaft, output side

Attention

Nature: Incorrect removal of the shaft sealing ring can result in damage to the housing.

Avoidance: Do not use too large a twist drill.
Make sure the bore is centred.

- Using a drill bit (< 3 mm) and drill stop (No. 00 8 586), carefully drill a centred hole into, but not through, the shaft sealing ring.
- Screw pull rod (No. 00 8 581) with adapter for cone-head self-tapping screw (No. 00 8 587) and impact weight (No. 00 8 582) into the hole drilled in the rotary shaft seal.
- Use pull rod (No. 00 8 581), (No. 00 8 587) and impact weight (No. 00 8 582) to remove the rotary shaft seal from the crankcase.
- Clean the bore in the crankcase and the crankshaft collar where the rotary shaft seal sits on the shaft.



Consumables/lubricants

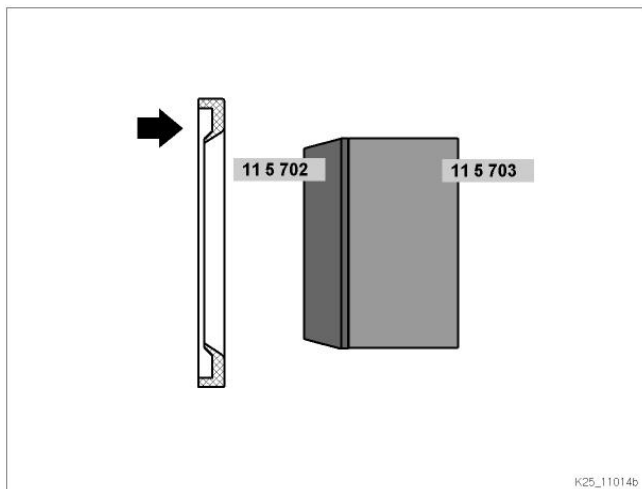
Brake cleaner	Cleaners	83 11 9 407 848
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(-) Installing rotary shaft seal, crankshaft, output side

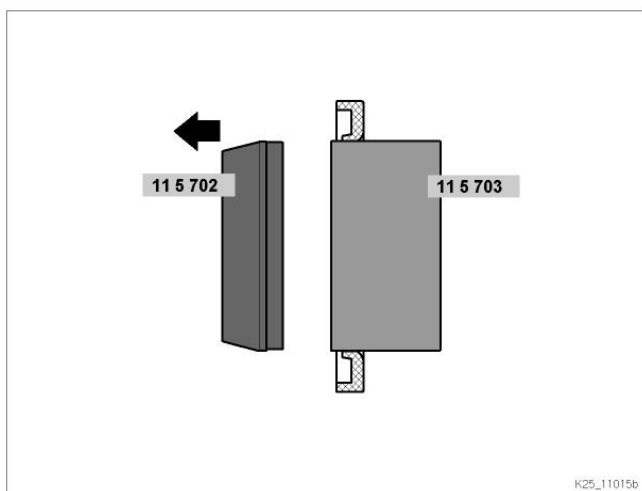
Attention

Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.

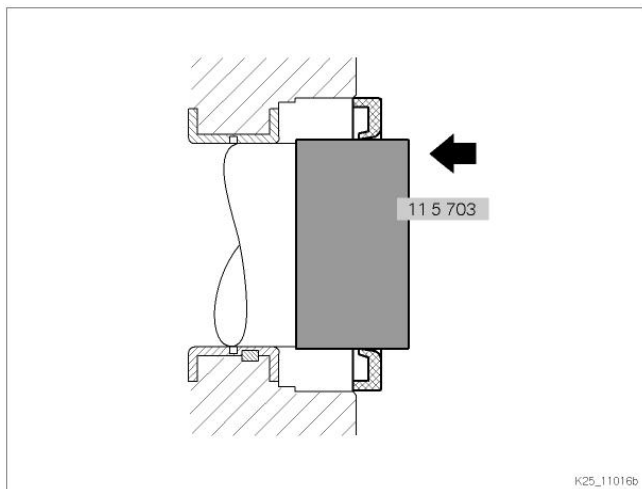
Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.



- Using sliding sleeve (No. 11 5 702) , slip the rotary shaft seal with the closed side toward the clutch onto sleeve (No. 11 5 703) .
- » The sealing lip of the rotary shaft seal is correctly preshaped.

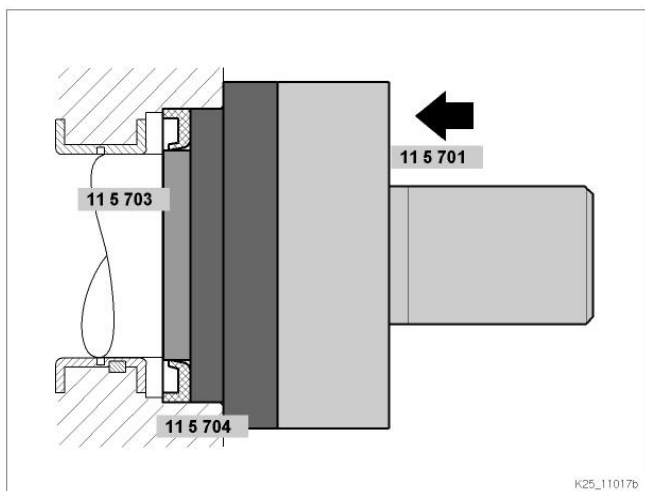


- Remove sliding sleeve (No. 11 5 702) from sleeve (No. 11 5 703) .

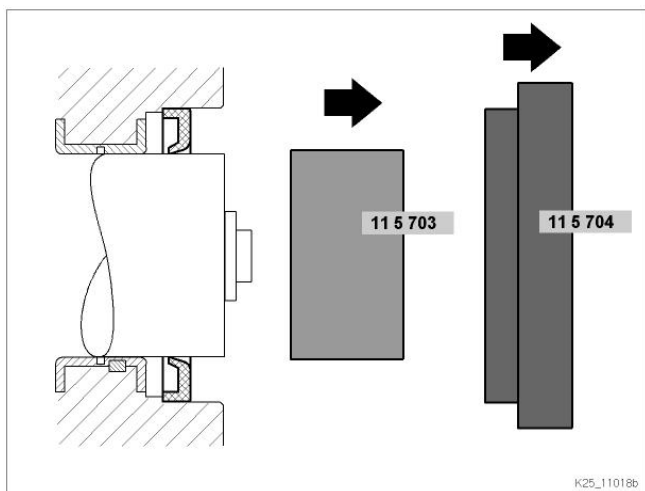


- Seat sleeve (No. 11 5 703) with the rotary shaft seal on the crankshaft.

- Seat ring (No. 11 5 704) and drift (No. 11 5 701) on sleeve (No. 11 5 703) and uniformly drive the rotary shaft seal into the crankcase until the special tool comes into contact with the crankcase.
- Remove drift (No. 11 5 701) .

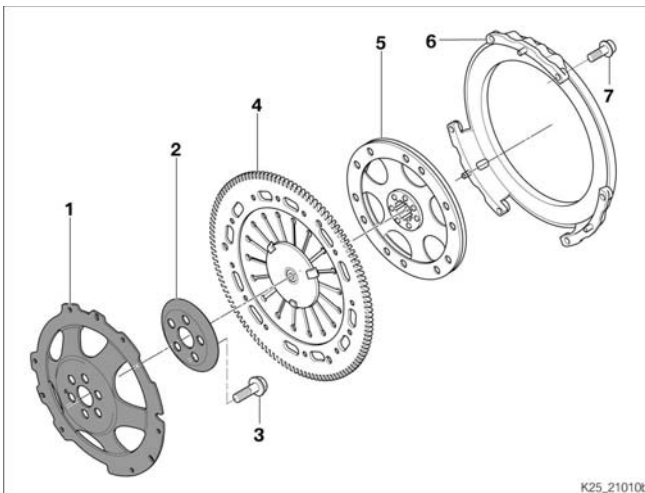


- Remove ring (No. 11 5 704) and sleeve (No. 11 5 703) from the crankshaft.

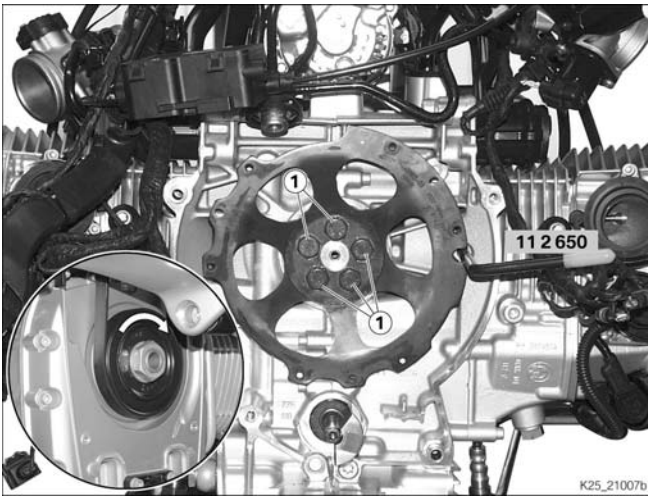



(-) Installing clutch housing

- Install the clutch housing with the locating lug engaged in the locating bore of the crankshaft.
- Install reinforcing plate (2) and install screws (3) to hold it in position.



- By means of the belt pulley, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .
- Install screws (1) and tighten in correct tightening sequence.



 Tightening torques		
Never re-use the original screws, M11 x 1.5 12.9	Threads and underside of head lightly oiled	
	Initial torque, 40 Nm	
	Final torque, 40 °	

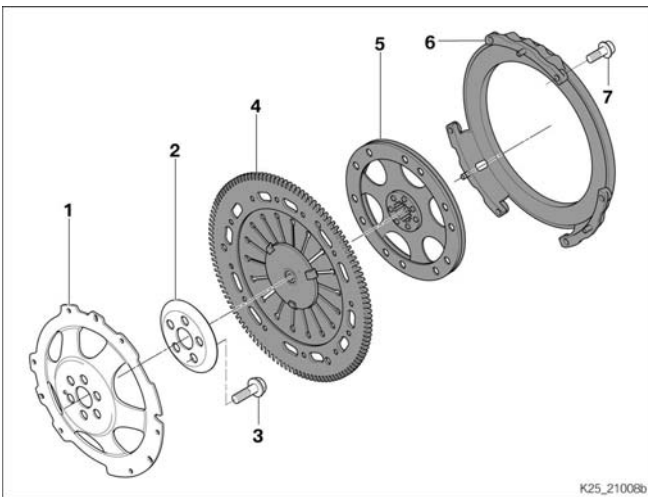
- Remove TDC locating pin (No. 11 2 650) .

(-) Checking clutch for foreign matter

- Remove housing cover (6) from thrust plate (4) and remove clutch plate (5).

Test


- Check the friction faces of thrust plate (4) and housing cover (6) for foreign matter.



Result: Oil or grease on friction faces.

Measure:

- Clean and degrease the friction faces.

 Consumables/lubricants		
Brake cleaner	Cleaners	83 11 9 407 848

Test

- Check clutch plate (5) for foreign matter.

Result: Oil or grease on clutch plate.

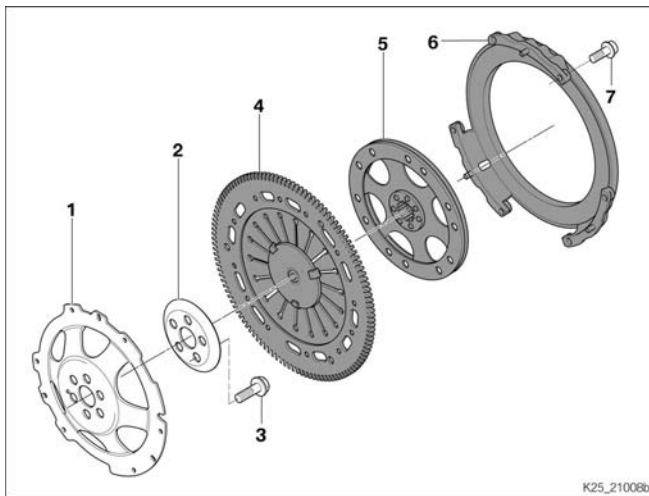
Measure:

- Replace clutch plate (5).

=> Checking clutch for wear (clutch removed) (Position: 21 21 600)

(-) Installing clutch


- Install the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6) in clutch housing (1).



Note

The clutch components are all precision-balanced. It is not necessary to check for identification marks when assembling.

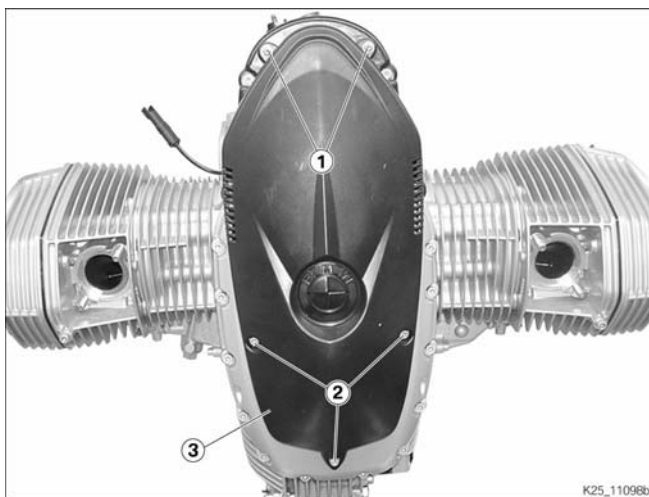
- Insert screws (7).
- Use centering pin for clutch (No. 21 2 673) to centre the clutch plate.
- Insert engine locking device (No. 11 5 640) .
- Install screws (7) and tighten in correct tightening sequence.


 Tightening torques		
Never re-use the original screws, M6 x 20, in diagonally opposite sequence and stage by stage	12 Nm	

- Remove engine locking device (No. 11 5 640) and centering pin for clutch (No. 21 2 673) .

(-) Installing belt guard


- Install belt guard (3) and secure with screws (1) and (2).



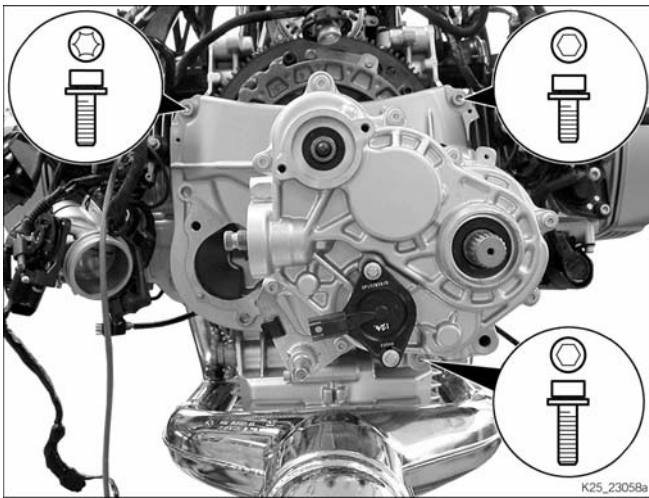
 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing gearbox

- Remove dirt and old lubricant from the splines of the clutch hub and the gearbox input shaft.
- Lubricate the splines of the clutch hub and the gearbox input shaft.

 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

- Position the gearbox with the gearbox input shaft just




introduced into the hub of the clutch plate.



Note


You will find it easier to introduce the splined end of the gearbox input shaft into the clutch hub if you engage a gear and turn the gearbox output shaft.

- Slide the gearbox over the reamed sleeve until it mates with the crankcase.
- Install 3 screws.

 Tightening torques		
Gearbox to engine block, M8 x 35	19 Nm	
Gearbox to engine block, M8 x 70	19 Nm	
Gearbox to engine block, M8 x 50	19 Nm	

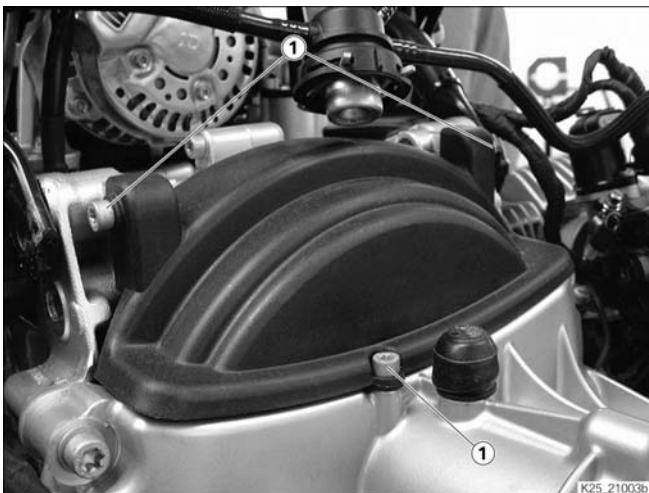



- Slip the exhaust clamp onto the holder on the gearbox and align it with the exhaust.
- Tighten screws (1).

 Tightening torques		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	

(-) Installing cover for clutch

- Remove screws (1).
- Carefully fit clutch cover under the pressure modulator and align.
- Install screws (1).




 Tightening torques		
Clutch cover to engine, M6 x 16	8 Nm	


(-) Installing starter



- Install the starter.
- Install screws (3).

 Tightening torques		
Starter with gearing to engine, M8 x 60	19 Nm	

- Connect "starter positive" cable (1) (terminal 30).


 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).

(-) Installing gearbox potentiometer




- Install the gearbox potentiometer, noting the O-ring.
- Install screws (2).

 Tightening torques		
Gear potentiometer to gearbox	9 Nm	

- Connect plug (1) to the gearbox potentiometer.
- Clip the cable into the cable clips.

(-) Installing rear section of motorcycle

- Remove dirt and old lubricant from the splines of the gearbox output shaft.
- Lubricate the splines of the gearbox output shaft.

 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

- Carefully manoeuvre the rear section of the motorcycle into position at the front section, making sure that the wiring harness is correctly positioned.
- Mate the universal shaft with the gearbox output shaft and align the rear frame with the anchorages.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have




to be disassembled in order to permit reinstallation of the universal shaft.

- Carefully turn the rear wheel to check that the universal shaft is still correctly positioned.
- Position the fuel pressure regulator on the intake air silencer.



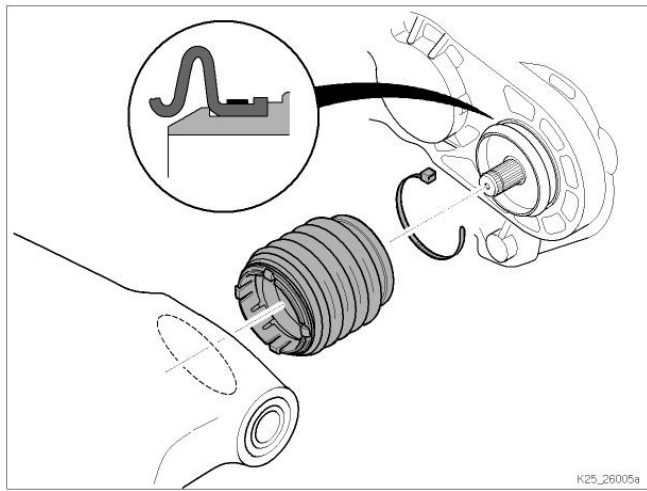
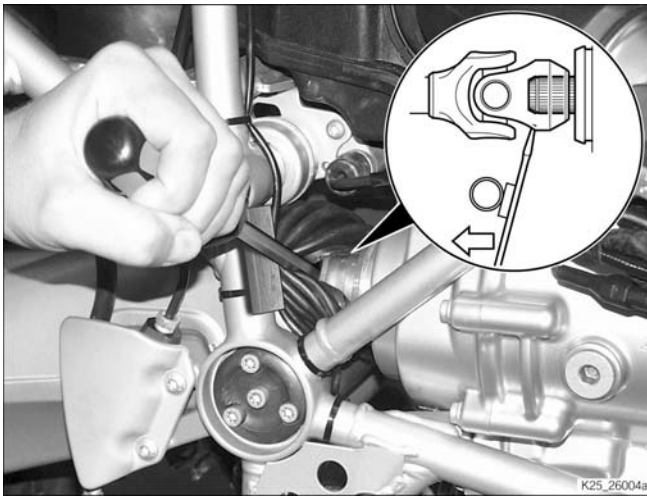
► **Securing rear frame to motorcycle**

- Install screw (4), but do not tighten it at this point.
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert screws (1) on left and right.
- Tighten screw (4).
- Tighten screws (1), (2) and (3).


 Tightening torques		
Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	

◄ **Pressing universal shaft onto gearbox output shaft**

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.

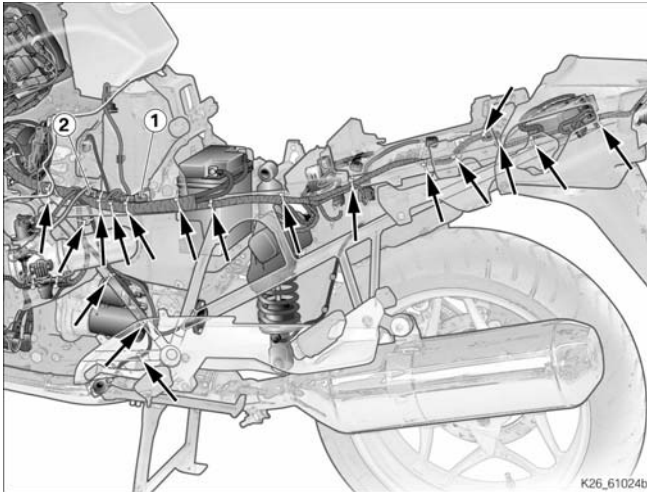
 Consumables/lubricants		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.

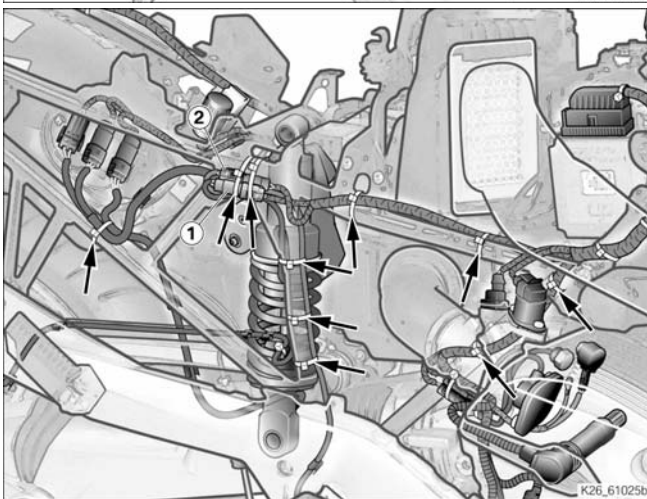
- ◀
- Release the straps securing the front wheel and disengage crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) with the straps from the rear section of the motorcycle.
- Release the control-circuit line complete with the brake master cylinder and pass it through to the rear.
- Route the fuel-tank breather hose into position along the rear frame.
- Connect the hose of the crankcase breather to the intake air silencer.
- Slide hose clamp (1) into position.



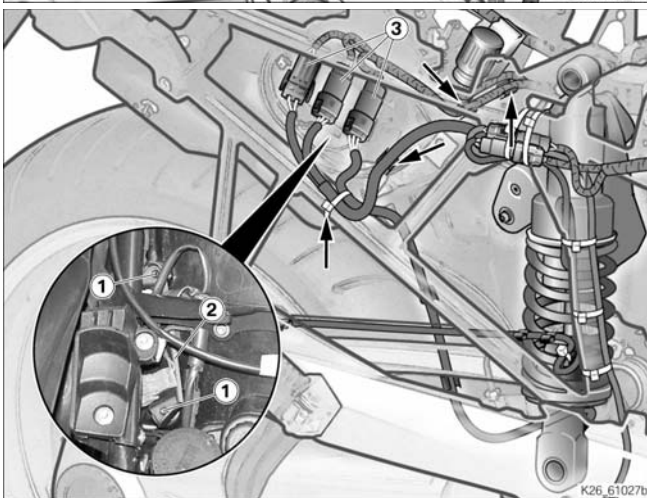
(-) Securing wiring harness at rear



- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.



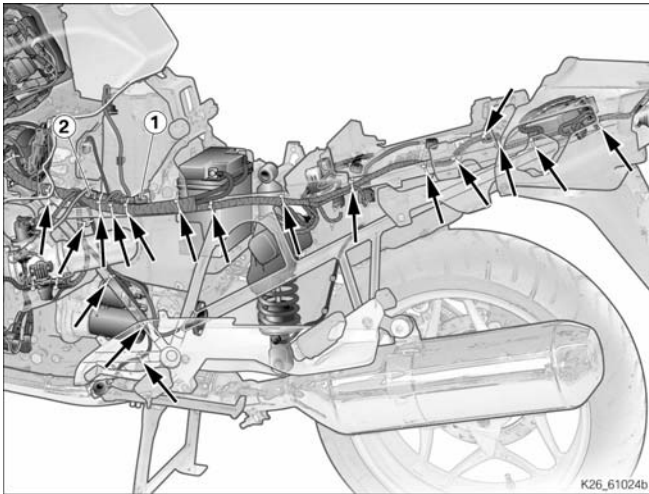
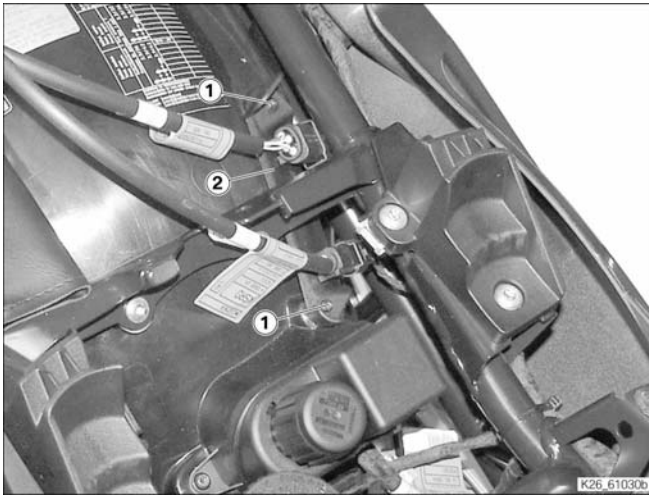
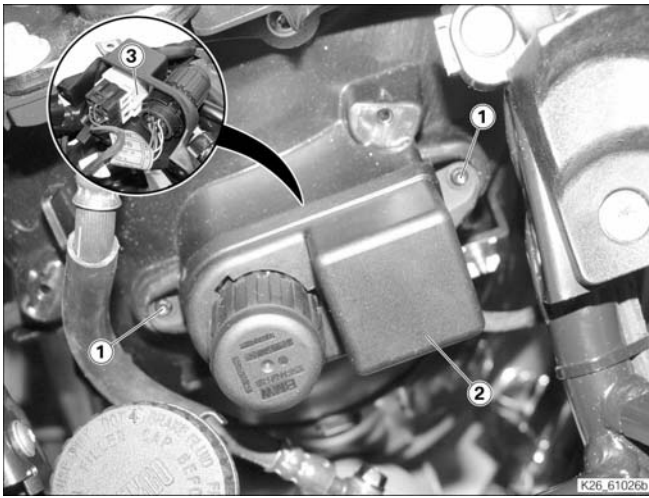
- Connect plug (1) of the speed sensor.



Variant, ESA

- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Secure holder (2) with screws (1).

- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).



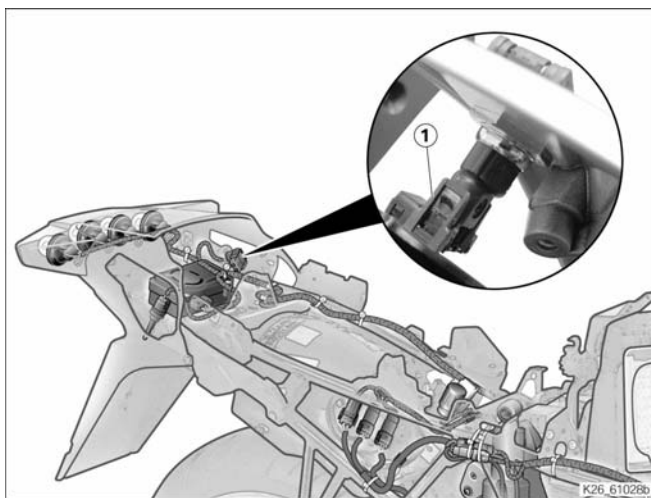
Variant, Seat heating

- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

- Secure the wiring harness to the rear frame with cable ties (arrows).

Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



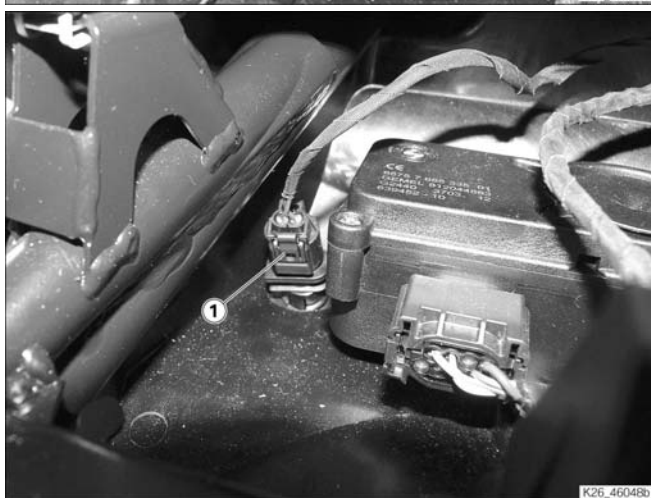
Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



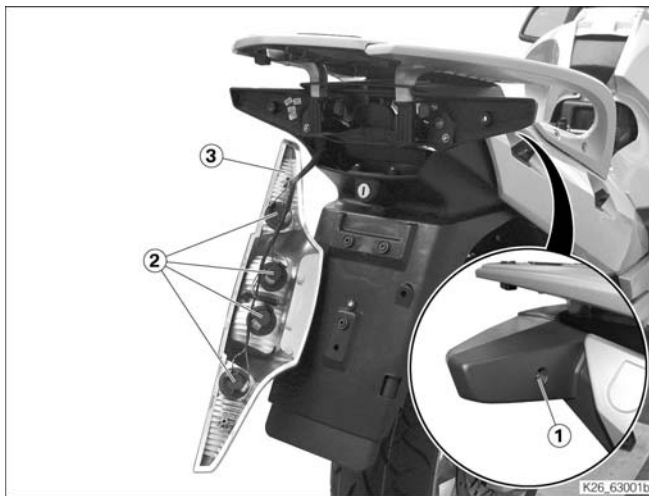
Variant, On-board computer

- Connect plug (1) of the temperature sensor.

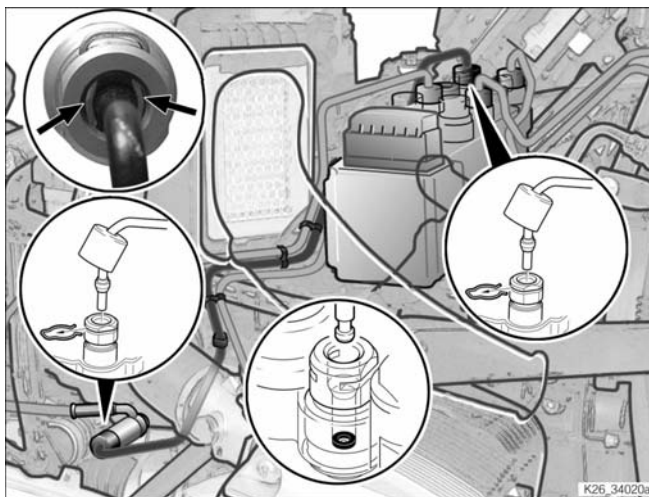


(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



(-) Connecting brake pipe for rear wheel circuit to pressure modulator



Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.



Warning

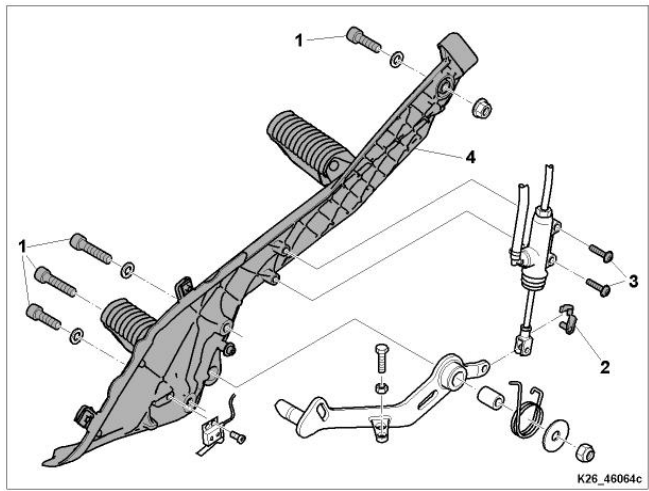
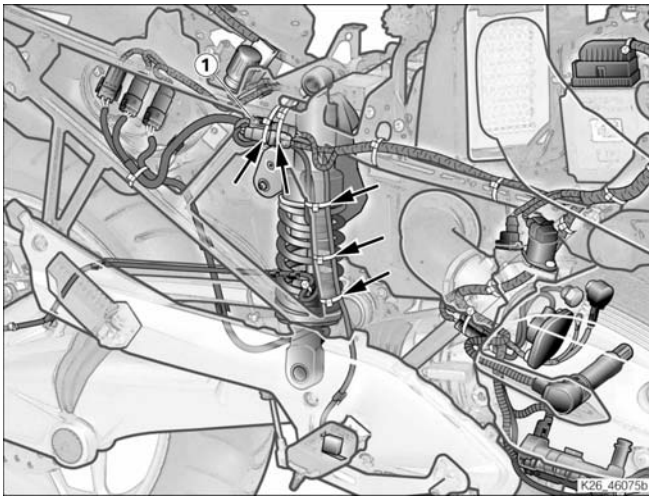
Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.


- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Installing right footrest plate


- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

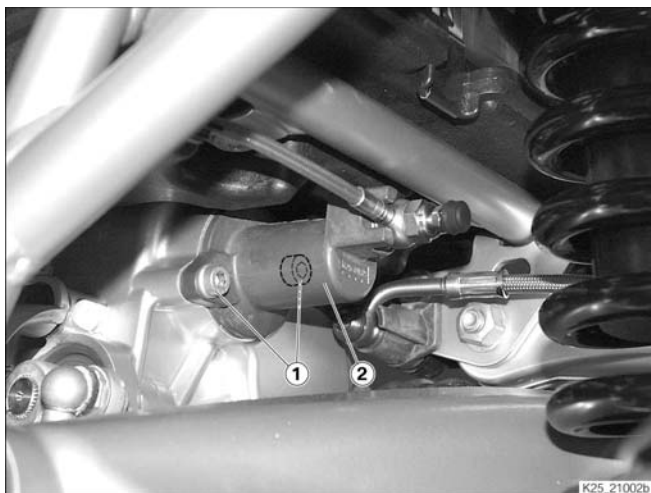
- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.

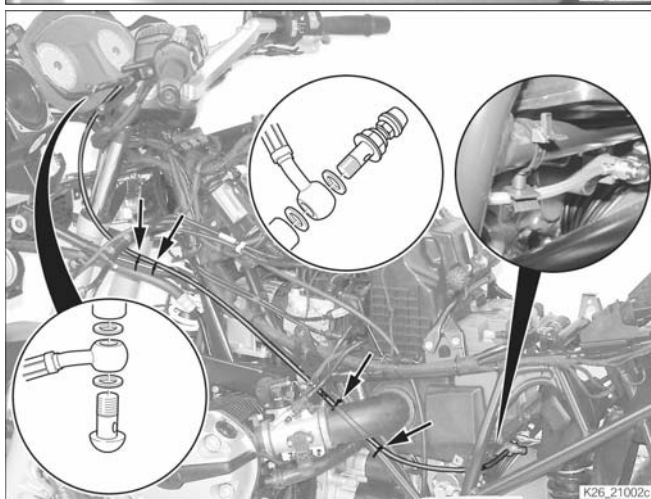


(-) Installing clutch slave cylinder



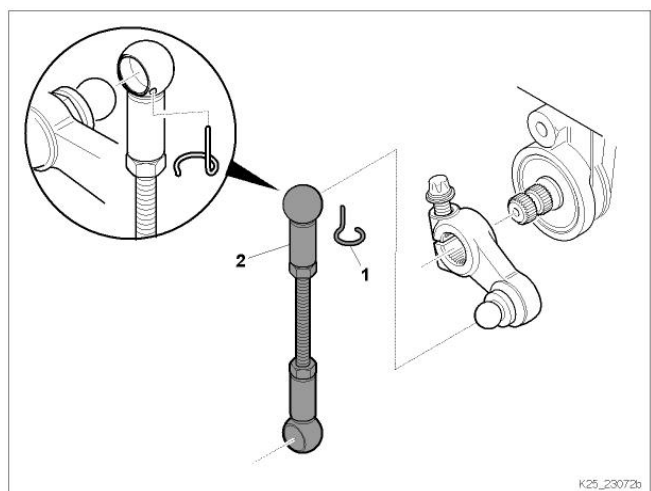
- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.

 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	




- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.

(-) Securing selector rod to shift lever



- Grease the ball head of the shift lever and the ball socket of selector rod (2).

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

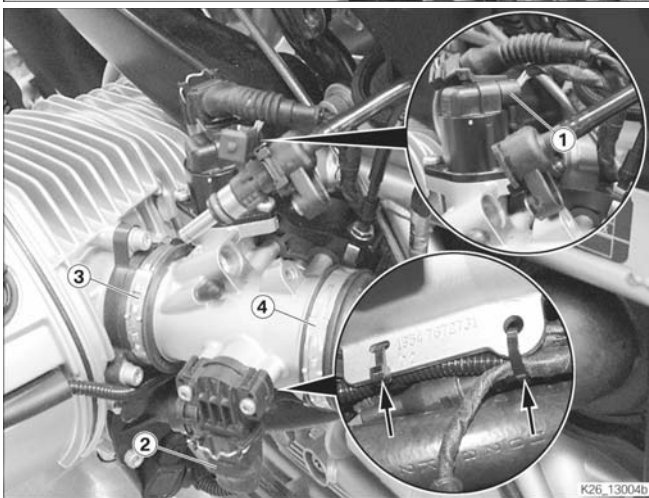
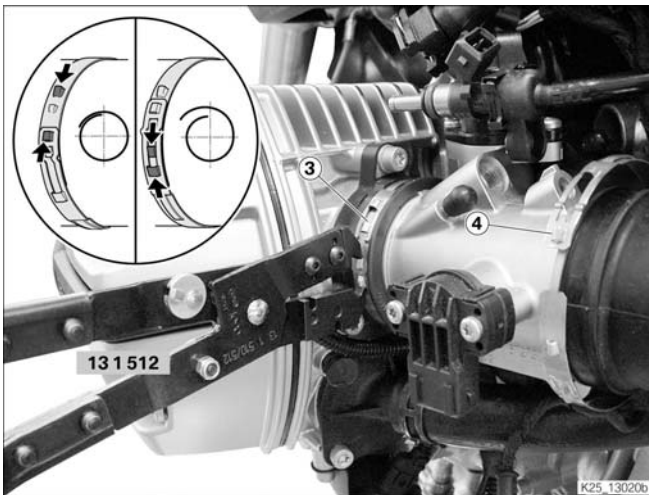
(-) Releasing throttle valve stub with cable divider

- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.



(-) Installing throttle-valve stub

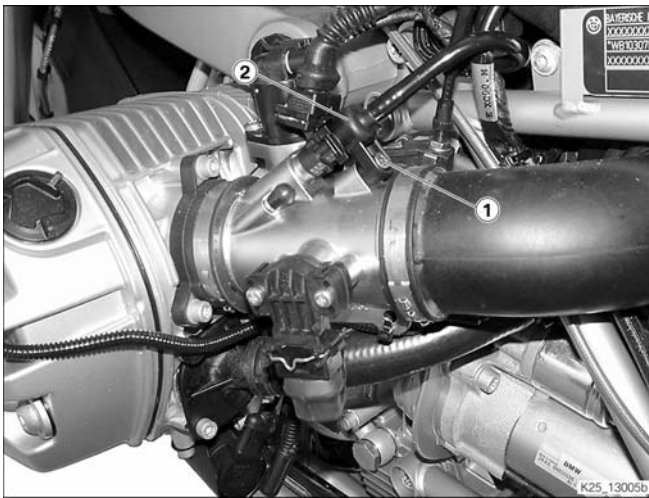
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .




- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing right and left injection valves

- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure

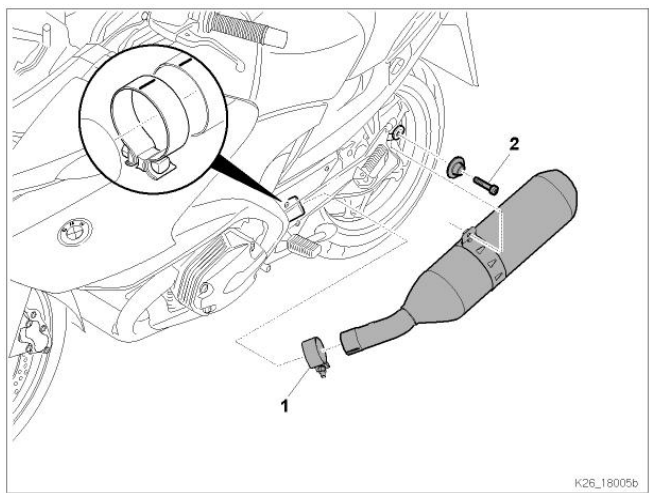


with screws (2).


 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.


(-) Installing silencer



- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

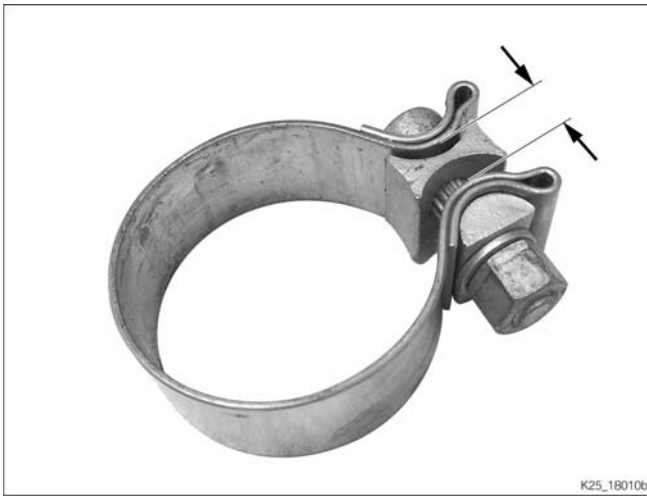
- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


► Checking Torca clamp on silencer

- Tighten the Torca clamp.



Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

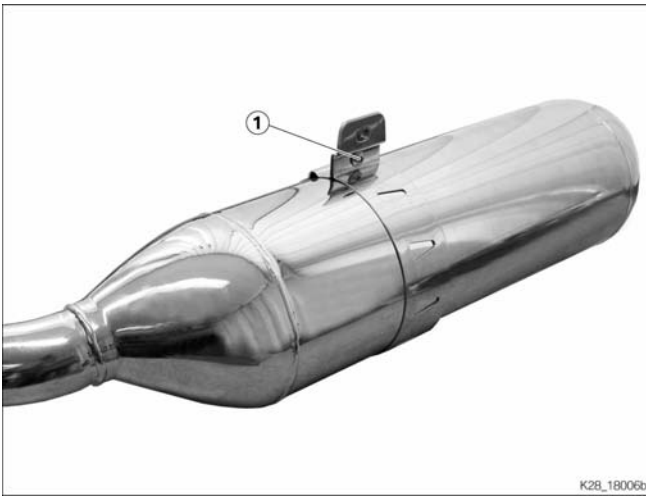


Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.



- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
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Checking Torca clamp on silencer

- Tighten the Torca clamp.

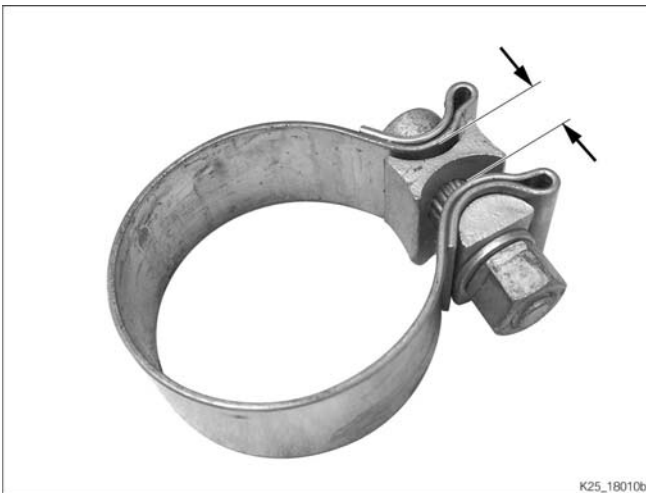
Test

- Check that a gap is visible at the clamp seat before final torque is applied.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
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Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



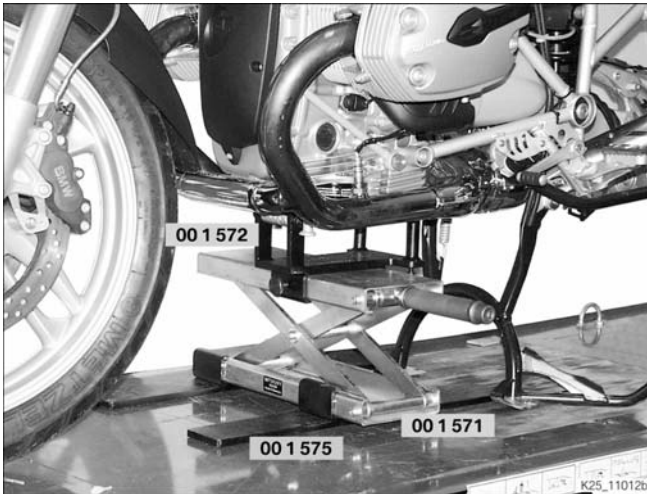
- Once again check distance (arrows) between silencer and rear wheel.



Technical data

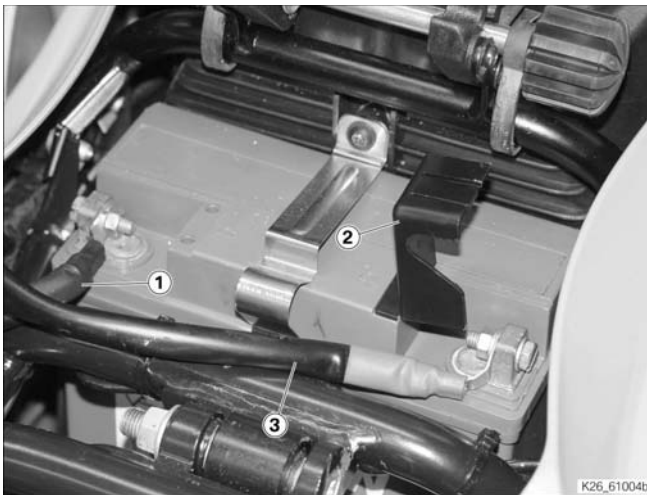
Minimum distance between silencer and rear wheel		min. 15 mm	
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(-) Removing engine stand



- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .

(-) Connecting battery



⚠ Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

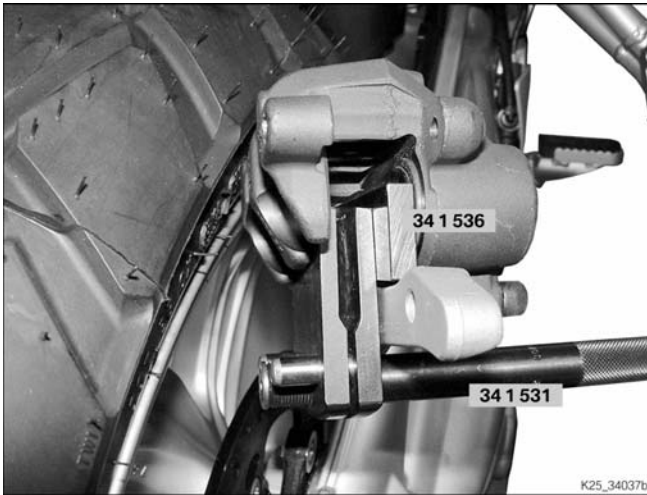


Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the


pressure modulator.



- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

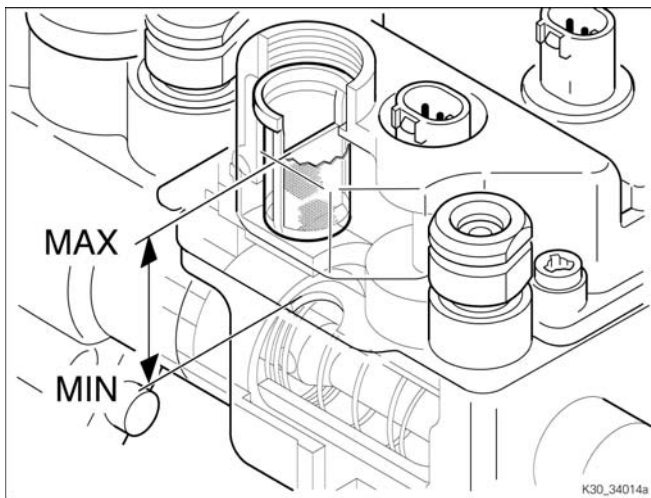
- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

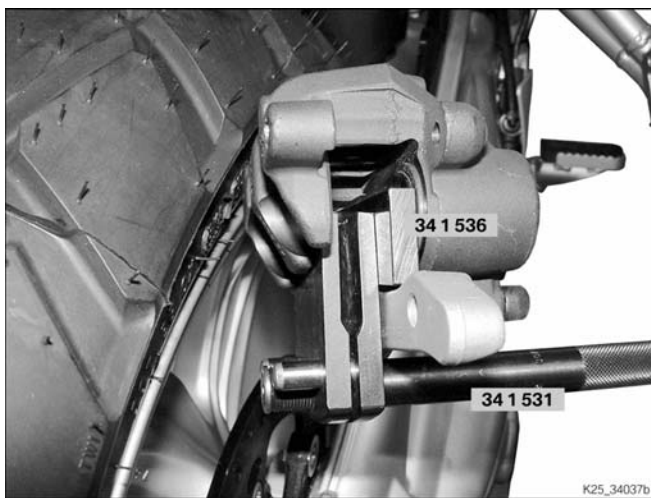
Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in



accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.



► **Instructions for filling rear wheel circuit reservoir**

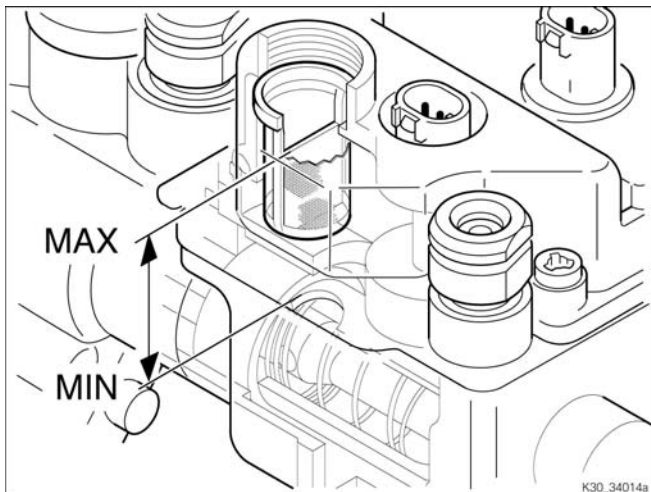
- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536) , in the rear brake caliper.




Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.



- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Hand-tighten the cap of the rear wheel-circuit reservoir.

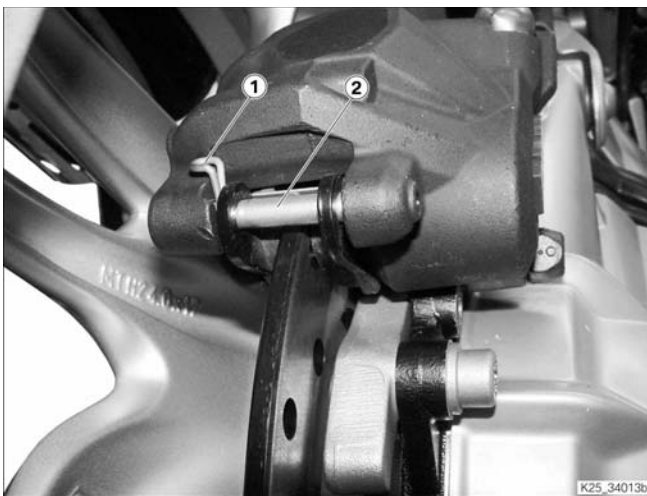
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary

▷ **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.
- » Arrow points in direction of travel.



K25_34010b



K25_34013b


- Install the brake pads.
- Manually install retaining pin (2).

▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).



K25_34034b

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

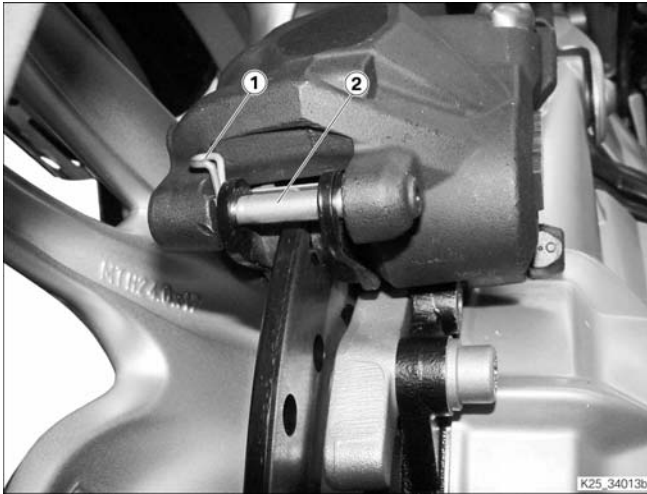
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



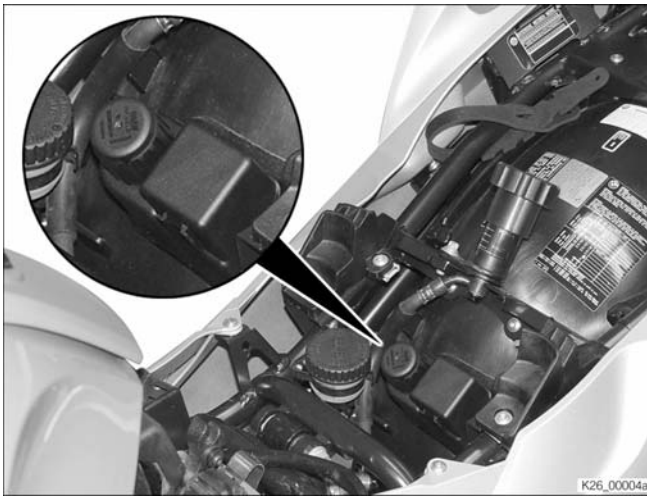
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.



- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



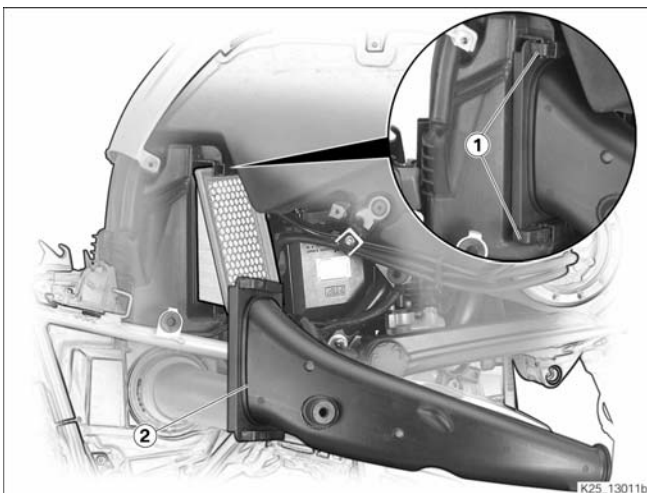
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

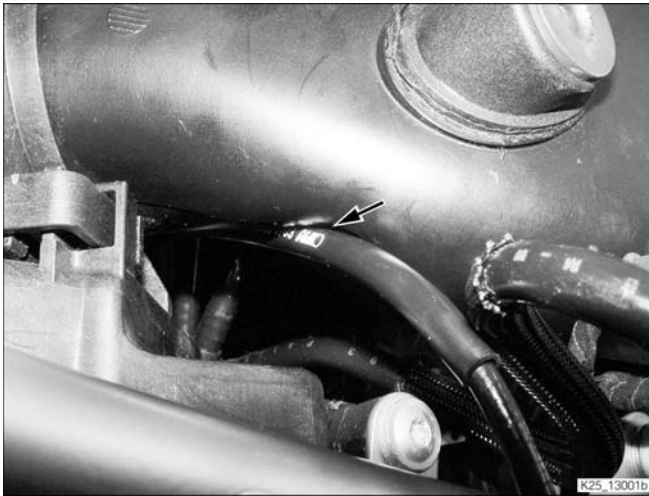
- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing intake air pipe



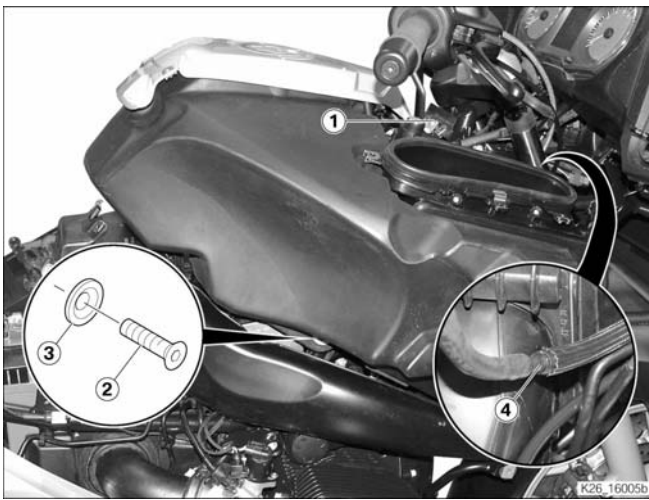
- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the



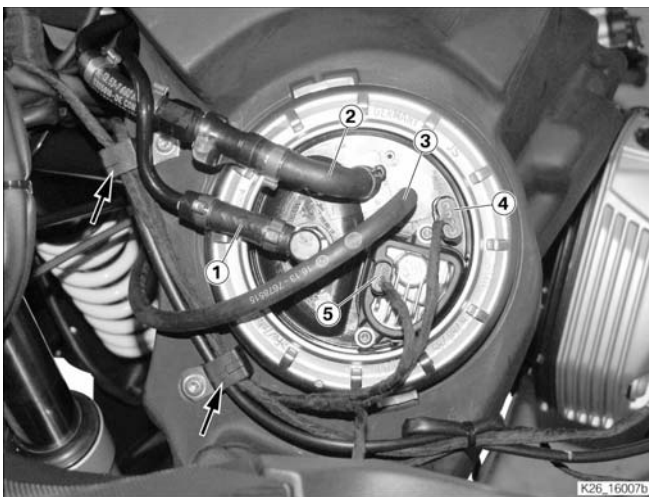
guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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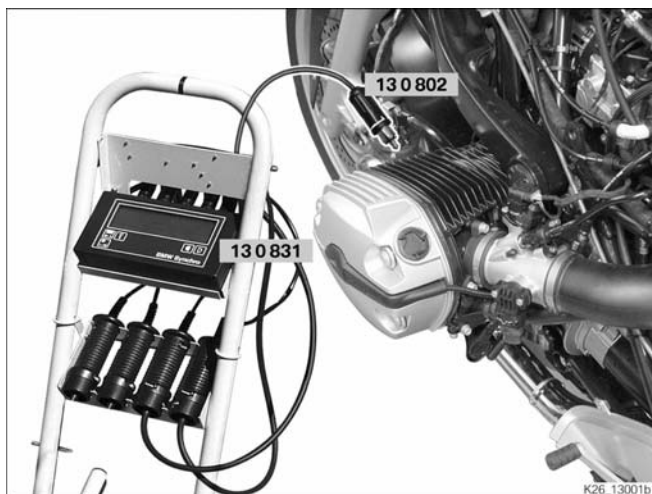
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

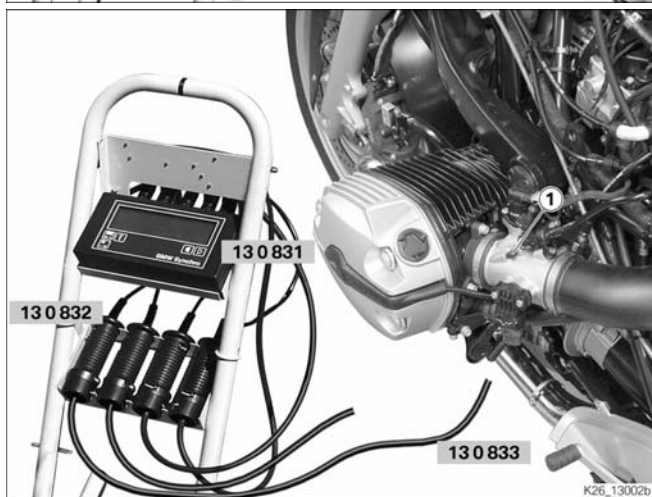
- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 832) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



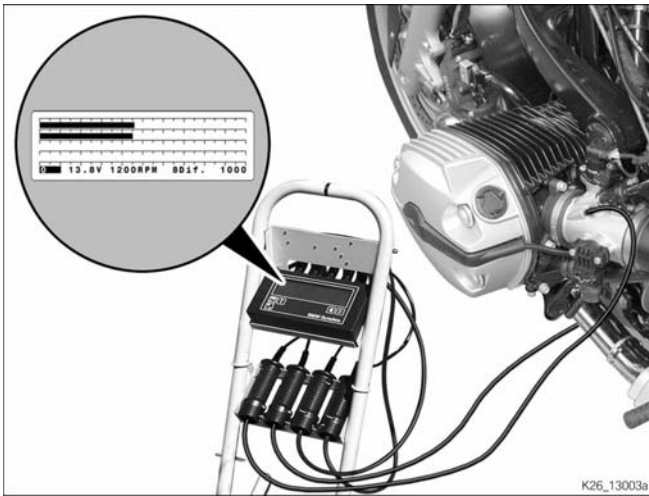
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions

issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

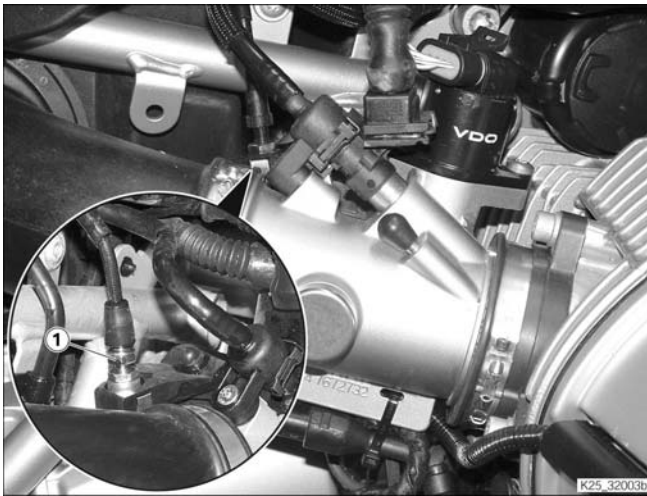
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.



» Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

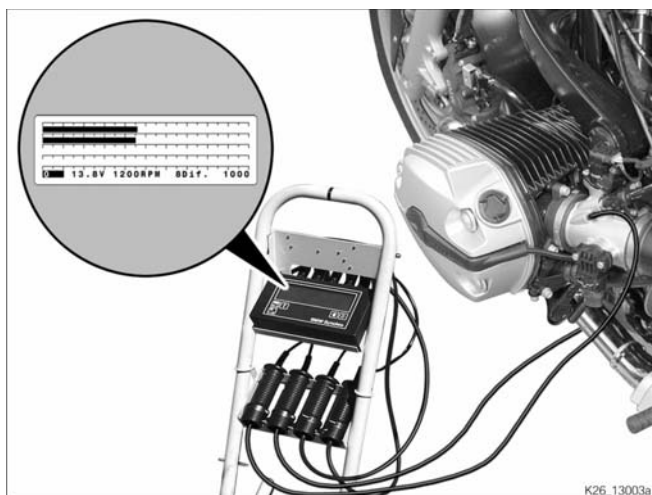
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.

- Disconnect the BMW Motorrad battery charger from the vehicle.

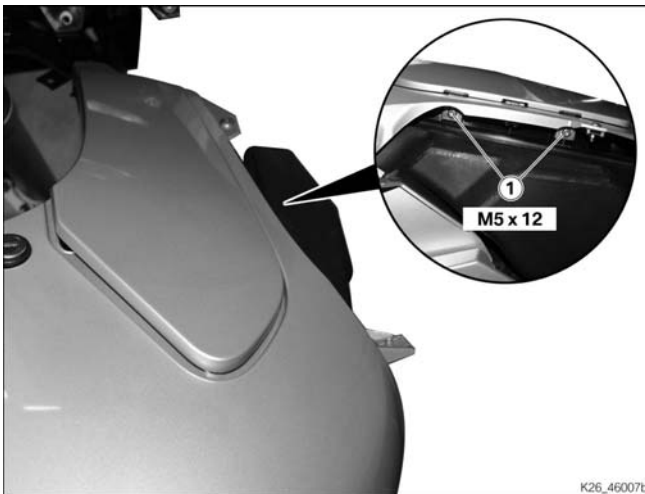
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



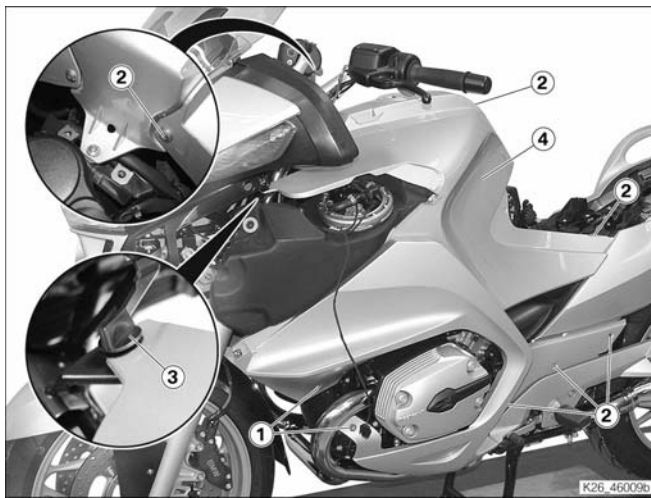
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).



- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



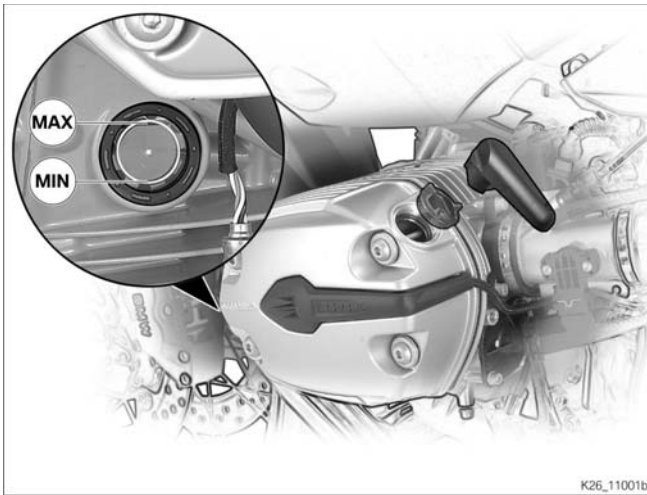
Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

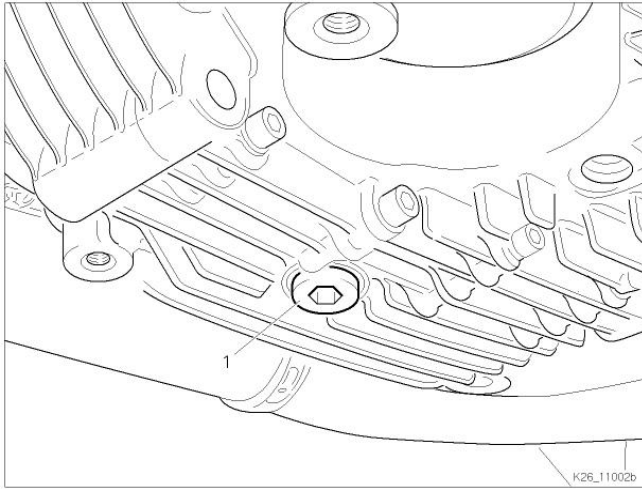


(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

📁 11 11 043 Replacing oil-level indicator



(-) Draining engine oil



Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the engine.
- Remove oil drain plug (1) and drain the oil.
- Dispose of used oil in an environmentally friendly manner.
- Remove the old sealing ring from the drain plug.

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



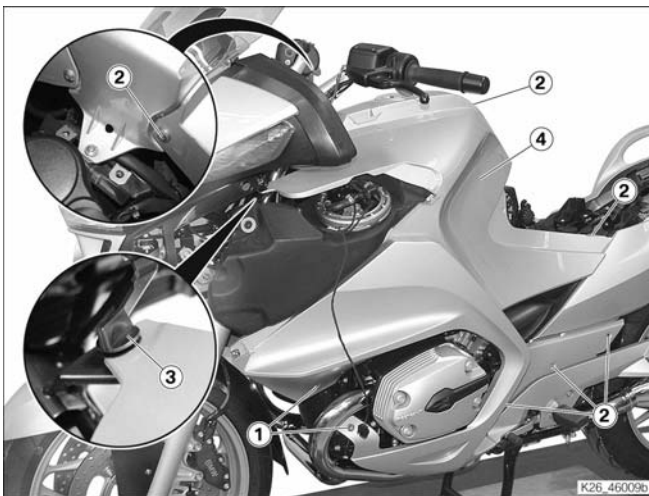
Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



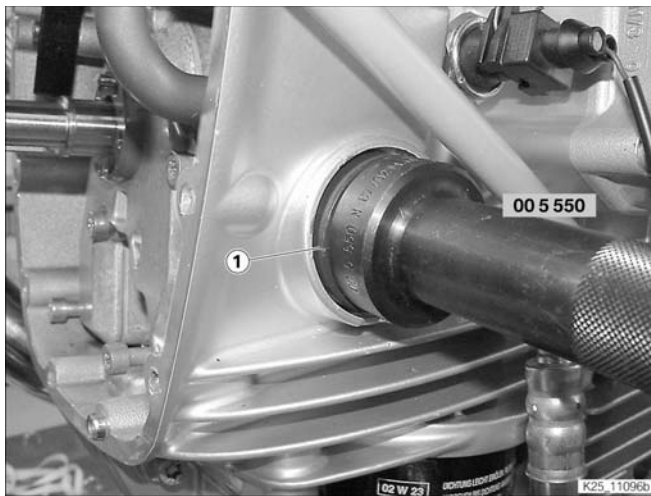
(-) Removing oil level indicator


- Remove circlip (1).
- Pierce the plastic disc with a large screwdriver and carefully pry out oil level sight glass (2).



(-) Installing oil level indicator

- Clean the sealing face.
- Apply assembly paste to the sealing face of the new oil-level indicator (1) and using drift (No. 00 5 550) , drive it in from outside until seated.




 <p>Consumables/lubricants</p>		
Tyre mounting paste	Assembly paste	36 32 1 239 263, 36 32 1 239 264

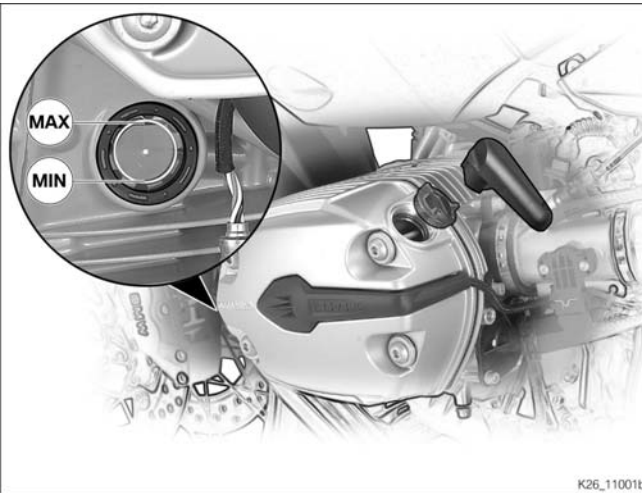
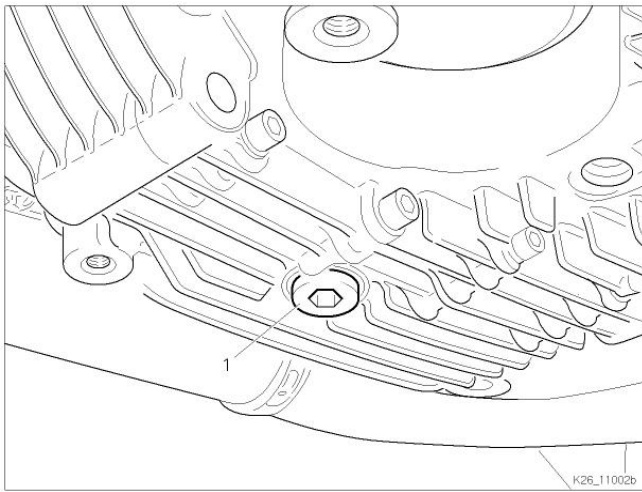


- Install circlip (1) making sure it is correctly seated in the groove.

(-) Pouring engine oil into engine


- Replace the sealing ring of oil drain plug (1).
- Screw in oil drain plug.


 <p>Tightening torques</p>		
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Oil drain plug, M16 x 1.5	Initial torque, 23 Nm	
	Final torque, 32 Nm	

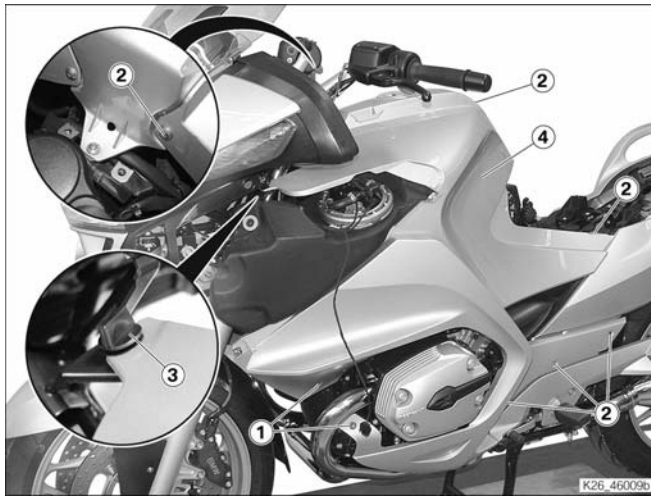
- Open oil filler plug using spanner from toolkit.
- Pour engine oil into the engine until the level reaches the MAX mark.

 Technical data		
Oil capacity, engine	with filter change Difference between Min. / Max. marks	max. 4 l 0.5 l
Consumables/lubricants		
Engine oil, 20W-50		

 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



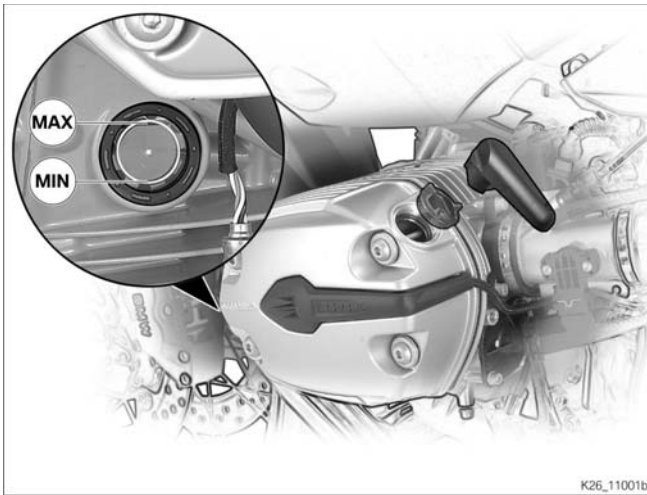
Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 11 052 Replacing shaft sealing ring for balancing shaft**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



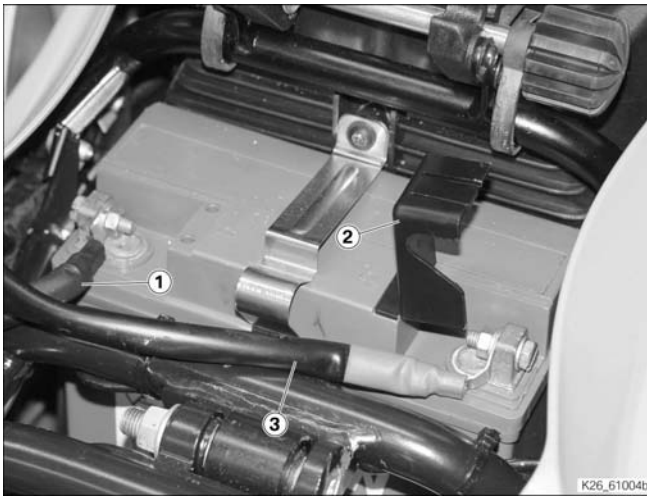
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

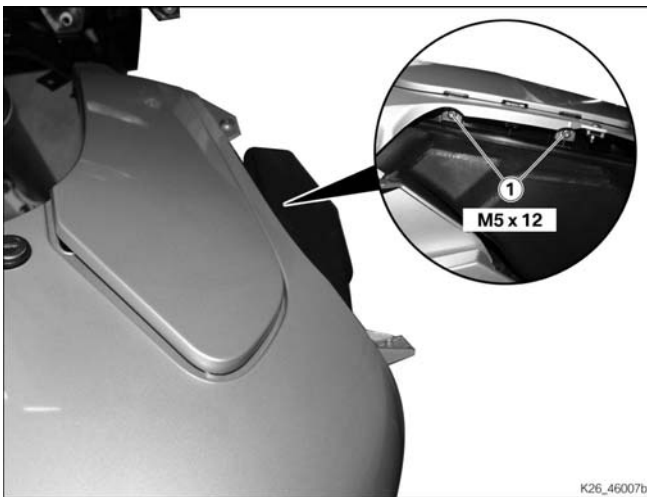
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



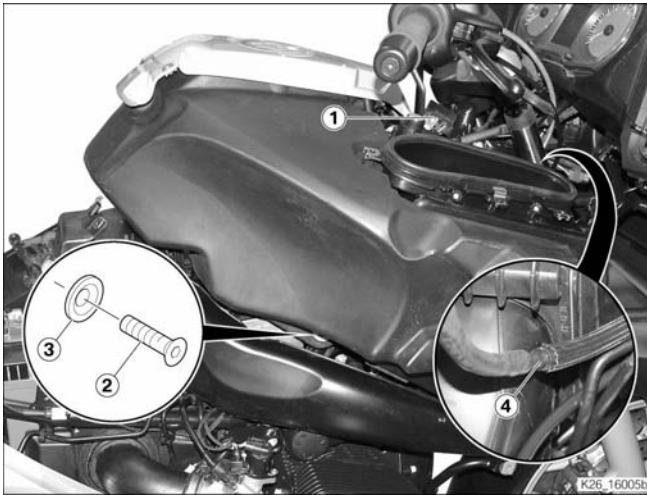
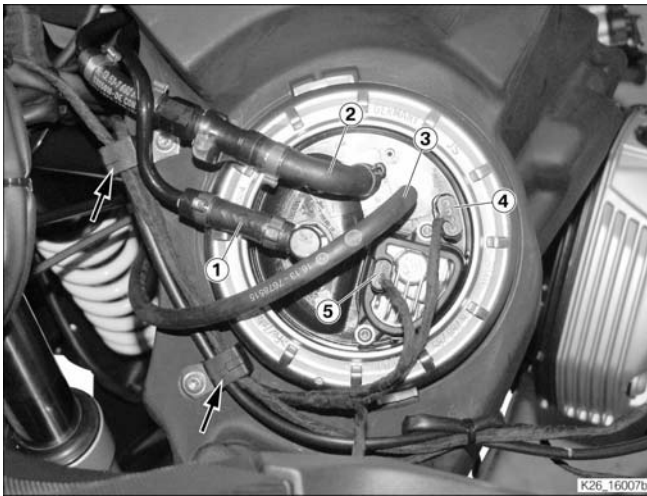
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

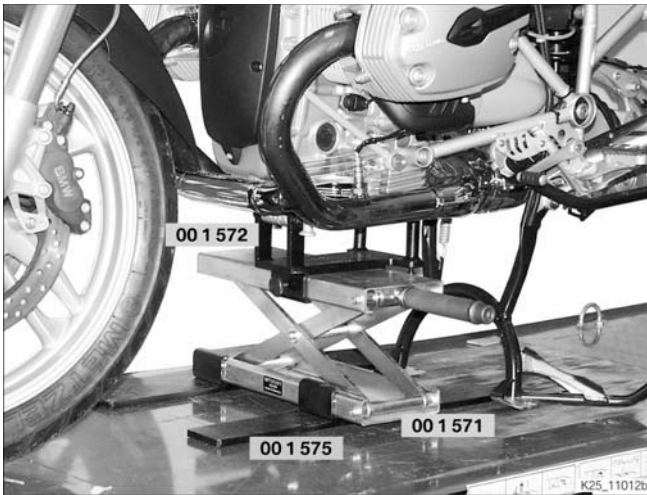


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

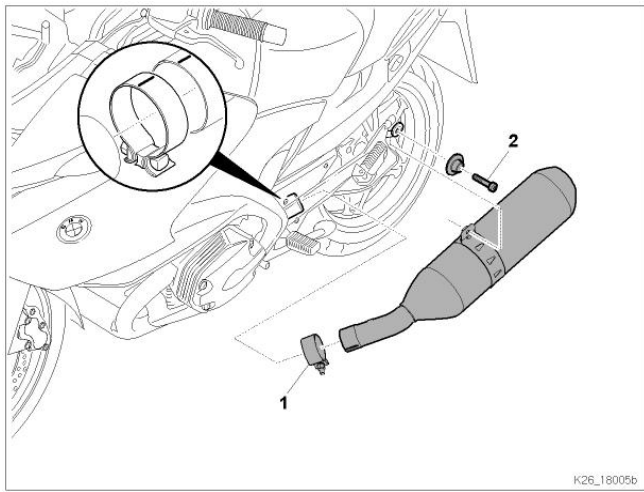


(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

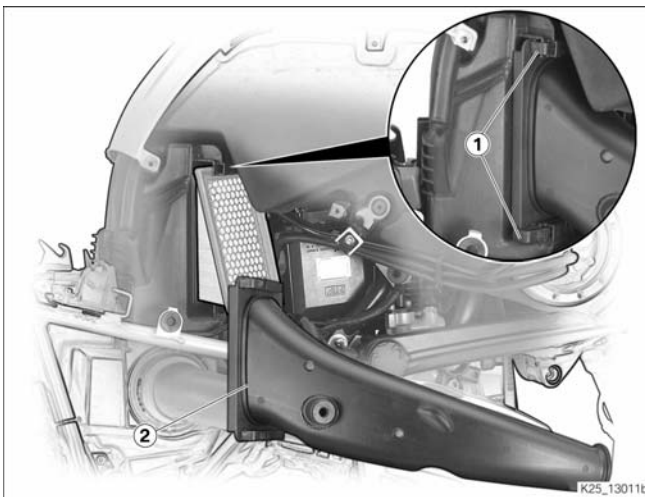
(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



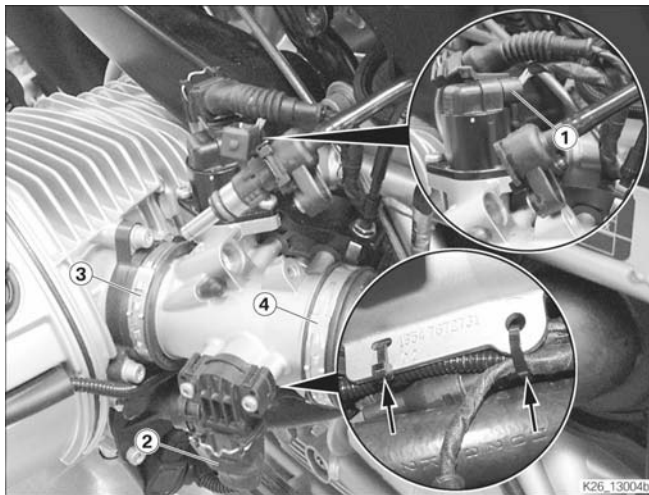
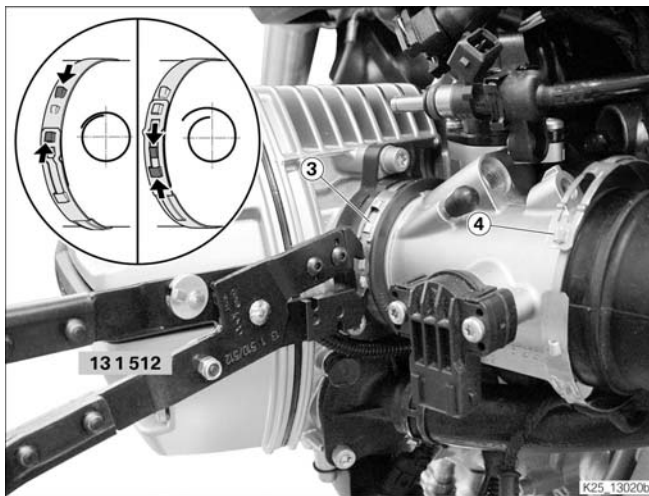
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.



(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

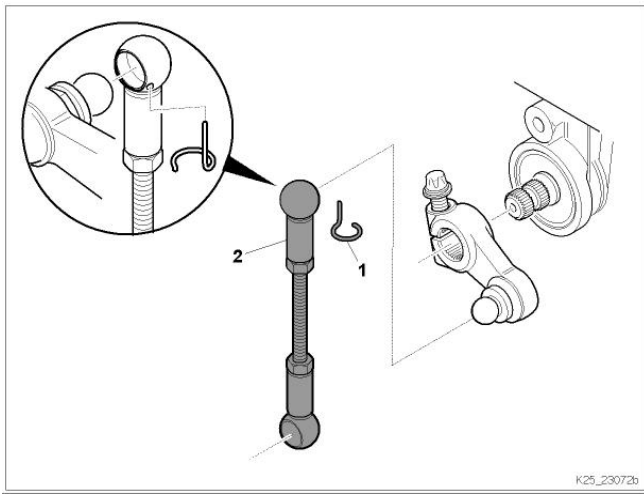
(-) Securing throttle valve stub with cable divider



- Tie up throttle valve stub and cable divider with cable tie (arrow).

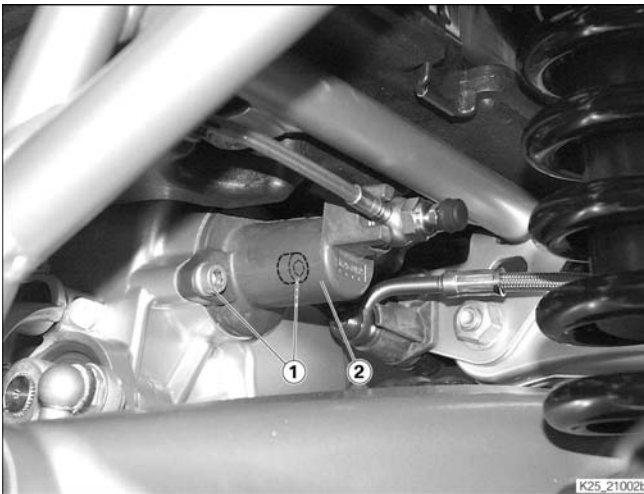
(-) Disengaging selector rod from shift lever

- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.



(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.

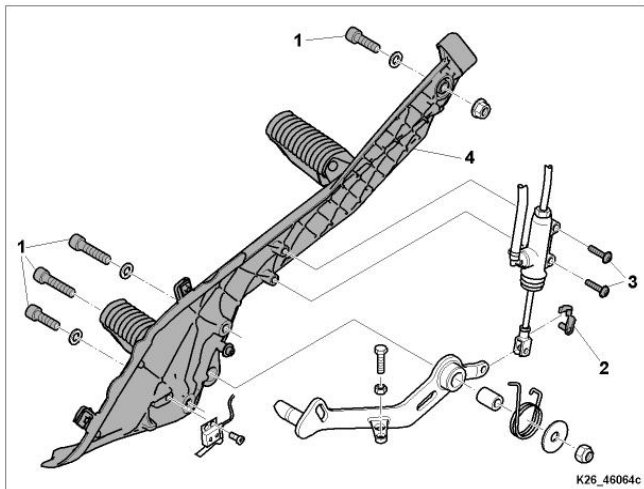


(-) Removing right footrest plate

- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.



Technical data

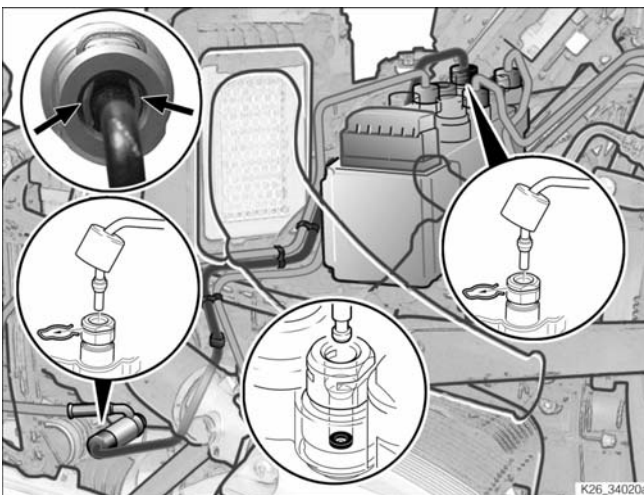
Release temperature, screws for rear brake master cylinder		100 °C	
--	--	--------	--

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.



- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.

(-) Disconnecting brake pipe for rear wheel circuit from pressure modulator



- Push the protective cap up.
- Remove the spring clip.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap the area around the connector in a cloth.
- Open the retaining clips, lift the brake pipe out of the pressure modulator and catch escaping brake fluid with a cloth.
- Seal the open end of the brake pipe to prevent brake fluid from dripping.

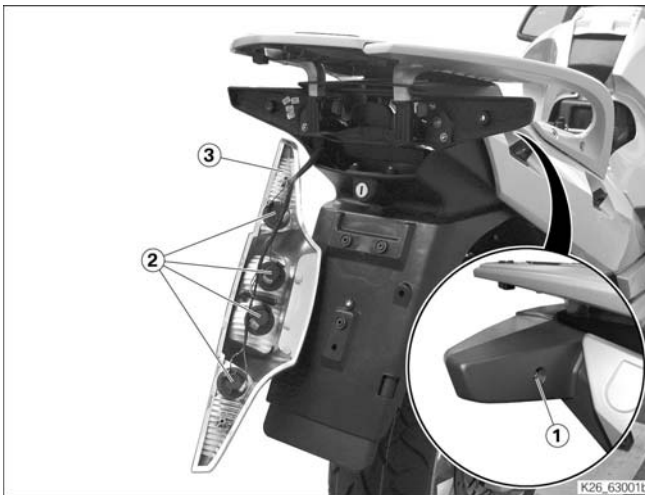


Note

Use the protective cap from a bleed screw to seal the brake pipes.

(-) Removing rear-light unit

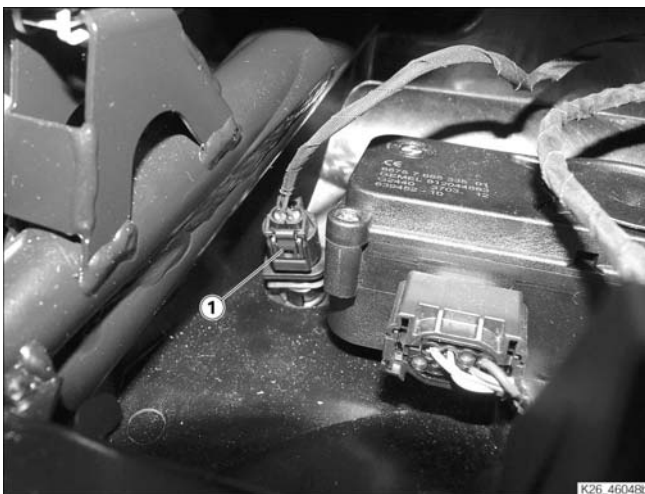
- Remove screws (1).
- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).



(-) Disengaging wiring harness at rear

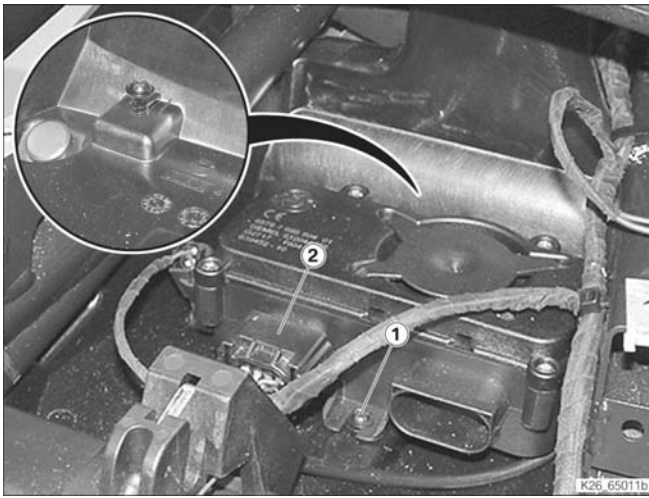
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



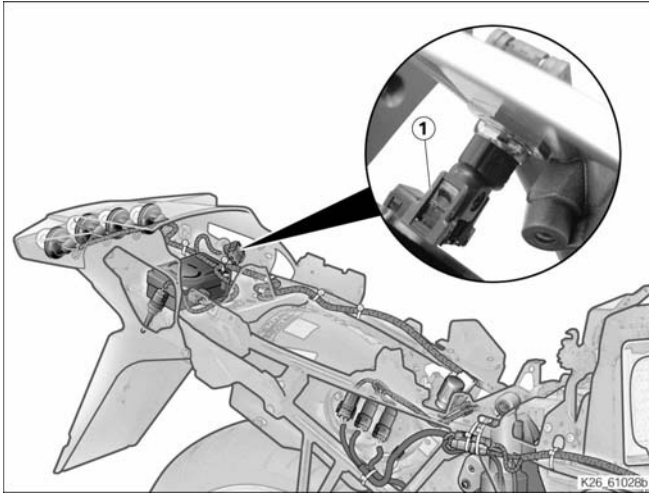
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

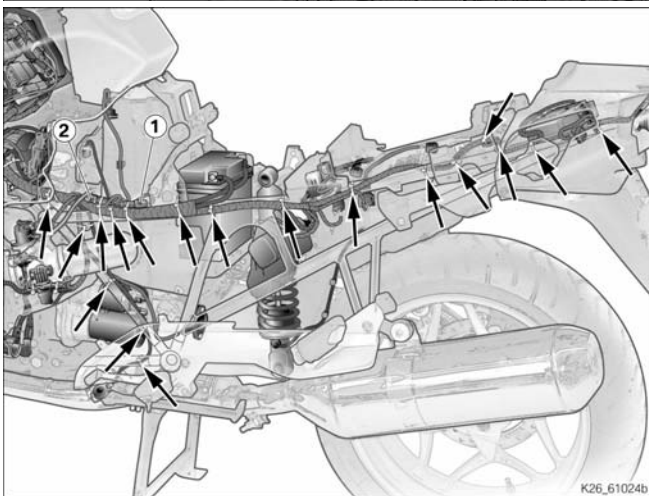


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.

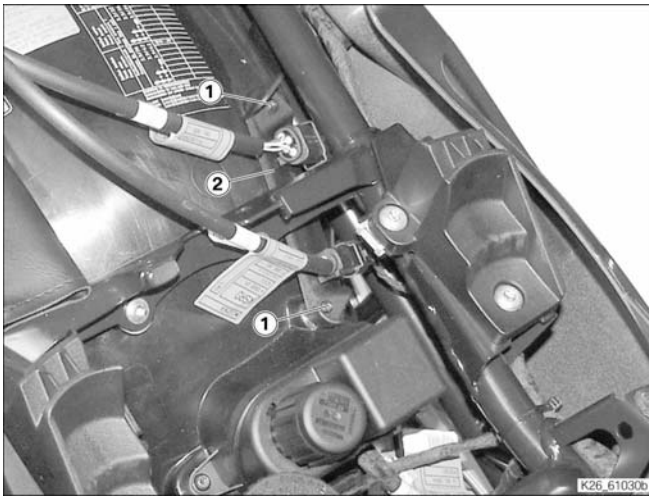


- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.

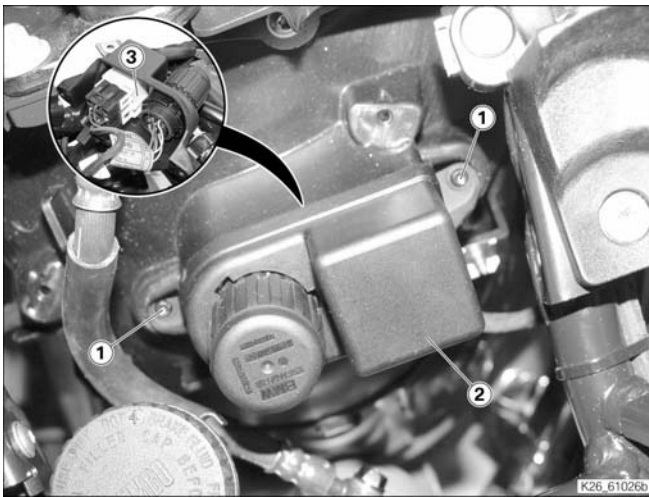


Variant, Seat heating

- Remove screws (1).
- Pass holder (2) forward with the cables.

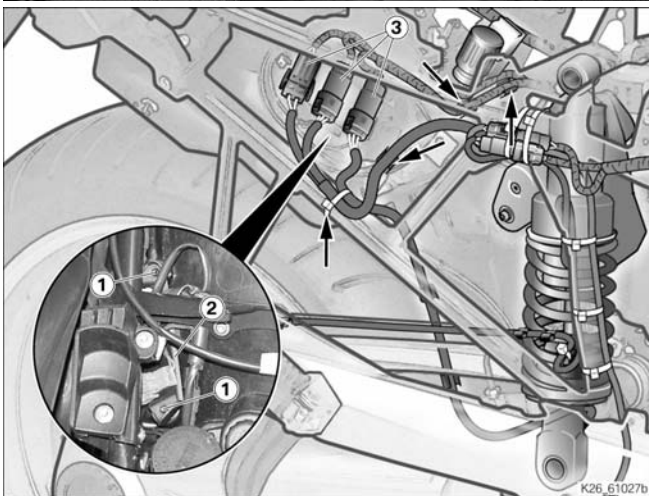


- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.

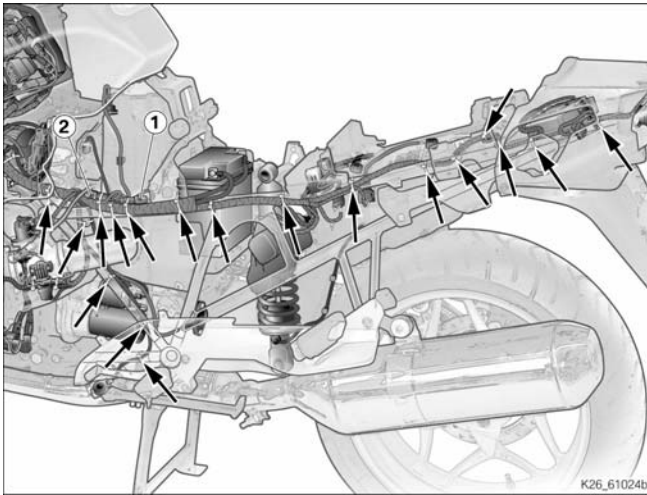
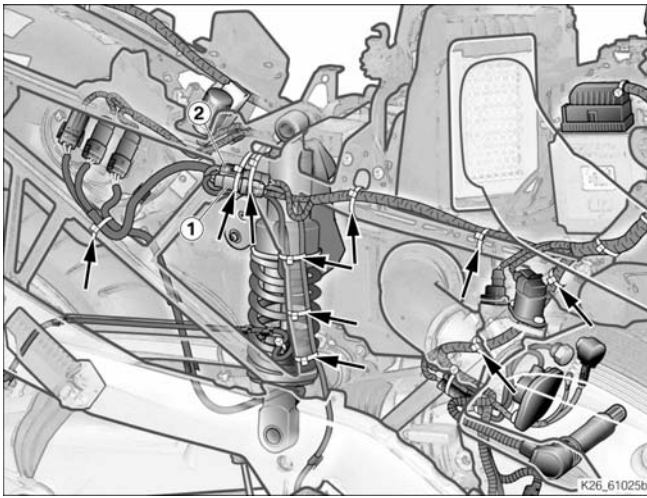


Variant, ESA

- Remove screws (1).
- Pass holder (2) forward with the cables.
- Disconnect plug (3) of the spring strut.



- Disconnect plug (1) of the speed sensor.



- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.

(-) Removing rear section of motorcycle



- Open hose clip (1).
- Disconnect the hose from the intake air silencer.

- Secure the front wheel on the lifting platform.
- Using straps, secure the rear section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.



► **Releasing threaded fastener on rear frame**

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.

! **Attention**

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

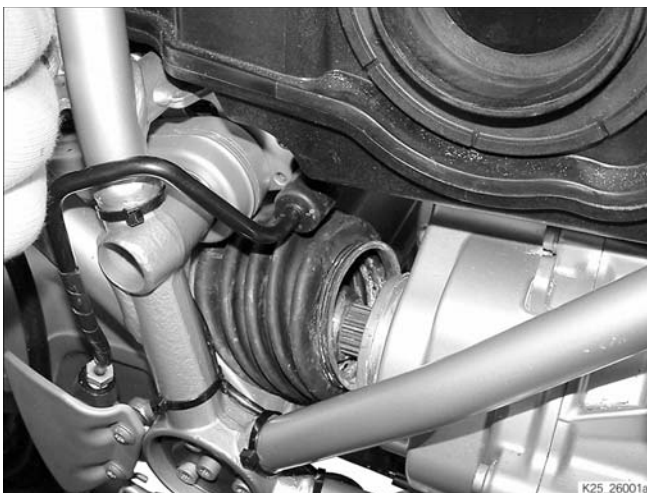
Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

Apply masking tape to the part of the swinging arm that could be damaged.

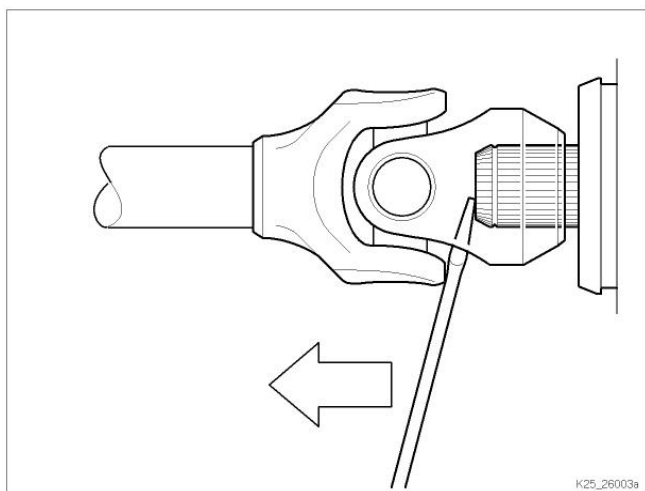
- Slacken screw (4), but do not remove it at this point.

▷ **Pressing universal shaft off gearbox output shaft**

- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.



- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the



shaft in this position.

- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Remove screw (4).



- Thread the fuel-tank breather hose out of the rear frame.
- Disconnect the fuel pressure regulator from the intake air silencer.
- Using crane (No. 46 5 671), (No. 46 5 672), (No. 46 5 673), (No. 46 5 674), carefully lift the rear section clear of the motorcycle, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.



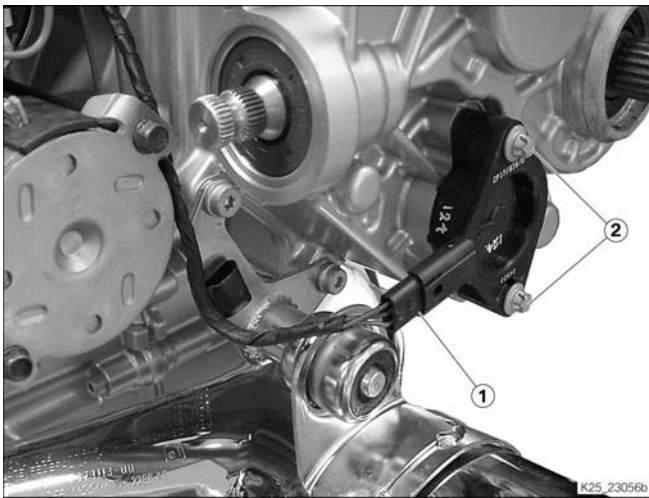
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Pass the control-circuit line with the brake master cylinder forward out of the way.
- Carefully set down the rear section where it will not be damaged.

(-) Removing gearbox potentiometer



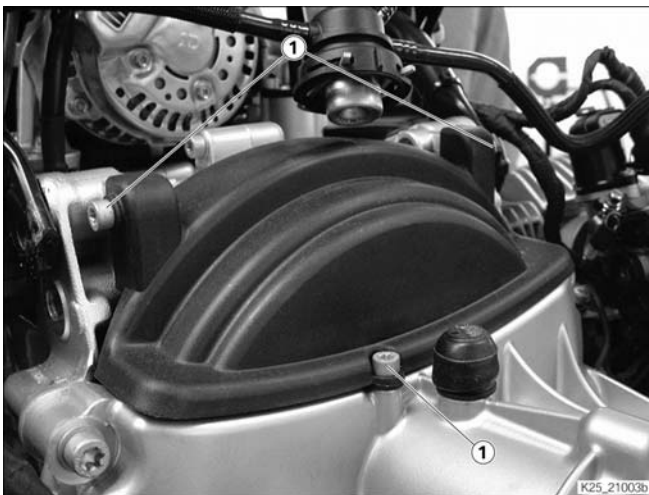
- Disconnect plug (1) of the gearbox potentiometer.
- Release the cable from the cable clips.
- Remove screws (2) from the gearbox potentiometer.
- Remove the gearbox potentiometer, noting the O-ring.

(-) Removing starter



- Disconnect "starter positive" cable (1) (terminal 30).
- Disconnect "starter start signal" plug (2) (terminal 50).
- Remove screws (3).
- Remove the starter.

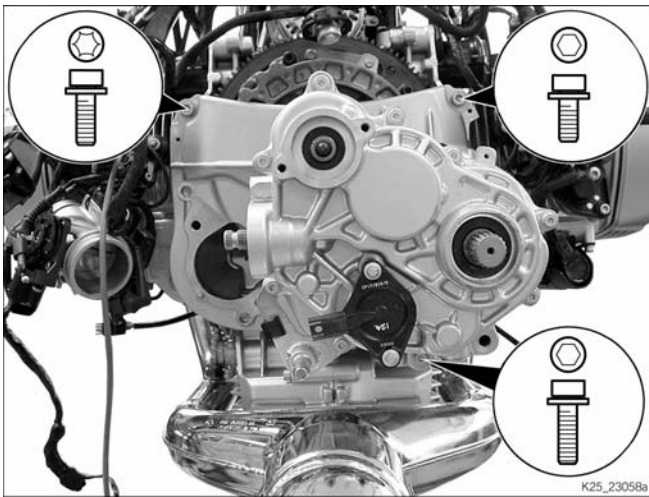
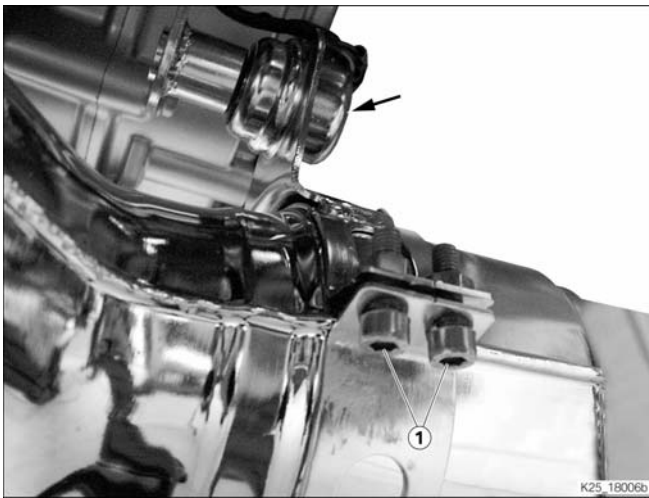
(-) Removing cover for clutch



- Remove screws (1).
- Carefully slip the clutch cover to the rear underneath the pressure modulator and remove.
- Install screws to hold the pressure modulator in position.

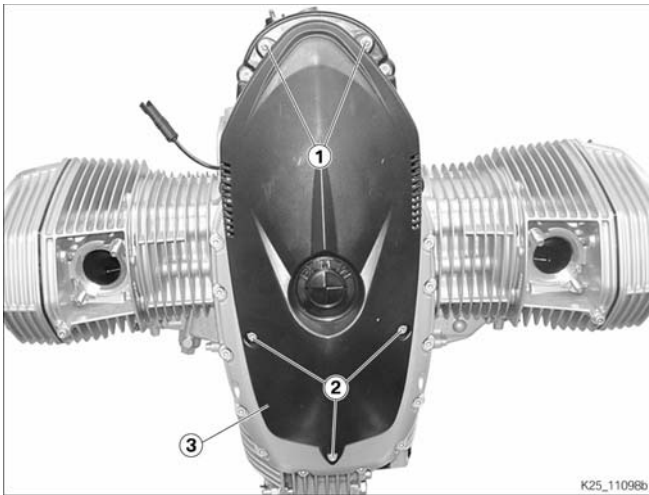
(-) Removing gearbox

- Remove screws (1) of the clamps on the exhaust manifold.
- Pull clamp (arrow) off the bracket.



- Remove 3 screws.
- Pull the gearbox straight to the rear to remove.
- Keeping it straight to ensure that oil does not escape through the breather, place the gearbox on a smooth, level surface.

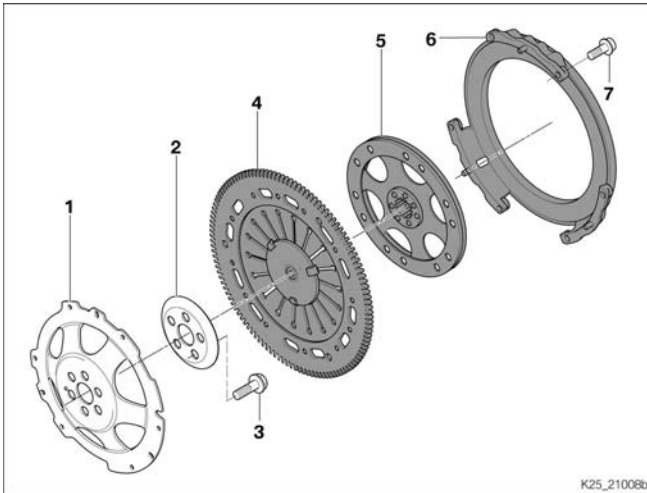
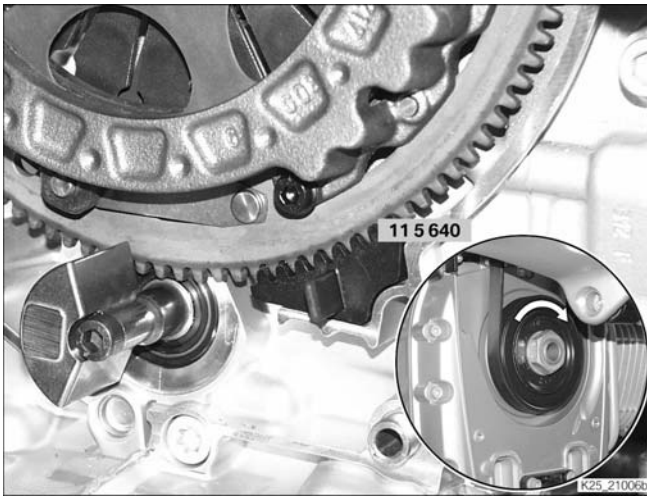
(-) Removing belt guard



- Remove screws (1) and (2).
- Remove belt guard (3).

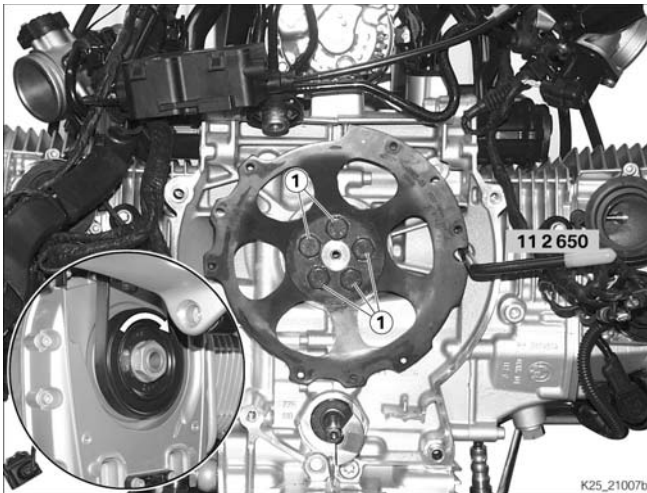
(-) Removing clutch

- By means of the belt pulley, turn the engine in the normal direction of rotation until the engine locking device can be inserted.
- Insert engine locking device (No. 11 5 640) .



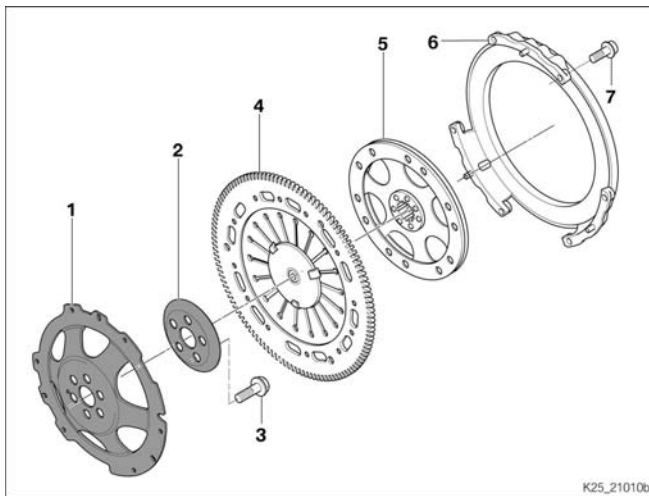
- Working in diagonally opposite sequence, loosen screws (7) in stages.
- Remove engine locking device (No. 11 5 640) .
- Remove the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6).

(-) Removing clutch housing

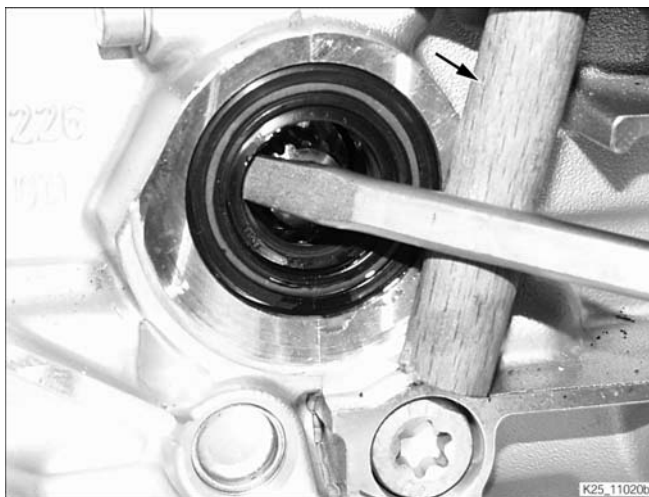


- By means of the belt pulley, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .


- Remove screws (3).
- Remove clutch housing (1) and reinforcing plate (2).
- Remove TDC locating pin (No. 11 2 650) .



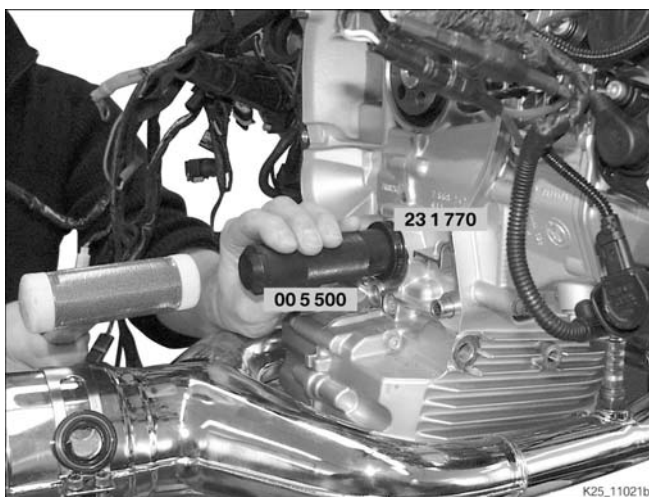
(-) Removing rotary shaft seal, counterbalance shaft



- Use a piece of wood (arrow) or similar to protect the edge of the crankcase and use a suitable screwdriver to pry out the rotary shaft seal.
- Clean the bore in the crankcase where the rotary shaft seal sits in the bore.

 <p>Consumables/lubricants</p>		
Brake cleaner	Cleaners	83 11 9 407 848

(-) Installing rotary shaft seal, counterbalance shaft



⚠ Attention

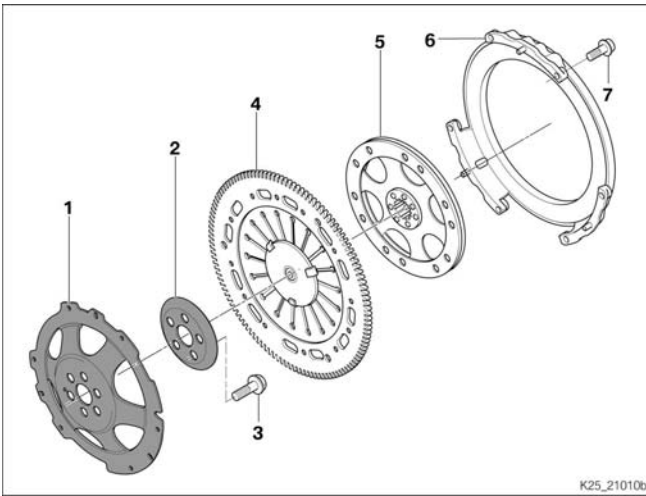
Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.

Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.

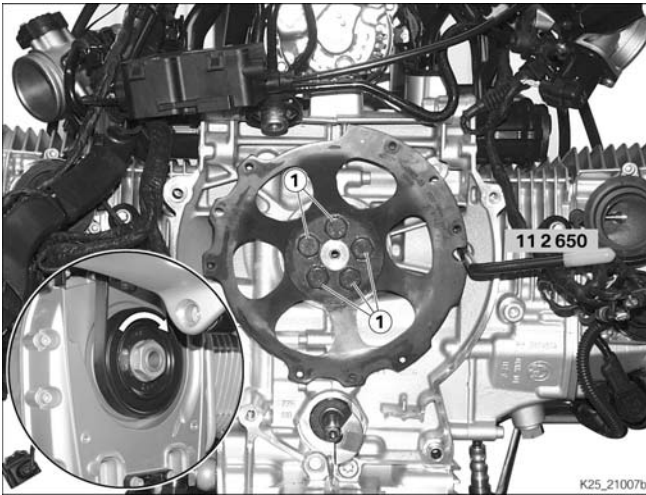
- Using handle (No. 00 5 500) and drift (No. 23 1 770) , drive the rotary shaft seal into the crankcase.

(-) Installing clutch housing

- Install the clutch housing with the locating lug engaged in the locating bore of the crankshaft.
- Install reinforcing plate (2) and install screws (3) to




K25_21010b



K25_21007b

hold it in position.

- By means of the belt pulley, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .
- Install screws (1) and tighten in correct tightening sequence.

 Tightening torques		
Never re-use the original screws, M11 x 1.5 12.9	Threads and underside of head lightly oiled	
	Initial torque, 40 Nm	
	Final torque, 40 °	


- Remove TDC locating pin (No. 11 2 650) .

(-) Installing balancing weight

- Lightly coat the friction face of the rotary shaft seal on balance weight (1) with engine oil.



K25_11019b


 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

 **Attention**

Nature: When the timing case cover is removed, the balancing shaft can be pushed forward in the engine and damage the sealing lip of the shaft sealing ring.

Avoidance: If the timing case cover is removed secure the balancing shaft in position, so that it cannot be pushed forward.

- Push balance weight (1) onto the counterbalance shaft.
- Install screw (2) and tighten.

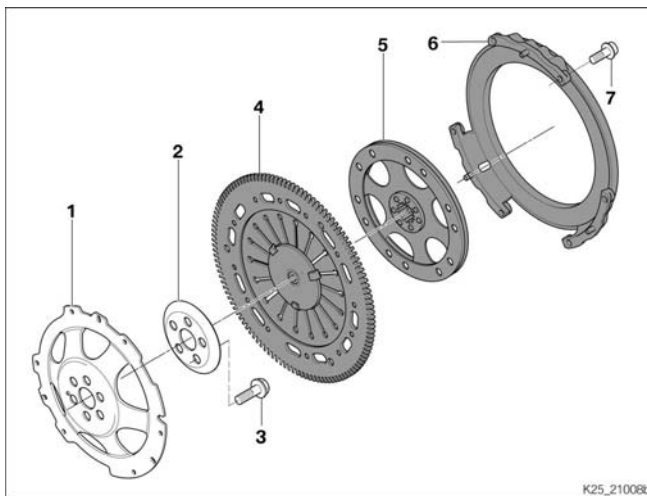
 Tightening torques		
Neck-down screw, M8 x 70, Replace screws	Initial torque, 10 Nm	
	Final torque, 90 °	

(-) Checking clutch for foreign matter

- Remove housing cover (6) from thrust plate (4) and remove clutch plate (5).

Test


- Check the friction faces of thrust plate (4) and housing cover (6) for foreign matter.



Result: Oil or grease on friction faces.

Measure:

- Clean and degrease the friction faces.

 Consumables/lubricants		
Brake cleaner	Cleaners	83 11 9 407 848

Test

- Check clutch plate (5) for foreign matter.

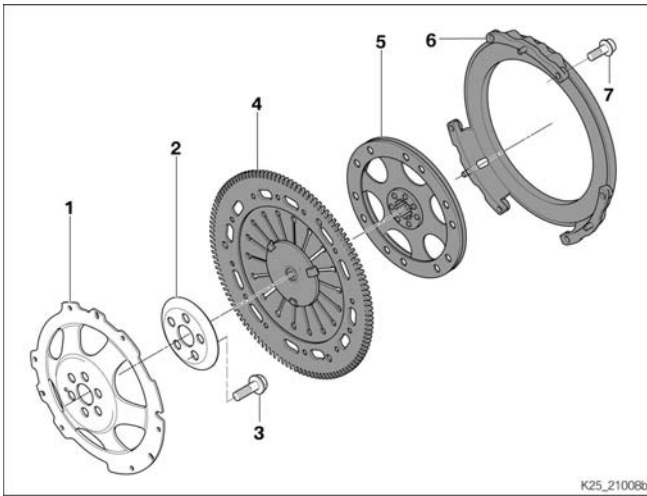
Result: Oil or grease on clutch plate.

Measure:

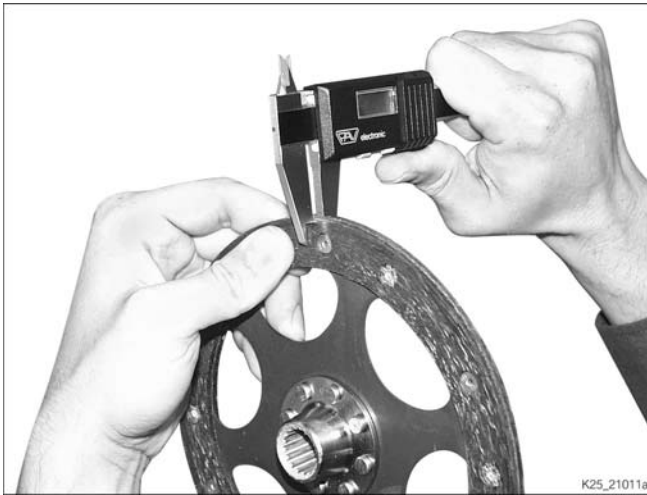
- Replace clutch plate (5).

(-) Checking clutch for wear

- Remove housing cover (6) from thrust plate (4) and remove clutch plate (5).




K25_21008b



K25_21011a

Test

- Measure the thickness of clutch plate (5).

 Technical data			
Clutch plate - thickness	Measured with caliper tips	4.4 - 4.6 mm	
Value definition:	pressed by hand against rivets of clutch plate		
Wear limit			

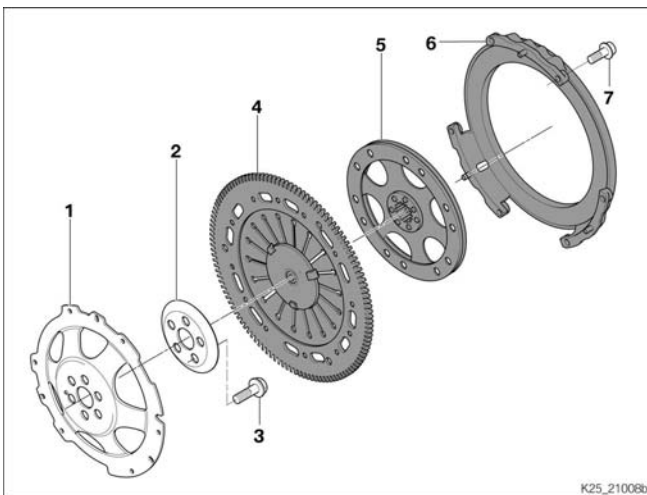
Result: The clutch plate is worn to the wear limit.

Measure:

- Replace clutch plate (5).

Test

- Visually inspect the friction faces of housing cover (6) and thrust plate (4) for signs of wear and scoring.

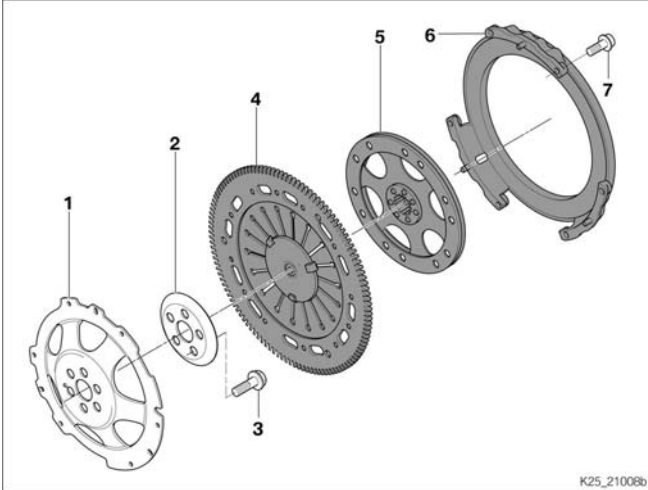


K25_21008b

Result: Deep grooves or signs of wear in the friction faces of the clutch components.

Measure:

- Replace housing cover (6) and thrust plate (4) as a set together with clutch plate (5).



(-) Installing clutch


- Install the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6) in clutch housing (1).



Note

The clutch components are all precision-balanced. It is not necessary to check for identification marks when assembling.

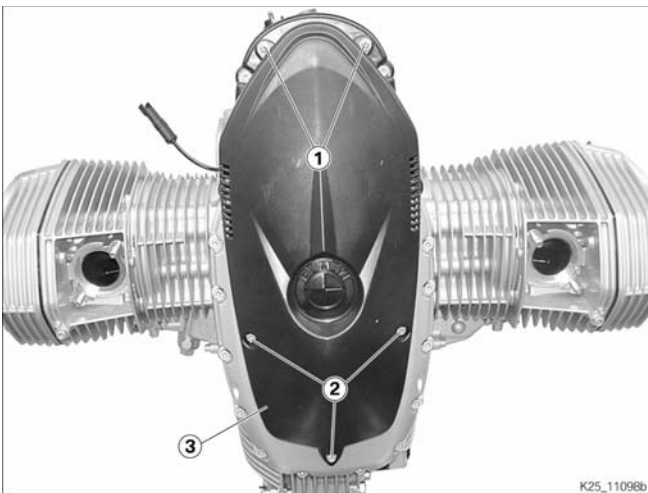
- Insert screws (7).
- Use centering pin for clutch (No. 21 2 673) to centre the clutch plate.
- Insert engine locking device (No. 11 5 640) .
- Install screws (7) and tighten in correct tightening sequence.


 Tightening torques		
Never re-use the original screws, M6 x 20, in diagonally opposite sequence and stage by stage	12 Nm	

- Remove engine locking device (No. 11 5 640) and centering pin for clutch (No. 21 2 673) .

(-) Installing belt guard


- Install belt guard (3) and secure with screws (1) and (2).



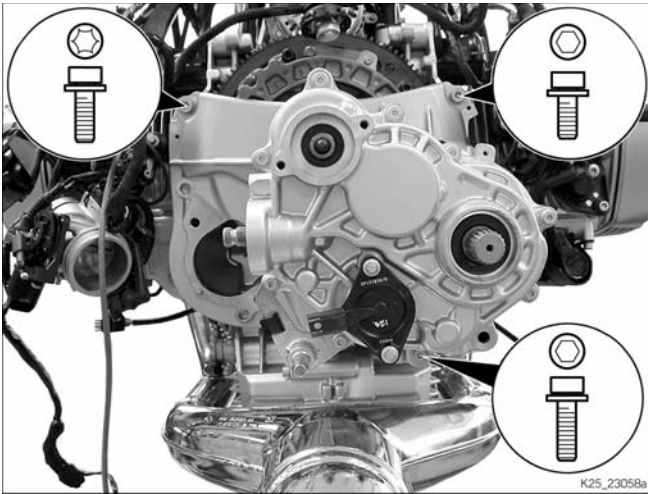
 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing gearbox

- Remove dirt and old lubricant from the splines of the clutch hub and the gearbox input shaft.
- Lubricate the splines of the clutch hub and the gearbox input shaft.

 Consumables/lubricants		
Optimoly MP 3	High-	07 55 9

	performance lubricating grease	062 476
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- Position the gearbox with the gearbox input shaft just introduced into the hub of the clutch plate.




Note

You will find it easier to introduce the splined end of the gearbox input shaft into the clutch hub if you engage a gear and turn the gearbox output shaft.

- Slide the gearbox over the reamed sleeve until it mates with the crankcase.
- Install 3 screws.

 Tightening torques		
Gearbox to engine block, M8 x 35	19 Nm	
Gearbox to engine block, M8 x 70	19 Nm	
Gearbox to engine block, M8 x 50	19 Nm	


- Slip the exhaust clamp onto the holder on the gearbox and align it with the exhaust.
- Tighten screws (1).

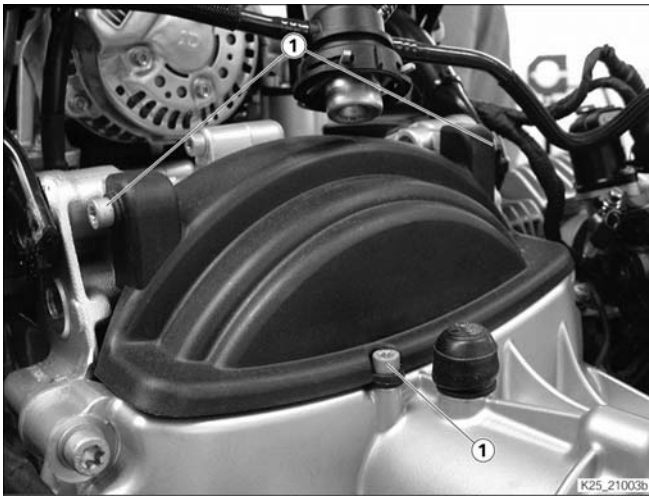
 Tightening torques		
Clamp, elbow, rear, M6 x 20	8 Nm	
Optimoly TA		



(-) Installing cover for clutch

- Remove screws (1).
- Carefully fit clutch cover under the pressure modulator and align.
- Install screws (1).


 Tightening torques		
Clutch cover to engine, M6 x 16	8 Nm	




(-) Installing starter

- Install the starter.
- Install screws (3).



 Tightening torques		
Starter with gearing to engine, M8 x 60	19 Nm	

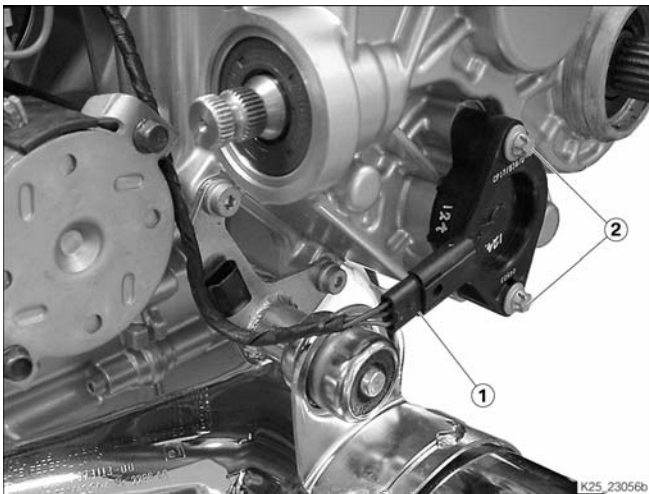
- Connect "starter positive" cable (1) (terminal 30).


 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).

(-) Installing gearbox potentiometer

- Install the gearbox potentiometer, noting the O-ring.
- Install screws (2).



 Tightening torques		
Gear potentiometer to gearbox	9 Nm	

- Connect plug (1) to the gearbox potentiometer.
- Clip the cable into the cable clips.

(-) Installing rear section of motorcycle

- Remove dirt and old lubricant from the splines of the gearbox output shaft.
- Lubricate the splines of the gearbox output shaft.

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Consumables/lubricants

Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476
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- Carefully manoeuvre the rear section of the motorcycle into position at the front section, making sure that the wiring harness is correctly positioned.
- Mate the universal shaft with the gearbox output shaft and align the rear frame with the anchorages.



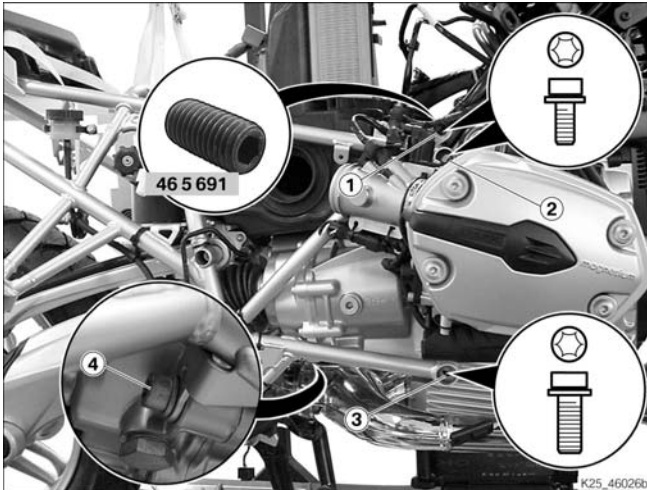
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Carefully turn the rear wheel to check that the universal shaft is still correctly positioned.
- Position the fuel pressure regulator on the intake air silencer.

► **Securing rear frame to motorcycle**

- Install screw (4), **but do not tighten it at this point.**
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert screws (1) on left and right.
- Tighten screw (4).
- Tighten screws (1), (2) and (3).

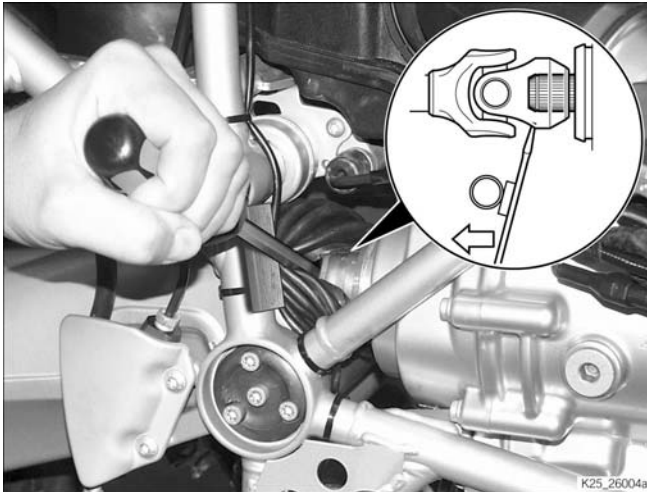


Tightening torques

Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	

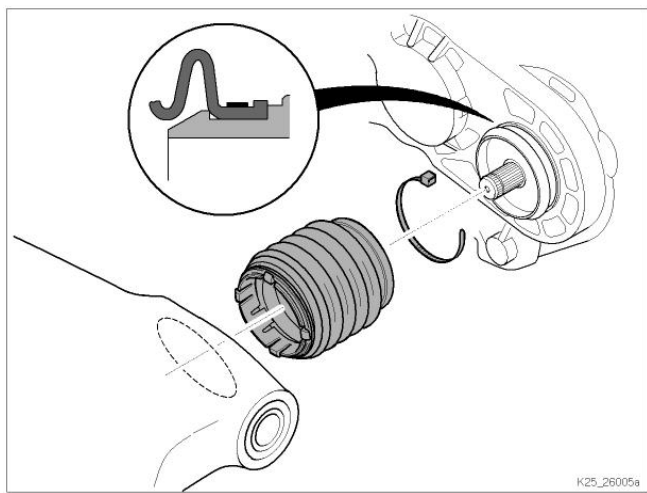


► **Pressing universal shaft onto gearbox output**



shaft

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.



Consumables/lubricants

Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174
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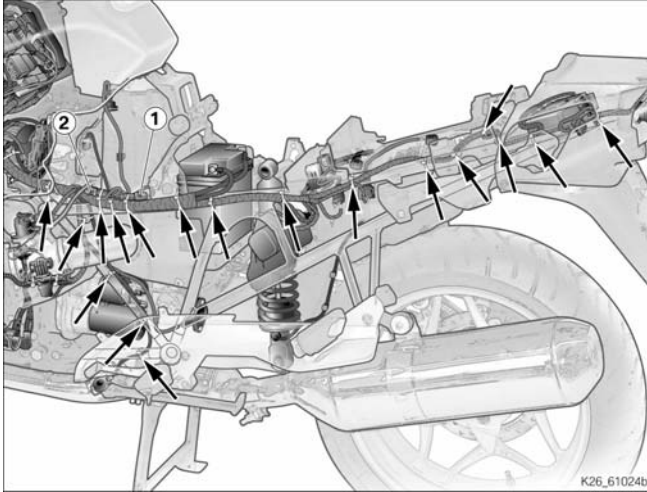
- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.



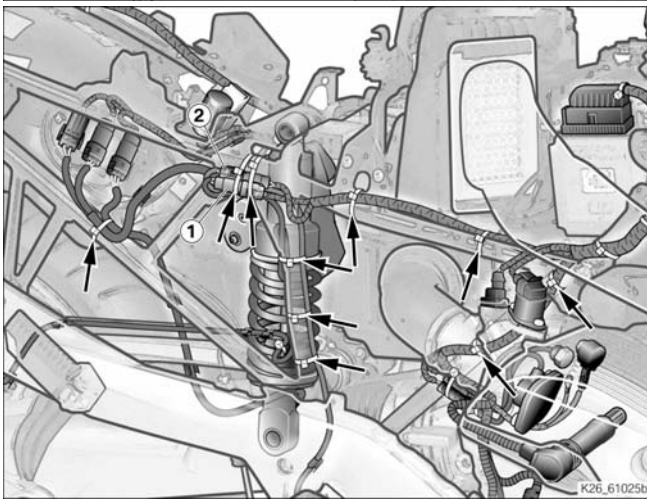
- Release the straps securing the front wheel and disengage crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) with the straps from the rear section of the motorcycle.
- Release the control-circuit line complete with the brake master cylinder and pass it through to the rear.
- Route the fuel-tank breather hose into position along the rear frame.
- Connect the hose of the crankcase breather to the intake air silencer.
- Slide hose clamp (1) into position.



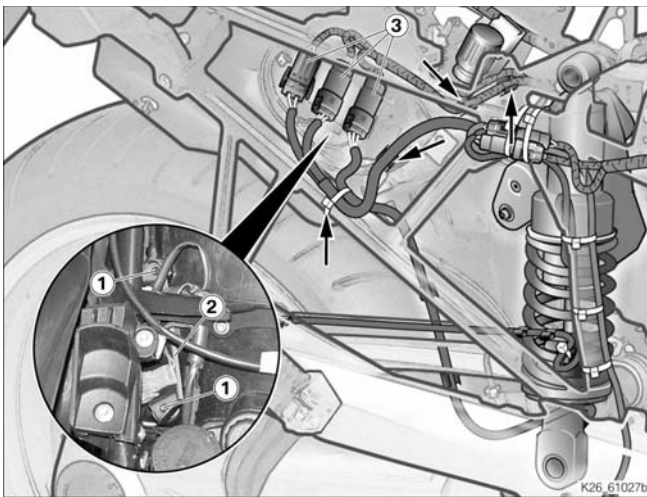
(-) Securing wiring harness at rear



- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.



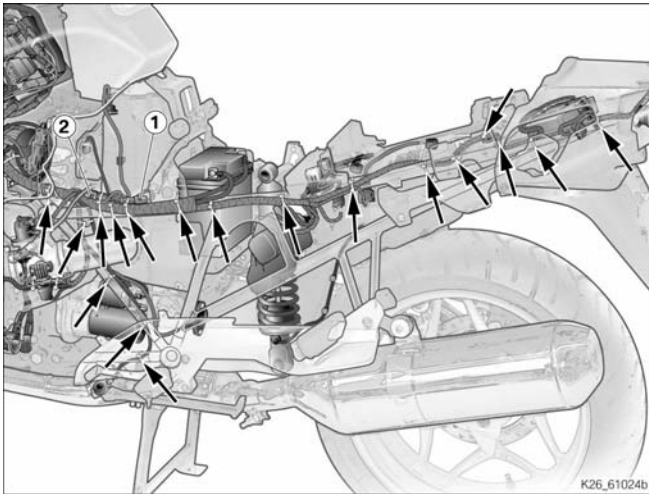
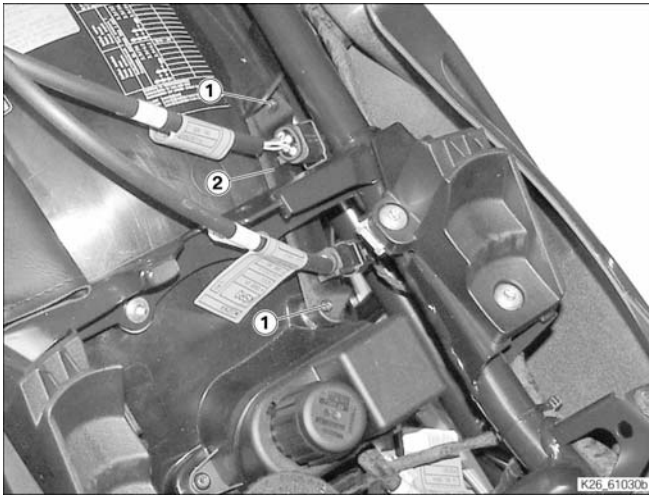
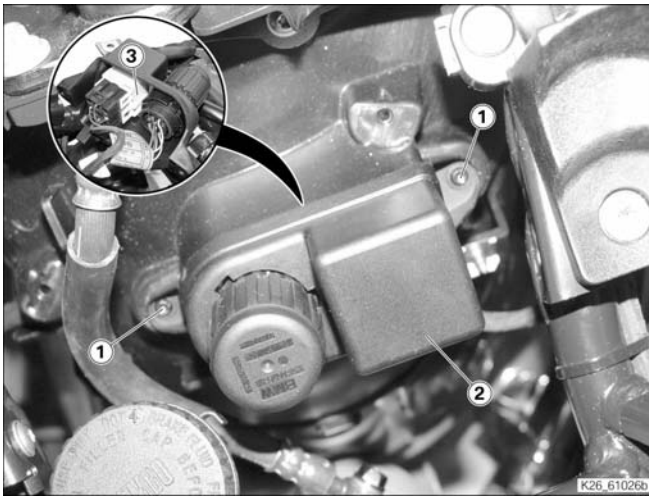
- Connect plug (1) of the speed sensor.



Variant, ESA

- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Secure holder (2) with screws (1).

- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).



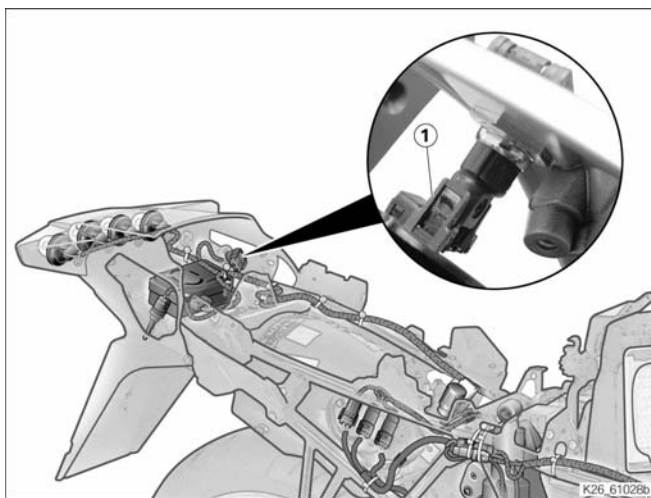
Variant, Seat heating

- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

- Secure the wiring harness to the rear frame with cable ties (arrows).

Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



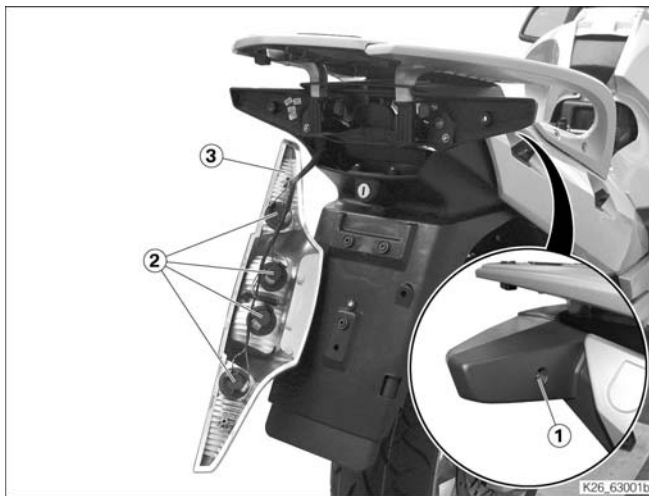
Variant, On-board computer

- Connect plug (1) of the temperature sensor.

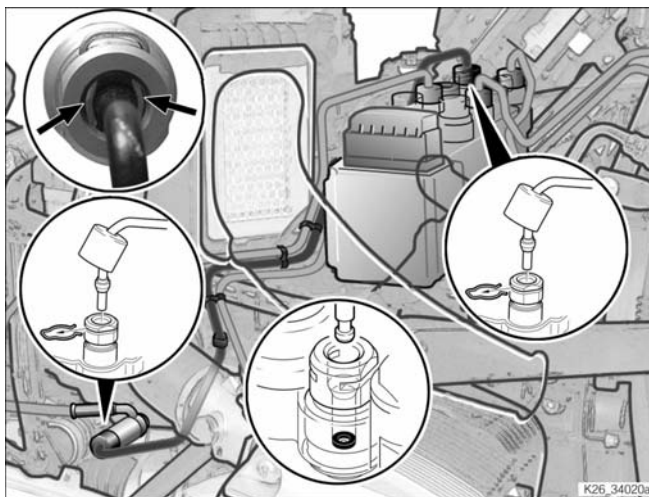


(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



(-) Connecting brake pipe for rear wheel circuit to pressure modulator



Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.



Warning

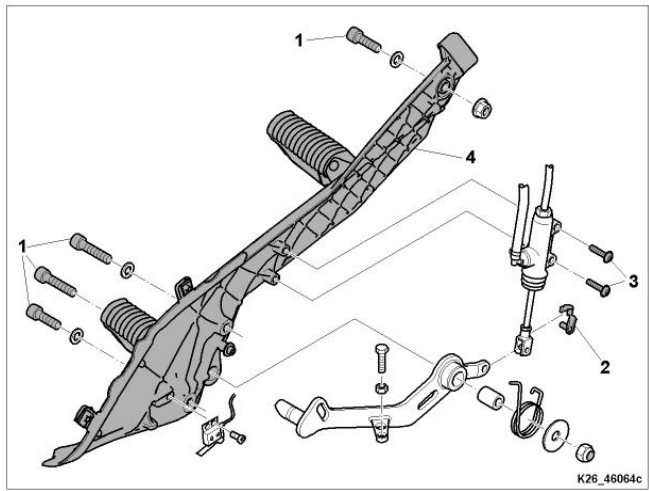
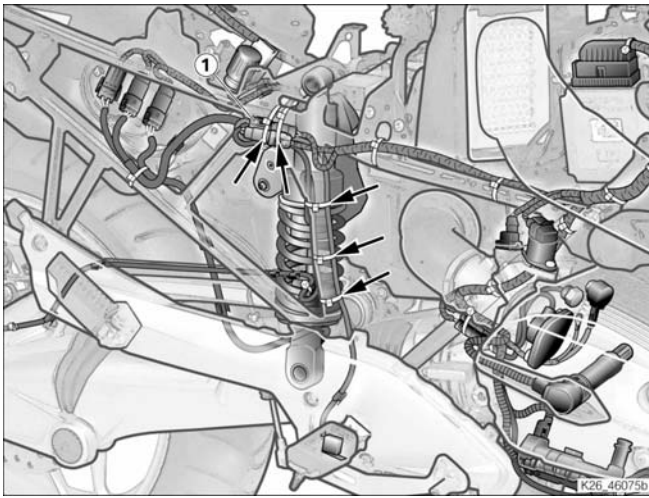
Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.


- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Installing right footrest plate


- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

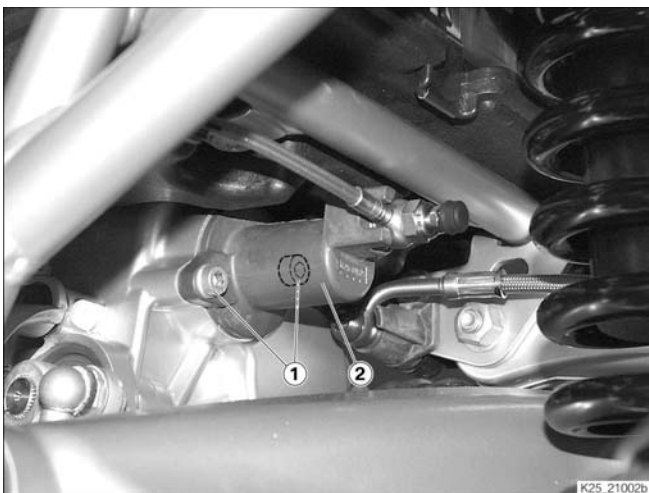
- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.

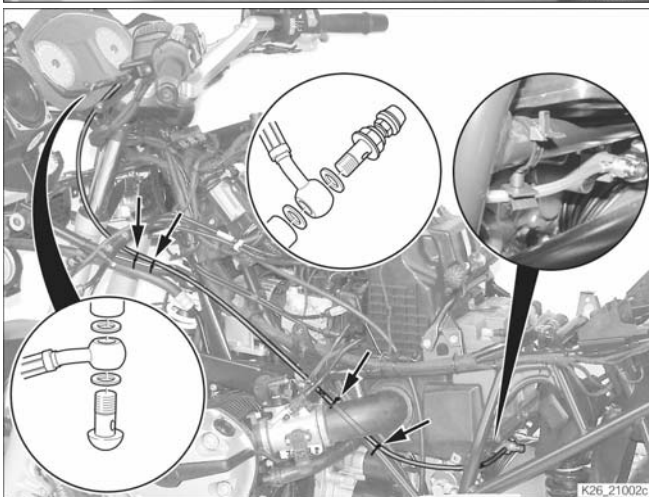


(-) Installing clutch slave cylinder



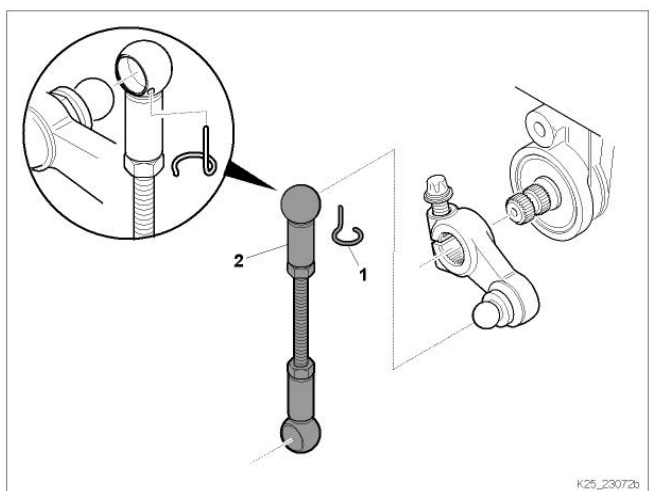
- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.

 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	




- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.

(-) Securing selector rod to shift lever



- Grease the ball head of the shift lever and the ball socket of selector rod (2).

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

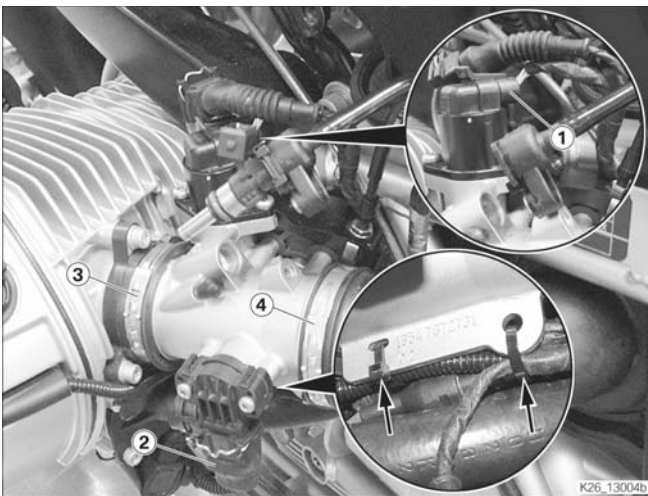
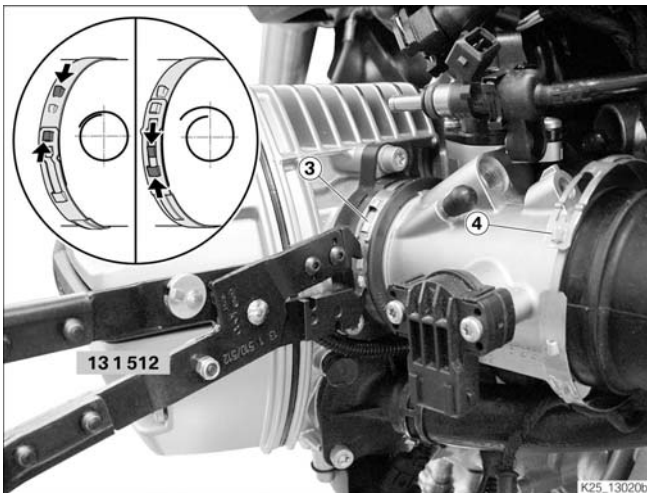
(-) Releasing throttle valve stub with cable divider

- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.



(-) Installing throttle-valve stub

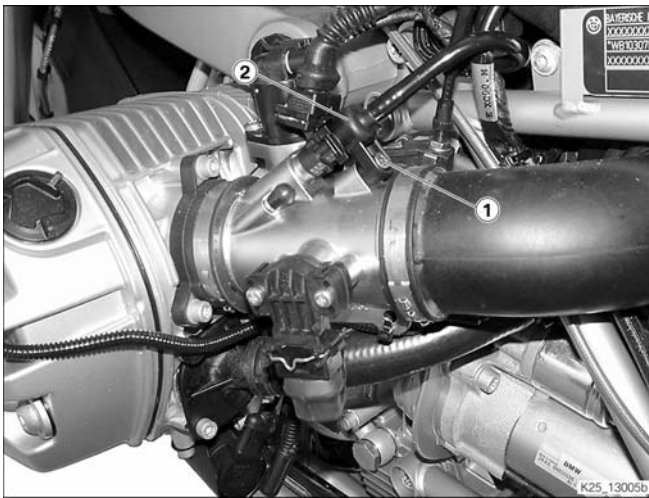
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .




- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing right and left injection valves

- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure

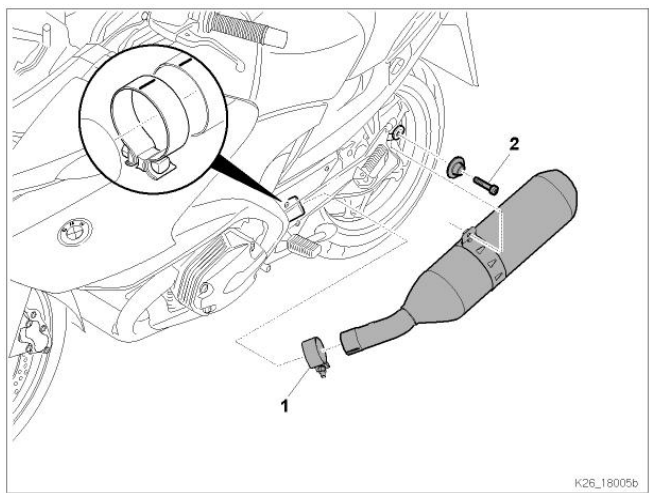


with screws (2).


 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.


(-) Installing silencer



- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

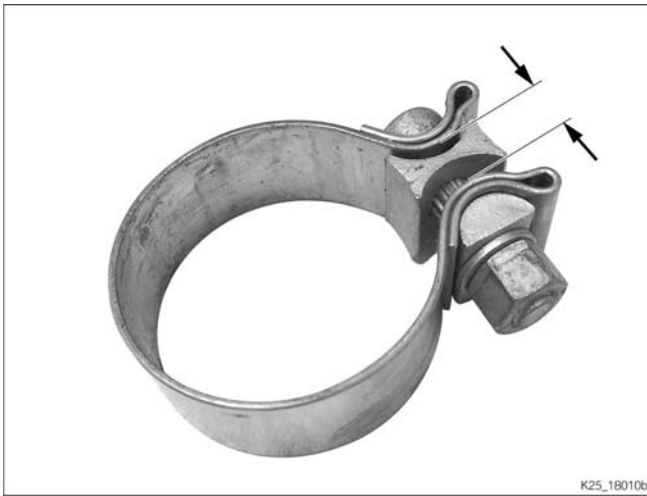
- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


► Checking Torca clamp on silencer

- Tighten the Torca clamp.



Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

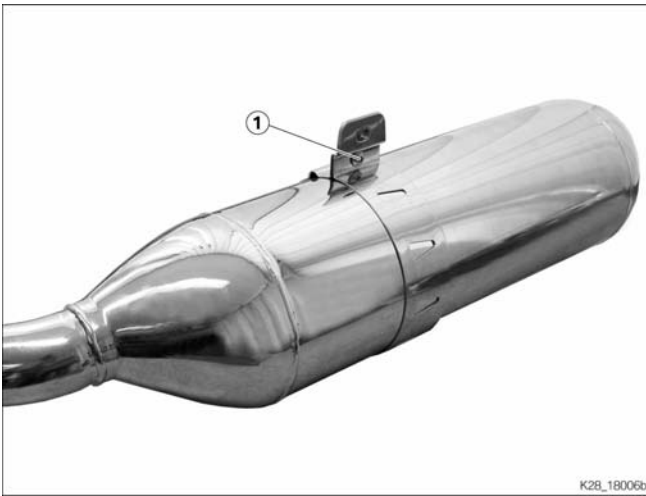


Attention


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.


Open the clamp far enough and grease it lightly.




- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

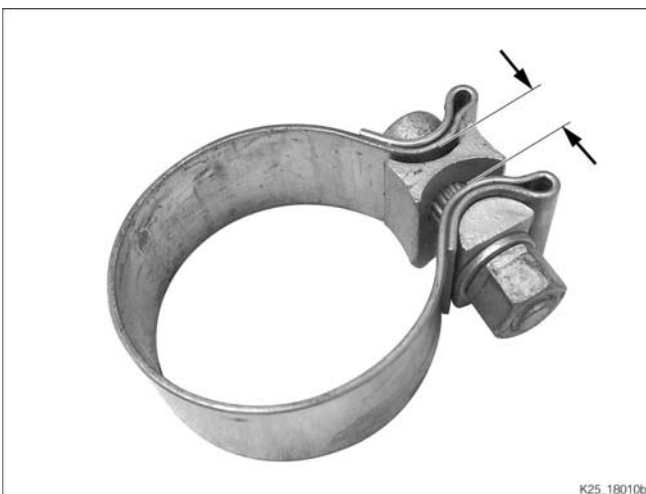



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



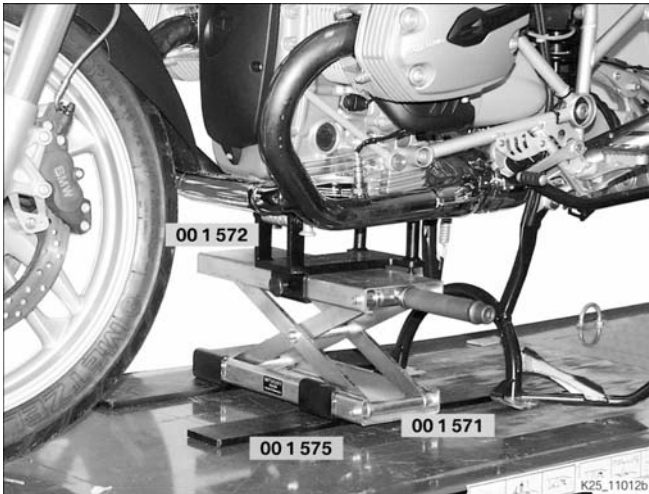
- Once again check distance (arrows) between silencer and rear wheel.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

(-) Removing engine stand



- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .

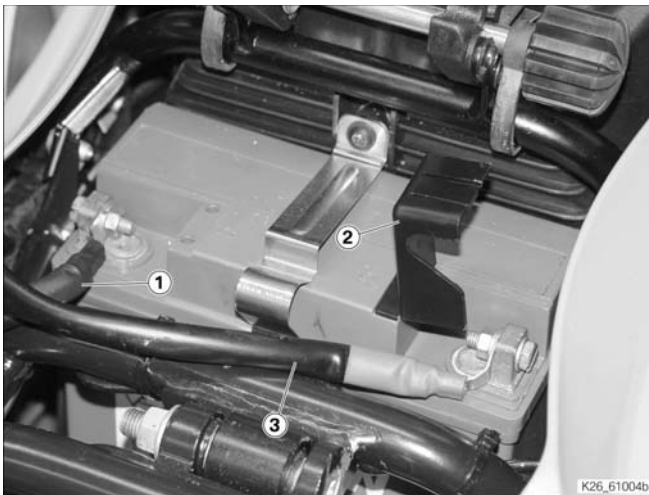
(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.



- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

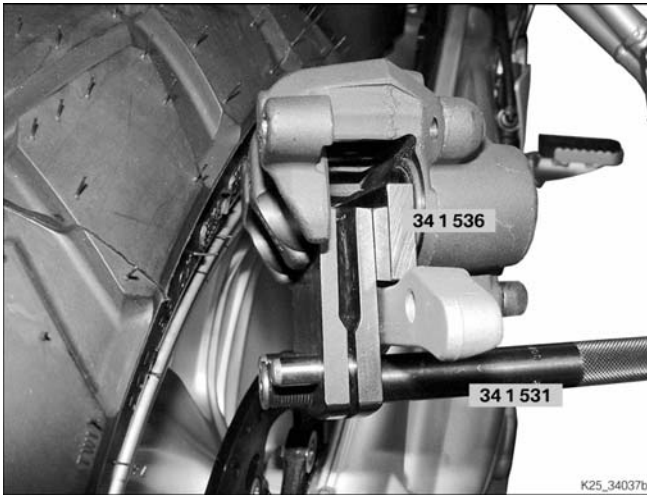


Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the


pressure modulator.



- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

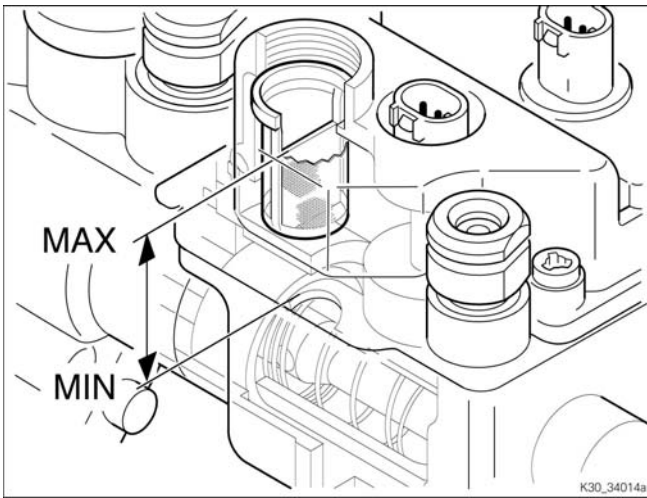
- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

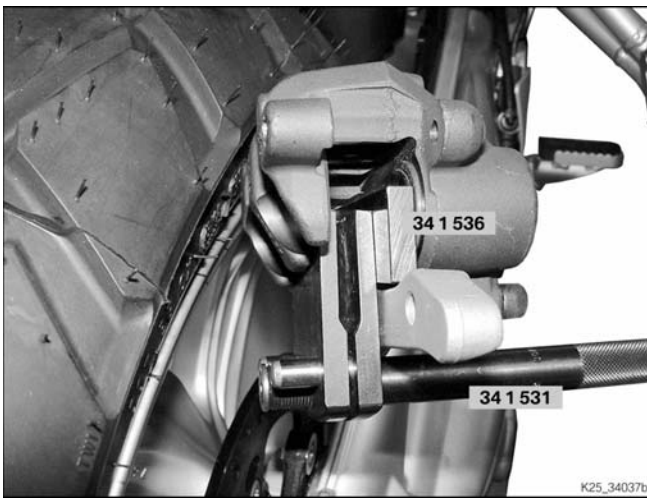
Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in



accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.



► **Instructions for filling rear wheel circuit reservoir**

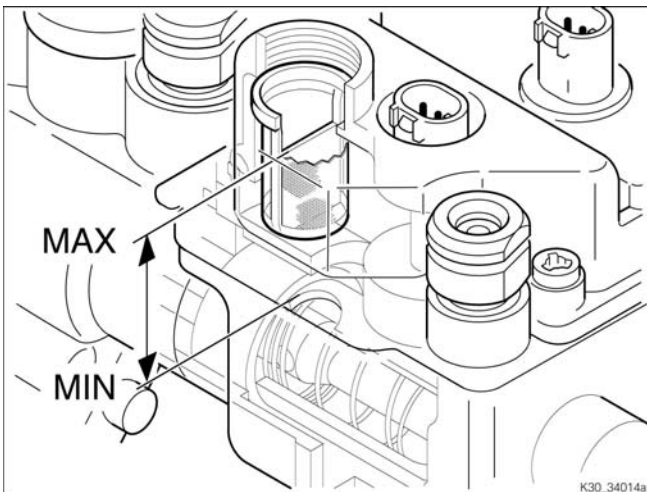
- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536) , in the rear brake caliper.



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.



- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.



Consumables/lubricants

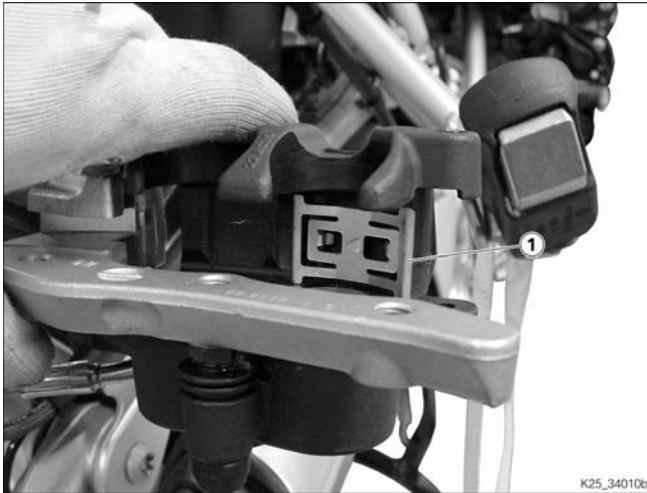
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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- Hand-tighten the cap of the rear wheel-circuit reservoir.

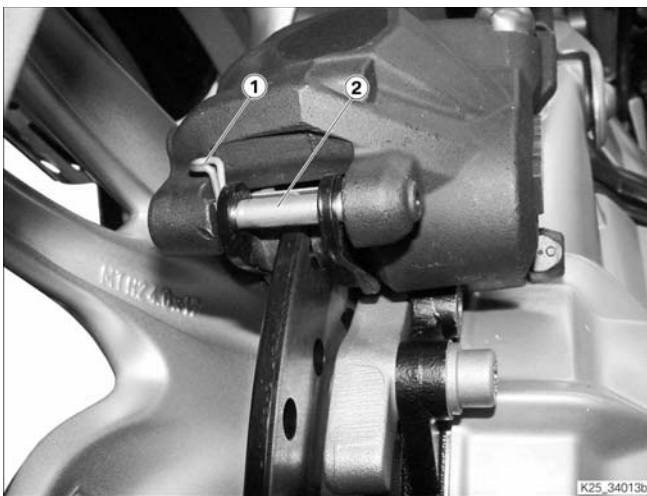
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary

▷ **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.
- » Arrow points in direction of travel.



K25_34010b



K25_34013b


- Install the brake pads.
- Manually install retaining pin (2).

▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).



K25_34034b

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

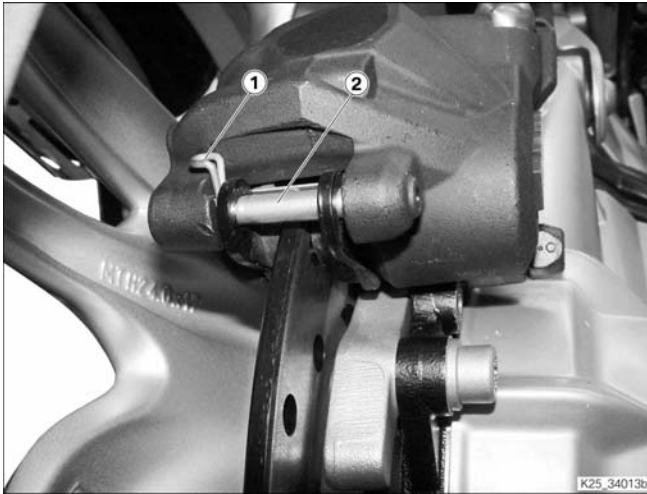
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



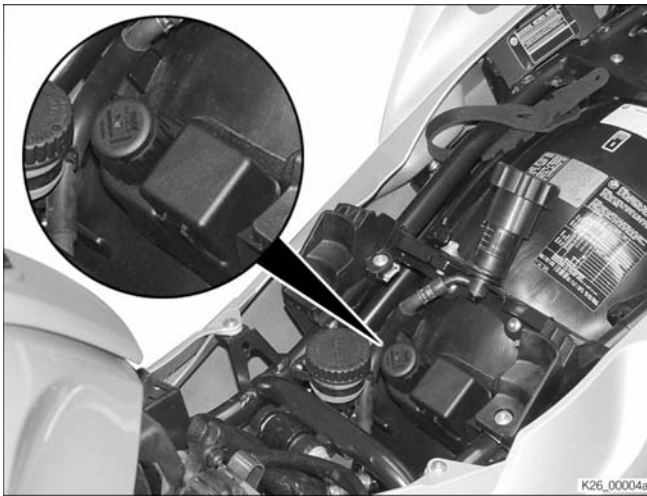
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.



- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



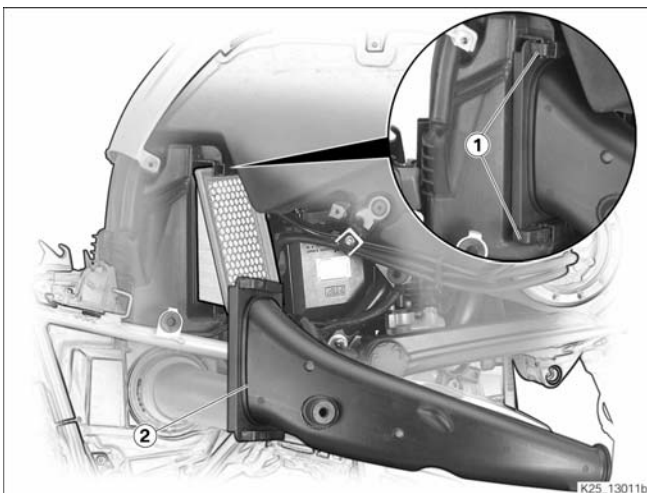
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

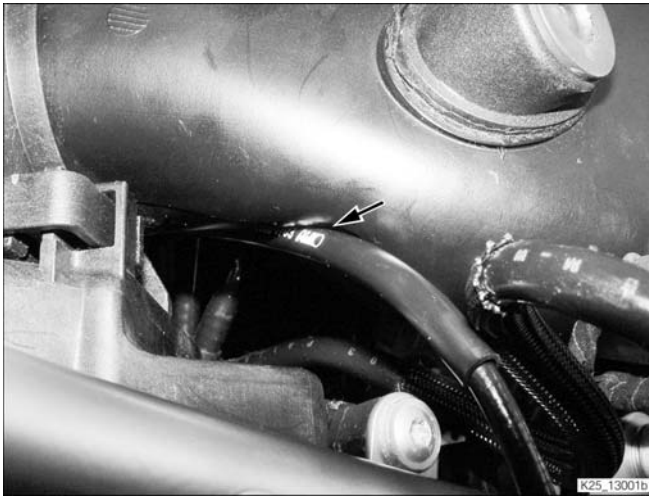
- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing intake air pipe



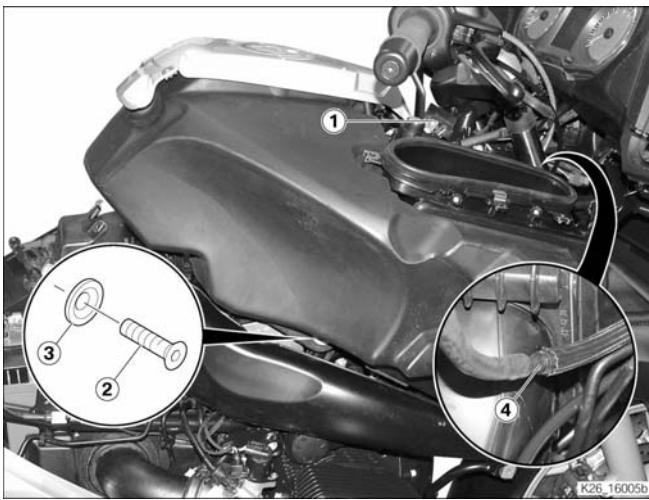
- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the



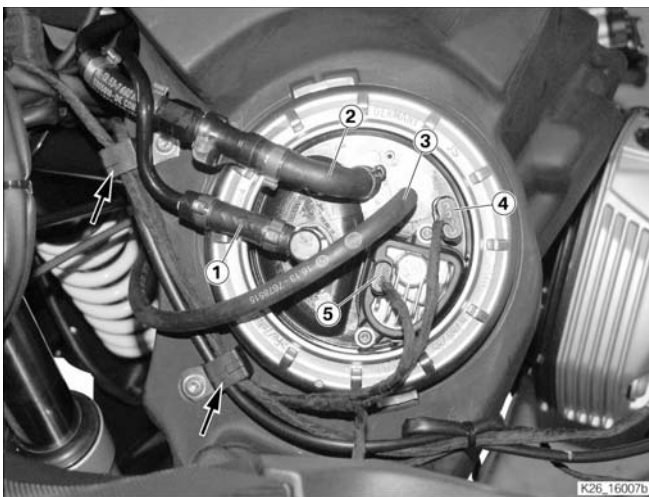
guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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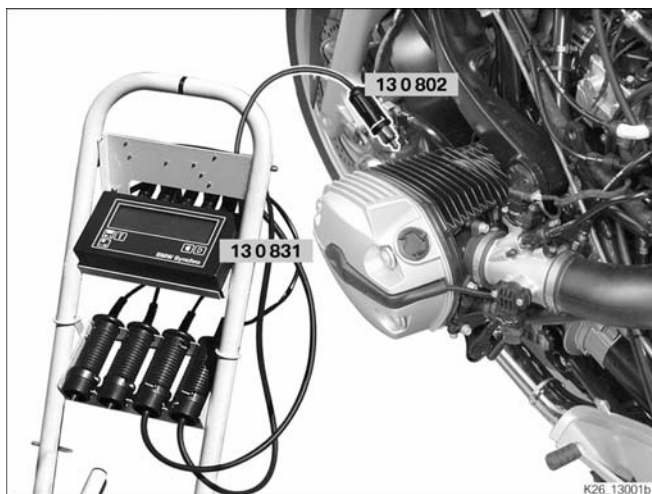
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

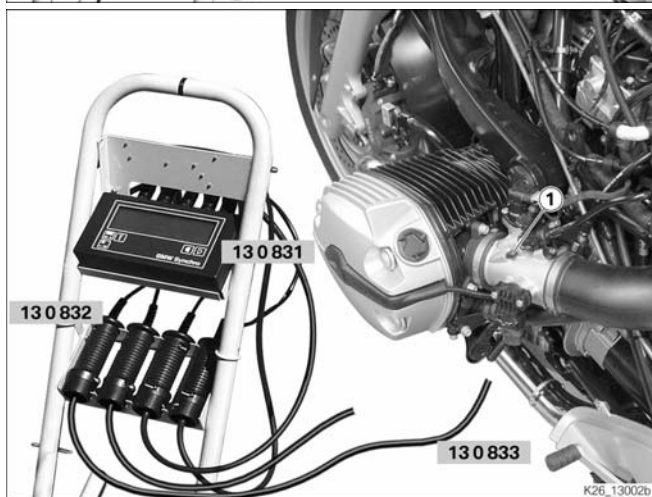
- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 832) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



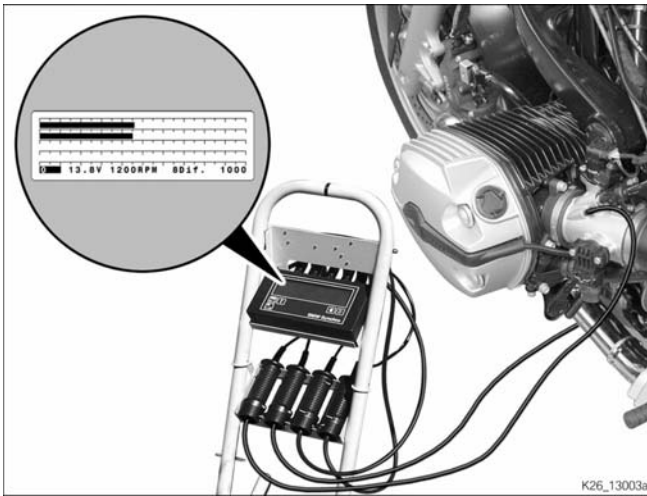
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions

issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

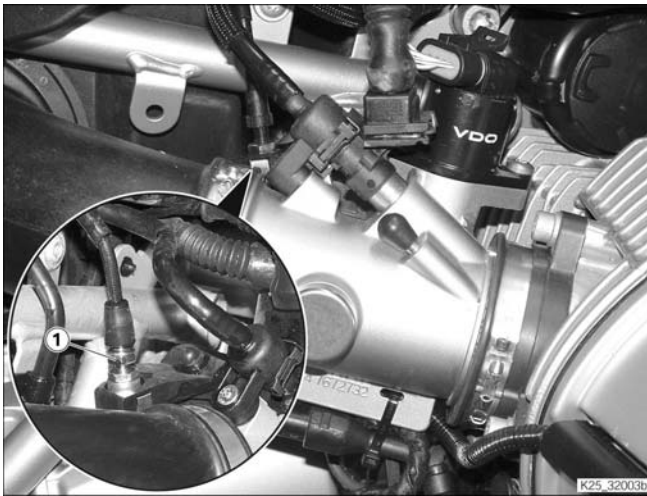
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.



» Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

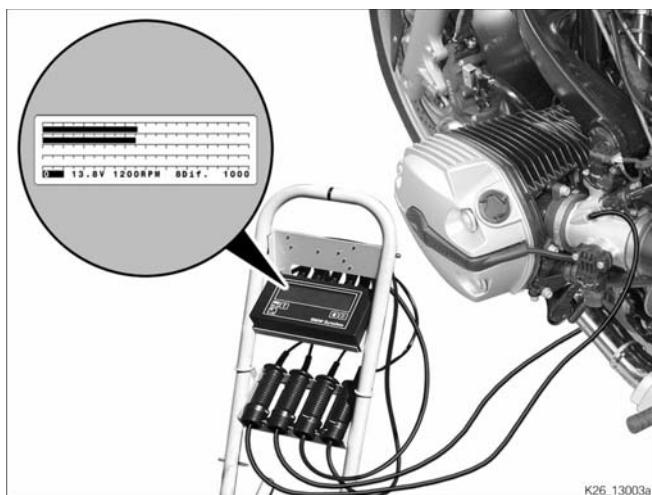
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.

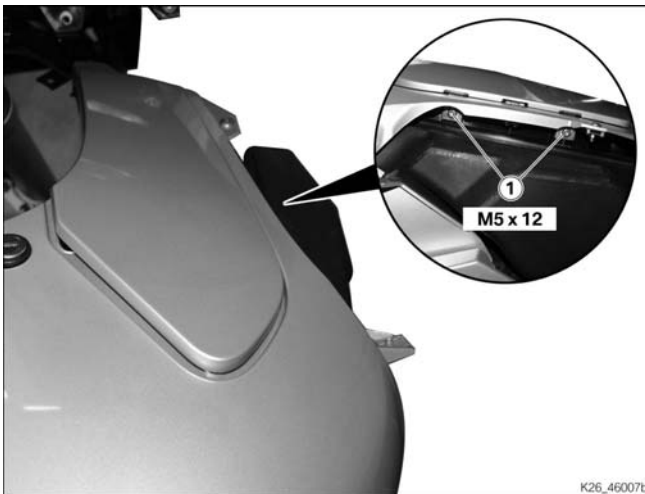
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover

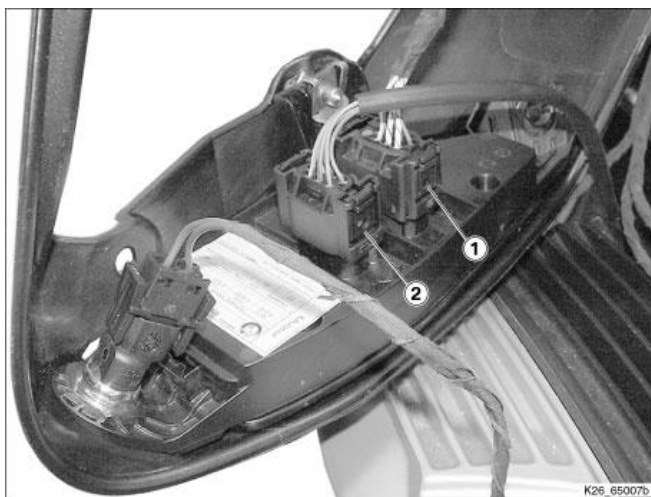
- Fit tank cover.
- Install screws (2).



- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

11 11 055 Replacing left cylinder



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

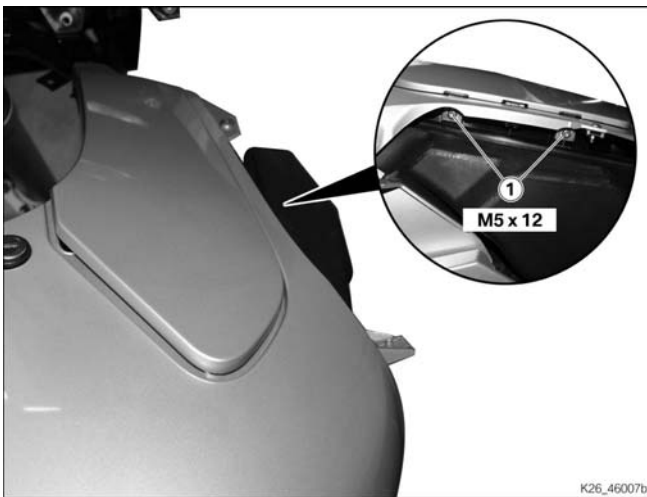
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



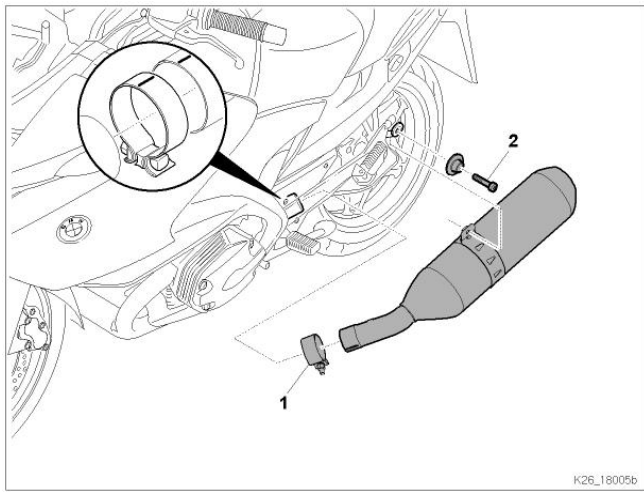
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



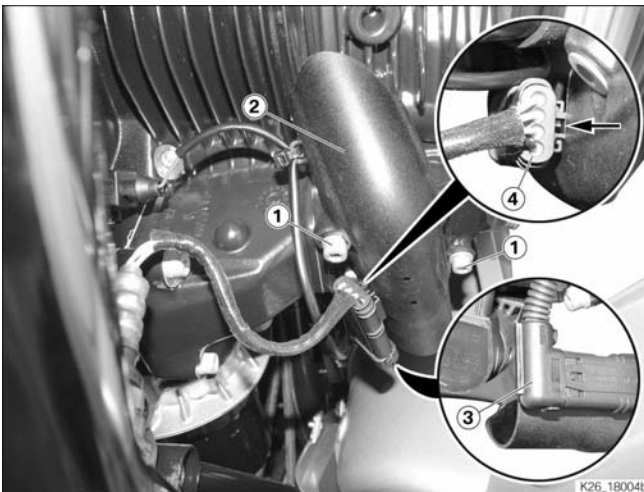
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

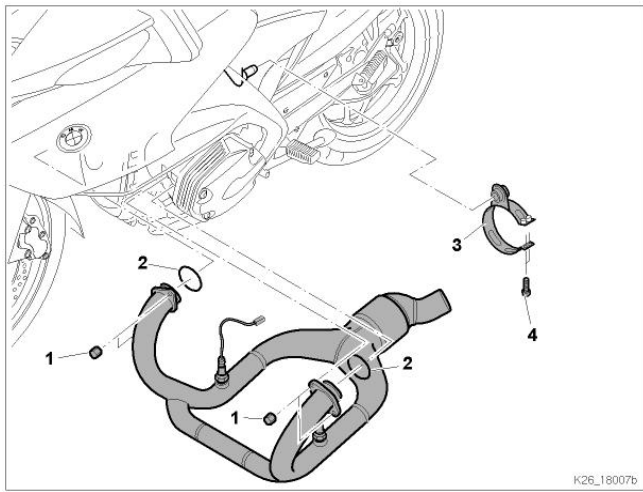
- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.



(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



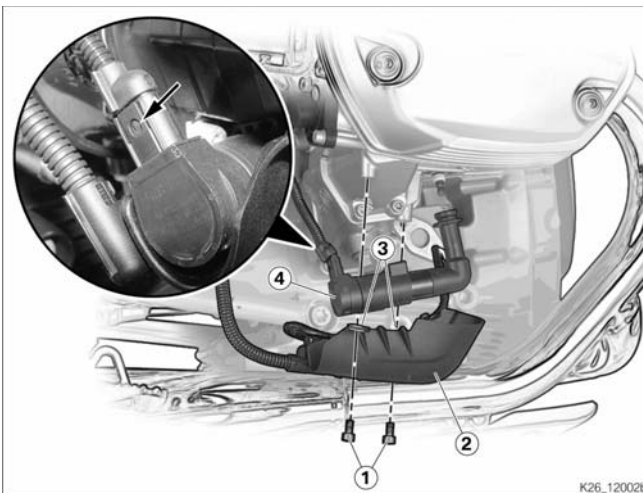
- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

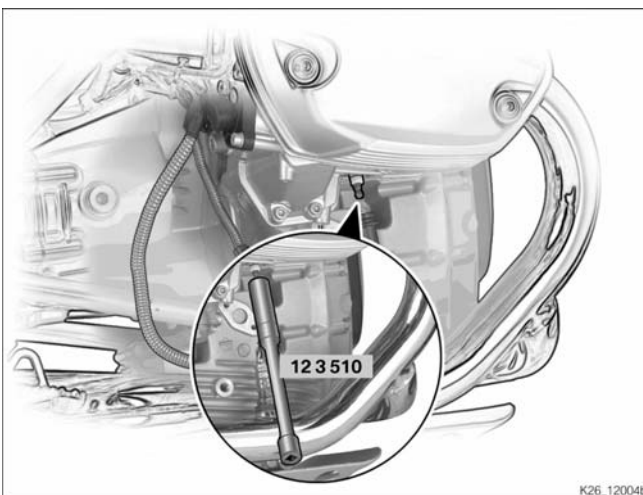
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

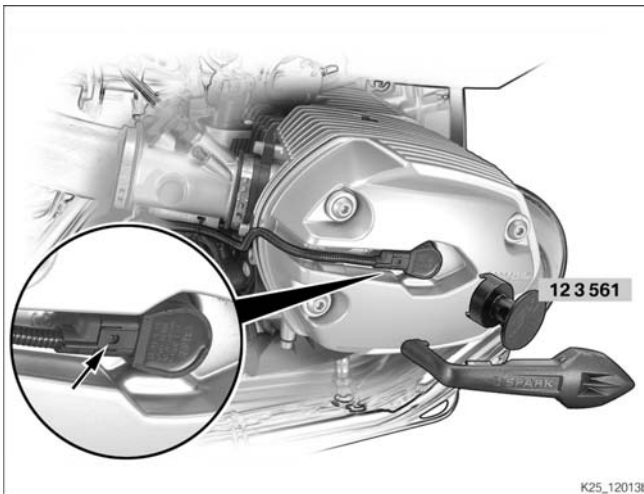


- Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

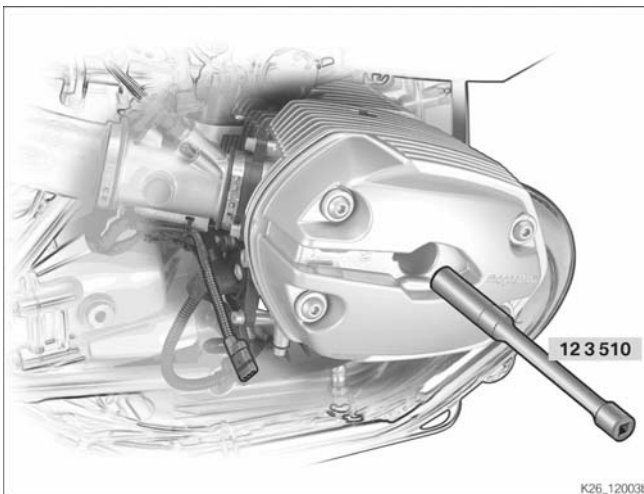
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

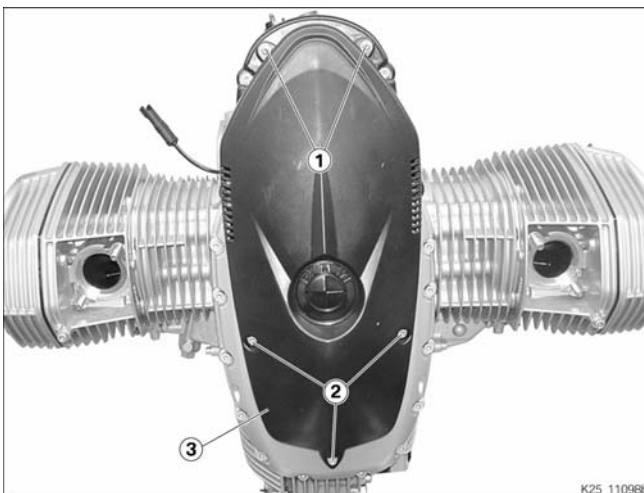
(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the primary spark plug.



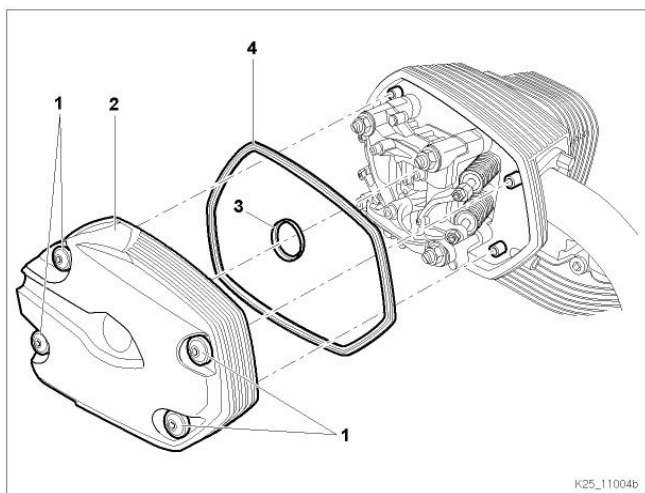
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

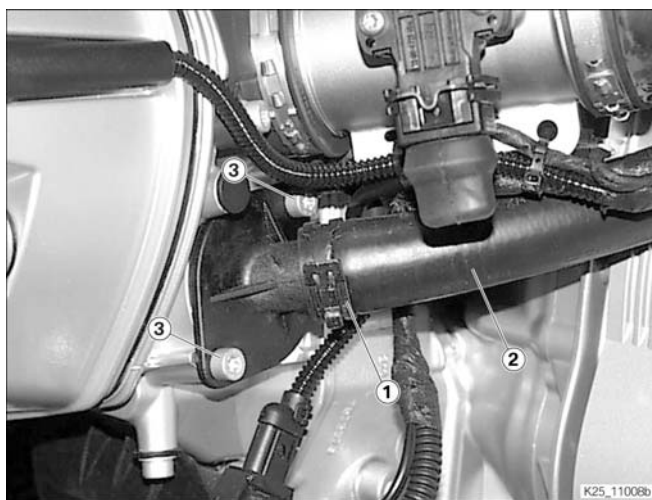
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

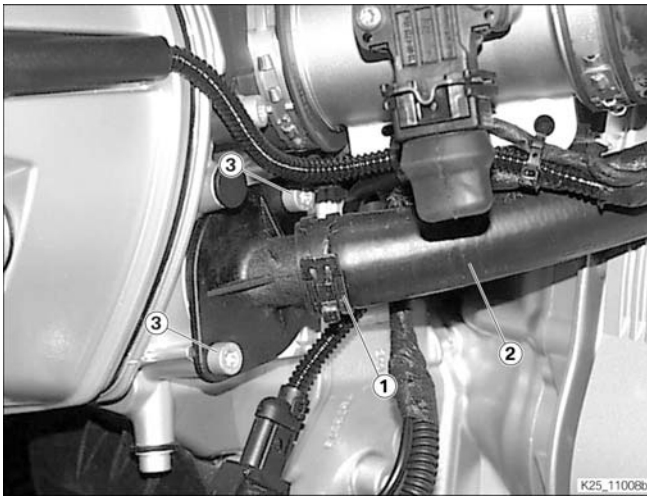
(-) Removing left camshaft cover

► **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



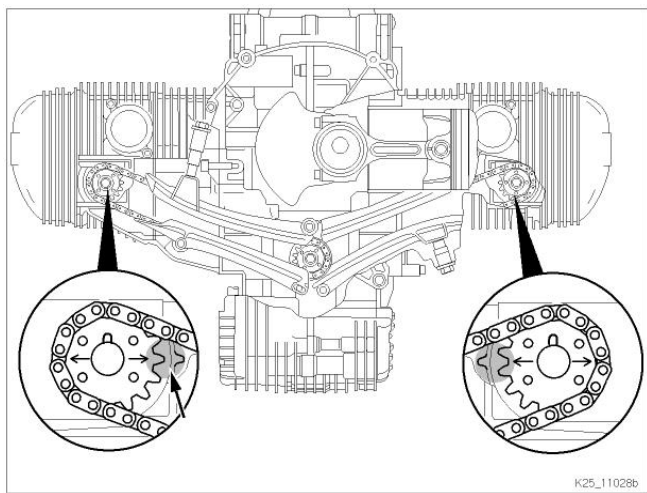
(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.



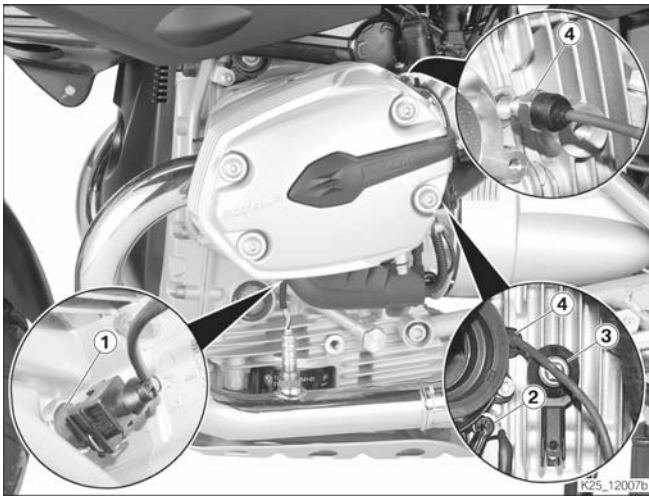
- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



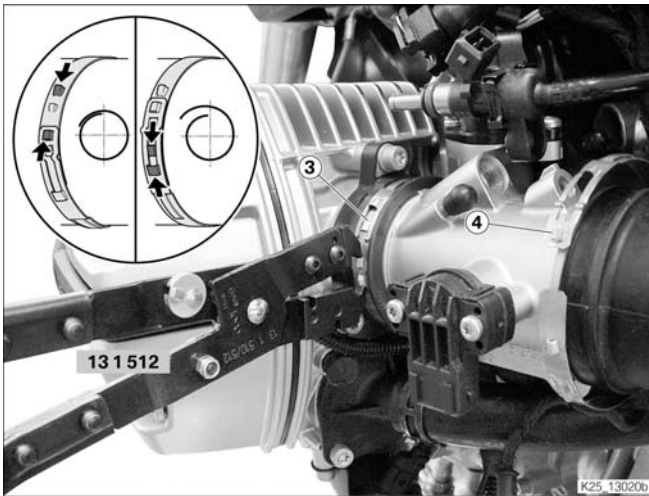
(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).



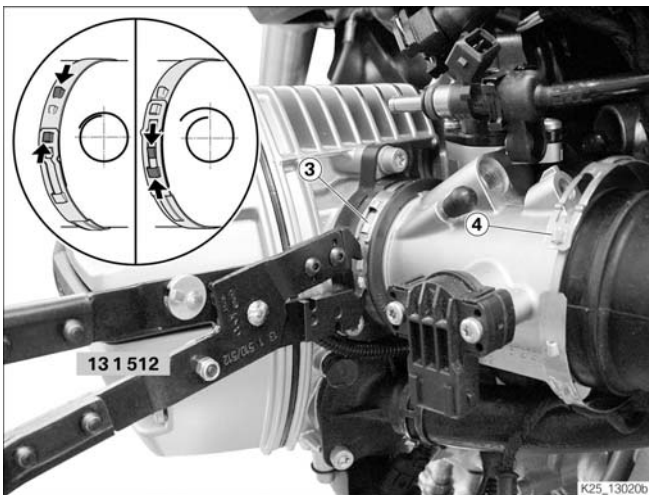
(-) Disconnecting intake air pipe from throttle-valve stub

- Open clips (4) on left and right with pliers (No. 13 1 512) .

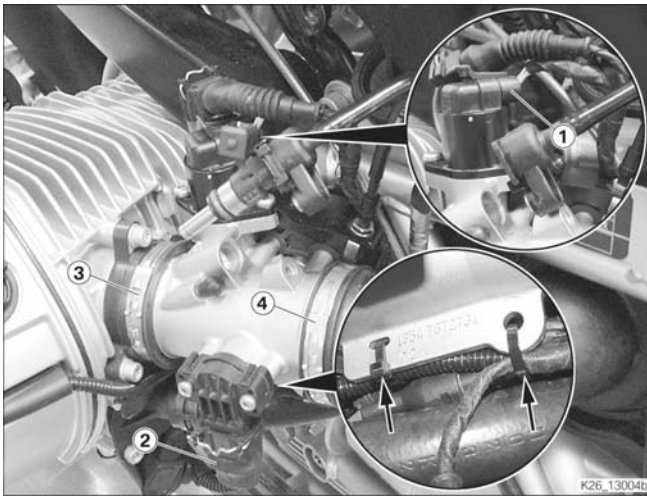


(-) Disconnecting left throttle-valve stub

- Open hose clips (3) at the left throttle valve stub with pliers (No. 13 1 512) .



- Cut through the cable tie (arrow) on the left.
- Disconnect plug of left idle actuator (1).
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the throttle-valve stub on the left and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.



- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

(-) Removing breather plate

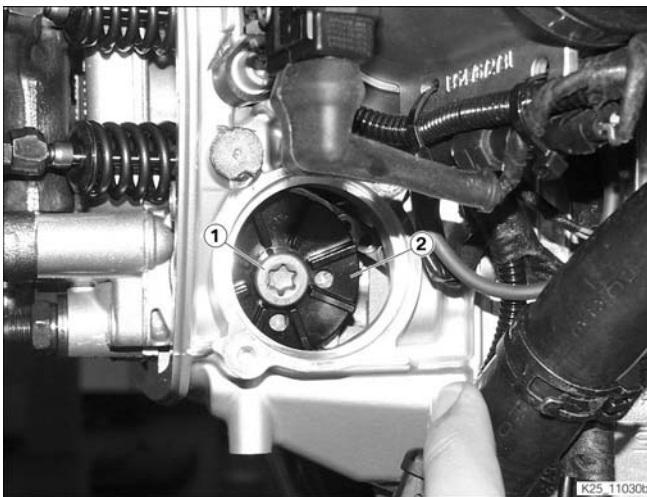
- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).



(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

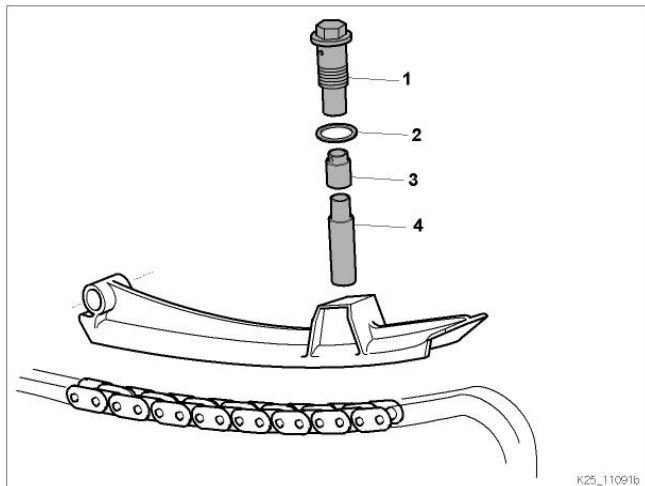
- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

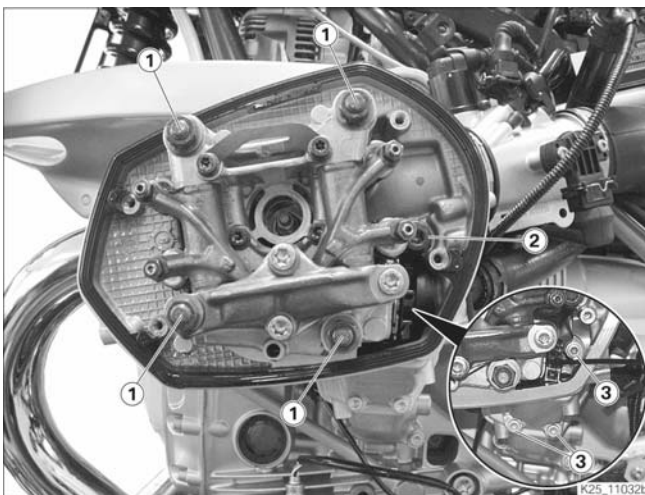
When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.



(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



(-) Removing left cylinder head

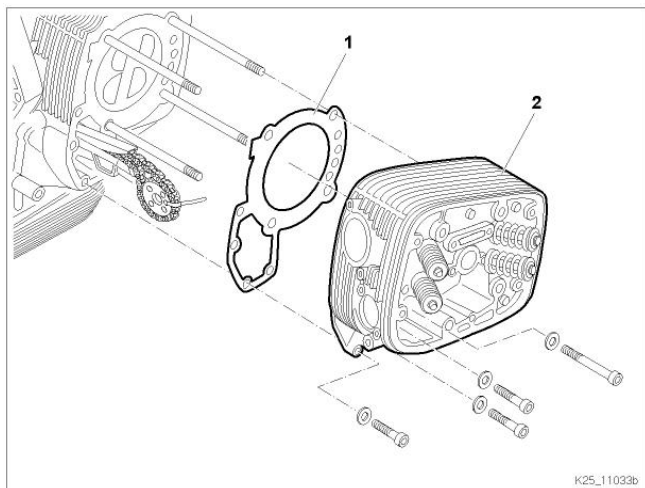
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

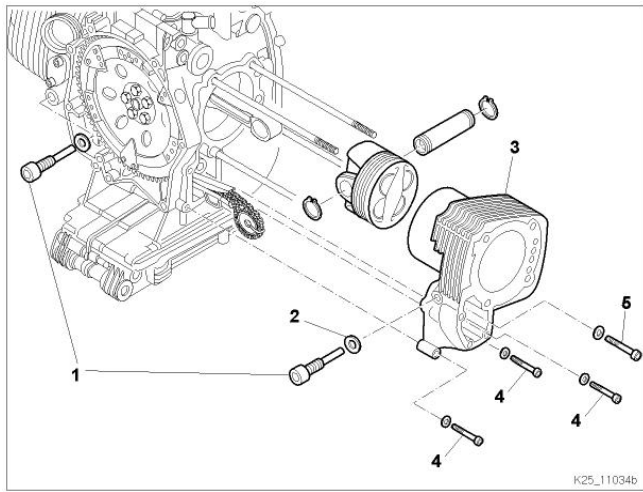
- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.

(-) Removing left cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.



- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

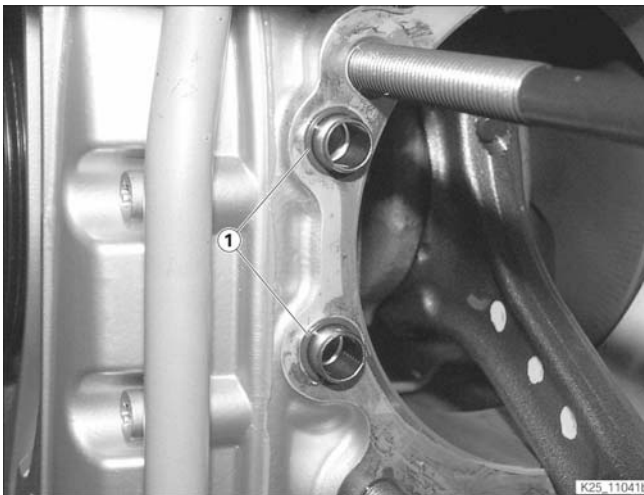
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Checking cylinders for wear

Test

- Visually inspect the friction faces for:
 - » flaking of the coating
 - » scores and wear marks

Result: Flaking or deep grooves are visible in the friction faces of the cylinder.

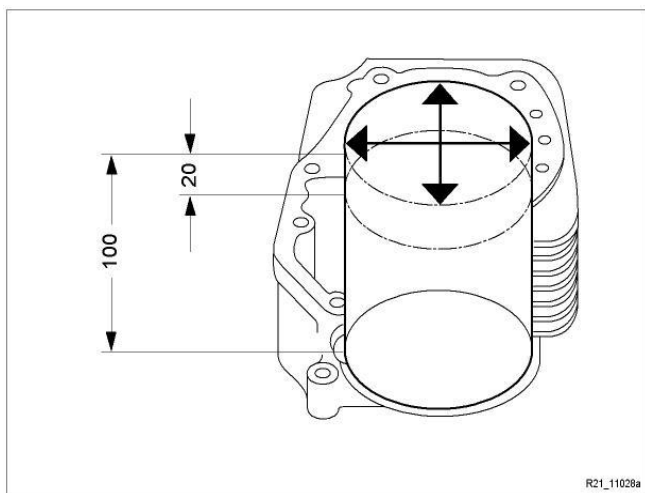
Measure:

- Replace cylinder complete with piston.

Result: No visual signs of wear or damage to the friction faces of the cylinder.


Measure:

- Measure the cylinder bore.



Test

- Measure the cylinder bore on three planes with internal calipers: measure on the same axis as the piston pin and at a right angle across the bore.

 Technical data			
Cylinder bore, tolerance group A Value definition: When new	from top edge 20 mm from top edge 100 mm	100.992 - 101 mm 100.992 - 101 mm	
Cylinder bore, tolerance group A Value definition: Wear limit	from top edge 20 mm from top edge 100 mm	max. 101.05 mm max. 101.05 mm	
Cylinder bore, tolerance group B Value definition: When new	from top edge 20 mm from top edge 100 mm	101 - 101.008 mm 101 - 101.008 mm	
Cylinder bore, tolerance group B Value definition: Wear limit	from top edge 20 mm from top edge 100 mm	max. 101.058 mm max. 101.058 mm	
Cylinder bore, tolerance group A/B Value definition: When new	from top edge 20 mm from top edge 100 mm	100.992 - 101.008 mm 100.992 - 101.008 mm	
Cylinder bore, tolerance group A/B Value definition: Wear limit	from top edge 20 mm from top edge 100 mm	max. 101.058 mm max. 101.058 mm	
Permitted out-of-roundness of cylinder bore	from top edge 20 mm from top edge 100 mm	max. 0.01 mm max. 0.015 mm	

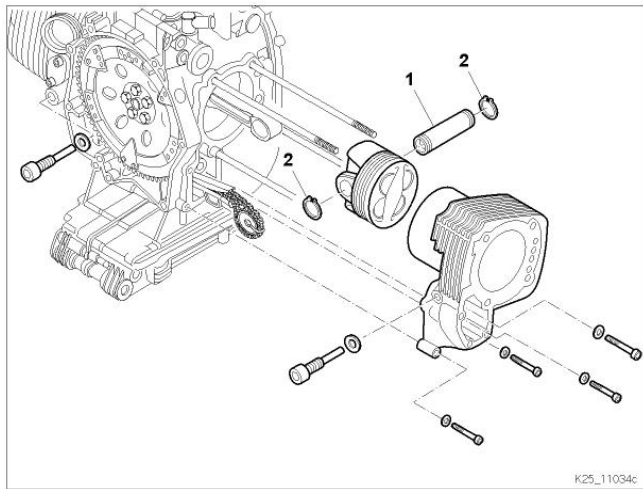
Result: Measured values are in excess of the wear limit or the cylinder evinces excessive out-of-round.

Measure:

- Replace cylinder complete with piston.

(-) Removing piston

- Remove both circlips (2) from the piston pin.



Note

Remember to mark the exhaust side on the piston crown if you are going to reinstall the same pistons.

- Pull out piston pin (1) in the forward direction of travel until the piston can be separated from the conrod.
- Remove the piston.

(-) Checking pistons for wear

Test

- Visually inspect the friction faces for:
 - >> scores and wear marks

Result: Deep scores visible in the piston.

Measure:

- Replace piston and cylinder.

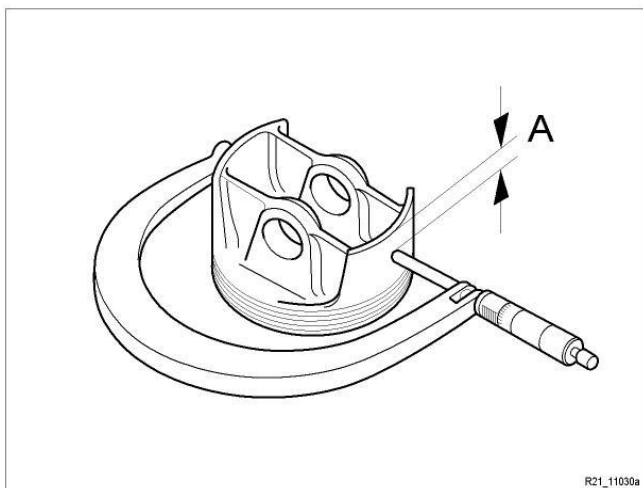
Result: No visual signs of wear or damage to the piston.


Measure:

- Measure the piston diameter.

Test

- Measure the piston diameter on the measuring plane with a caliper gauge: measure at a right angle to the axis of the piston pin.



 Technical data			
Piston diameter, tolerance group A Value definition: When new	At right angles to piston-pin axis, across bottom edge of piston 6 mm	100.977 - 100.989 mm	
Piston diameter, tolerance group A	At right angles to piston-pin axis,	min. 100.9 mm	

Value definition: Wear limit	across bottom edge of piston 6 mm		
Piston diameter, tolerance group B Value definition: When new	At right angles to piston-pin axis, across bottom edge of piston 6 mm	100.965 - 100.977 mm	
Piston diameter, tolerance group B Value definition: Wear limit	At right angles to piston-pin axis, across bottom edge of piston 6 mm	min. 100.89 mm	
Piston diameter, tolerance group AB Value definition: When new	At right angles to piston-pin axis, across bottom edge of piston 6 mm	100.973 - 100.981 mm	
Piston diameter, tolerance group AB Value definition: Wear limit	At right angles to piston-pin axis, across bottom edge of piston 6 mm	min. 100.895 mm	


Result: Measured values are lower than the wear limit.

Measure:

- Replace piston and cylinder.

Test

- Use the measured values for the cylinder and the piston to calculate the installed play of the piston.

 Technical data			
Piston installation		0.011 - 0.035 mm	

clearance Value definition: When new			
Piston installation clearance Value definition: Wear limit		max. 0.12 mm	

Result: Installed play of piston is greater than the wear limit.

Measure:

- Replace piston and cylinder.

(-) Checking piston rings for wear

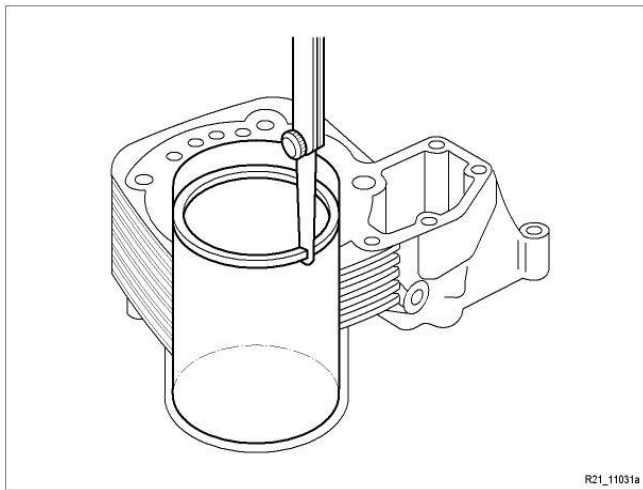
Precondition


- The cylinder bore must be in as-new condition or compliant with the dimensional specifications.




Test

- Insert the piston rings one at a time into the cylinder and use the piston to straighten the ring.



 Technical data			
Installed direction of piston rings		"Top" marking uppermost	

- » The piston ring is in the installed position in the cylinder.
- Use a feeler gauge to measure the piston-ring end gap.

 Technical data			
Piston ring 1st groove, end gap Value definition: When new		0.1 - 0.3 mm	
Piston ring 1st groove, end gap Value definition: Wear limit		max. 0.8 mm	
Piston ring 2nd		0.1 - 0.3 mm	

groove, end gap Value definition: When new			
Piston ring 2nd groove, end gap Value definition: Wear limit		max. 0.8 mm	
Piston ring 3rd groove, end gap Value definition: When new		0.3 - 0.6 mm	
Piston ring 3rd groove, end gap Value definition: Wear limit		max. 1.2 mm	


Result: Piston-ring end gap is greater than the wear limit.

Measure:

- Replace the piston rings.

(-) Cleaning sealing faces, cylinder base

- Remove all traces of old sealant from the cylinder base and the crankcase, paying particular attention to the grooves in the crankcase.
- Clean and degrease the sealing faces of the cylinder base and the crankcase.

 Consumables/lubricants		
Brake cleaner	Cleaners	83 11 9 407 848

(-) Installing piston in cylinder



Attention

Nature: There is only one tolerance group (A/B) for replacement pistons and cylinders. There are two other tolerance groups (A and B) for components installed ex-works. Piston and cylinder must belong to the same tolerance group.

Avoidance: Always replace piston and cylinder as a paired set.



Attention

Nature: In order to ensure low-vibration, smooth engine operation, all the pistons must belong to the same weight class.


Avoidance: Always use pistons of the same weight class in any one engine.

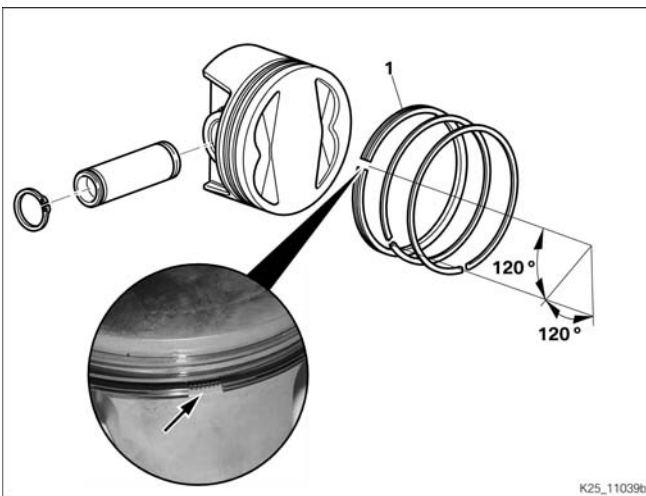
- Determine the correct weight class (1) of the piston and use a piston of the appropriate weight class.

Note

The weight class is stamped on the piston crown and is legible only if the piston is new.


If the symptoms are such that only one replacement cylinder with piston has to be installed, the weight of the other piston has to be ascertained by weighing.

 Technical data			
Difference in weight within a weight class (weight classes + and -)		max. 10 g	
Value definition:			
Complete with piston pin and piston rings			



Positioning piston rings

- Position oil wiper ring (1) with the end faces (arrow) up in the installed position.
- Position the other rings with the end gaps offset by the specified angle.

 Technical data			
Installed direction of piston rings		"Top" marking uppermost	
Offset of piston-ring gaps		120 °	

- Coat the friction face of the cylinder and the friction face of the piston skirt with oil.



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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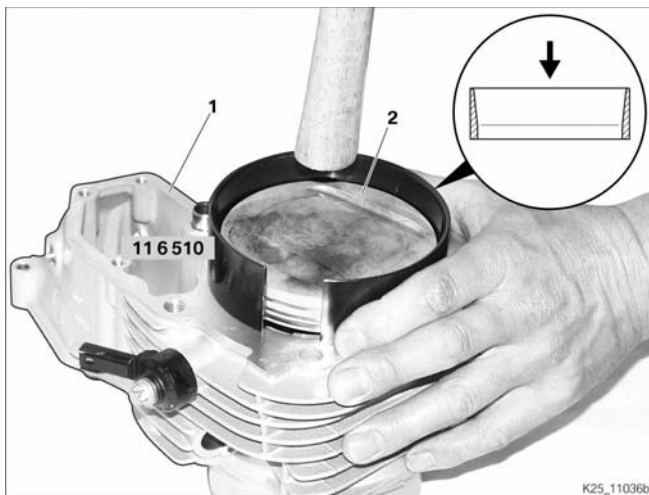
- Place the cylinder, base down, on a smooth, level and firm working surface.
- Set sliding sleeve for piston rings (No. 11 6 510) with the tapered end up on the cylinder.
- Insert the piston with the cast nose (arrow) pointing toward the exhaust side into sliding sleeve (No. 11 6 510) and carefully press it through the taper and into the cylinder.



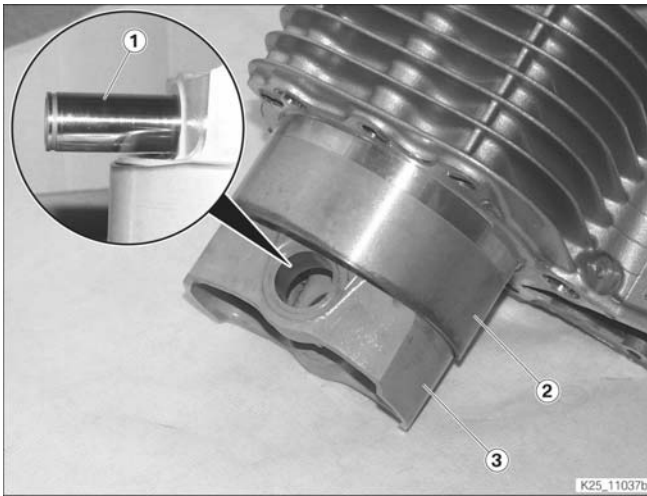
Technical data

Installation direction of piston		Arrow on piston crown and/or cast lug pointing to exhaust side	
----------------------------------	--	--	--

- » The piston rings are preloaded.
- » The piston skirt is held in position by the cylinder.
- Press sliding sleeve (No. 11 6 510) against the cylinder and carefully tap the piston into the cylinder.
- » The piston is full inserted into the cylinder.
- Remove sliding sleeve for piston rings (No. 11 6 510) .



- Push piston (3) through cylinder (2) just far enough to allow piston pin (1) to be inserted. Make sure that the piston rings do not project past the end of the cylinder liner.



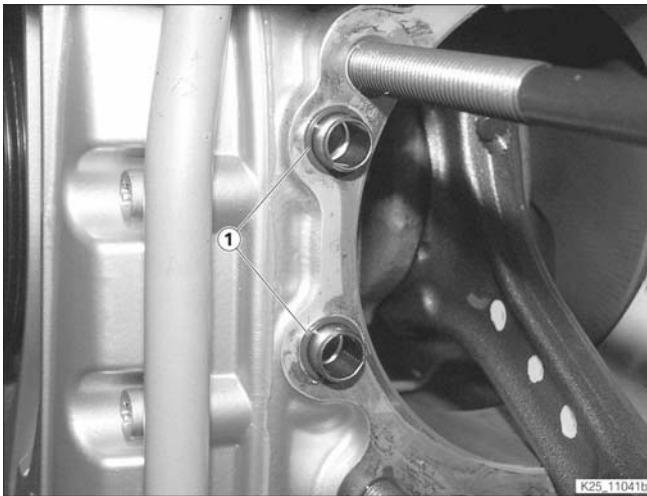
(-) Installing left cylinder

Precondition

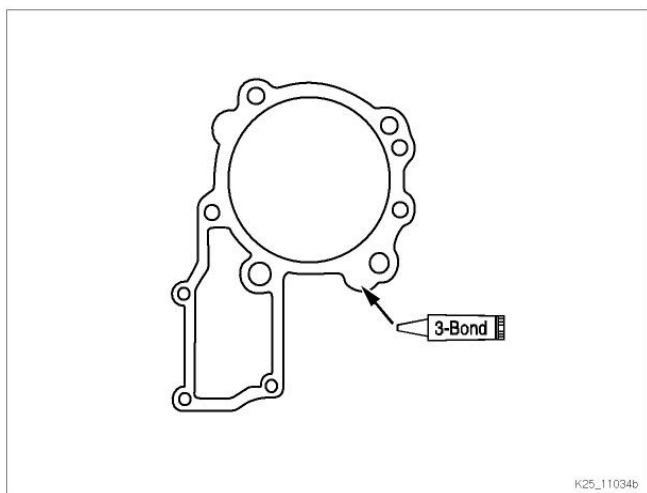
- Crankshaft is locked at TDC.




- Slip new O-rings (1) over the reamed sleeves and into the crankcase.

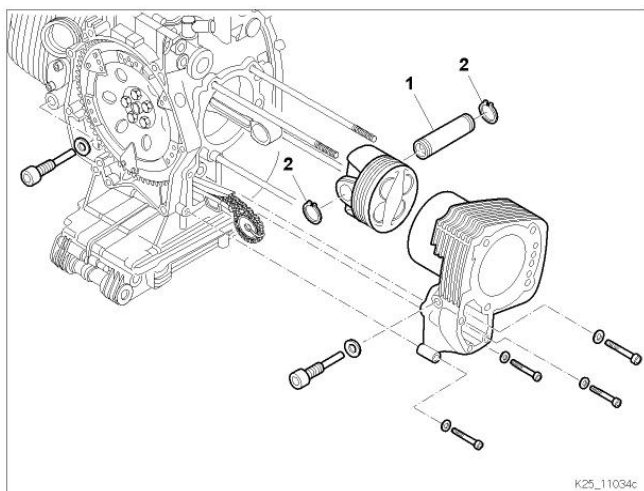


- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

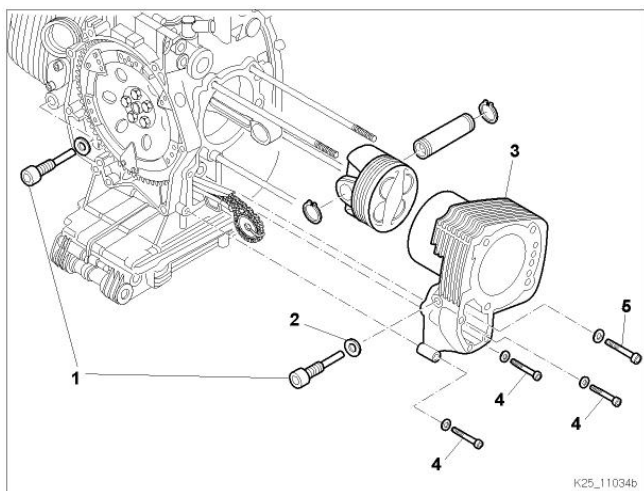


 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which




K25_11034c



K25_11034b

the small-end connecting rod bore is aligned with the bore for the piston pin.

- Oil piston pin (1) and install.

 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685


- Install circlips (2) and make sure they are correctly seated.

- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).




Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

 Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).

 Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing left cylinder head

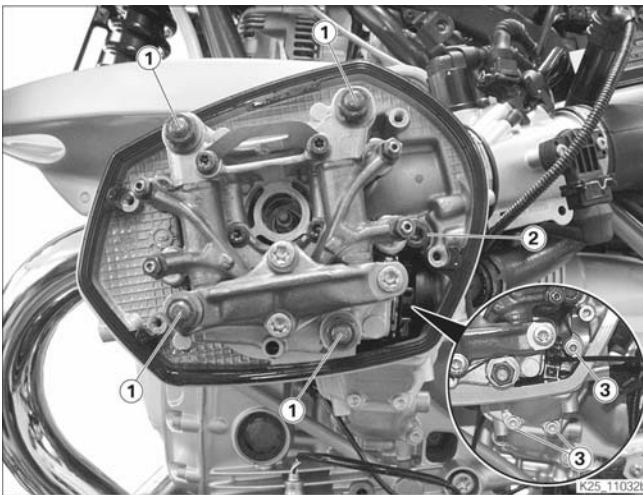
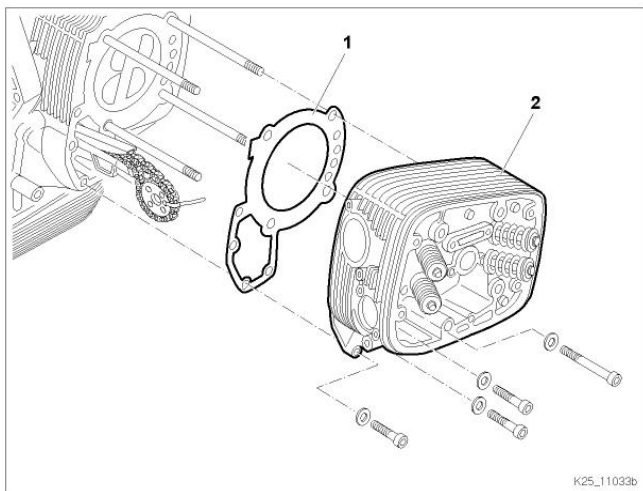
- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open



(overlap).

Turn the camshaft to an appropriate position if necessary.


- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

! Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

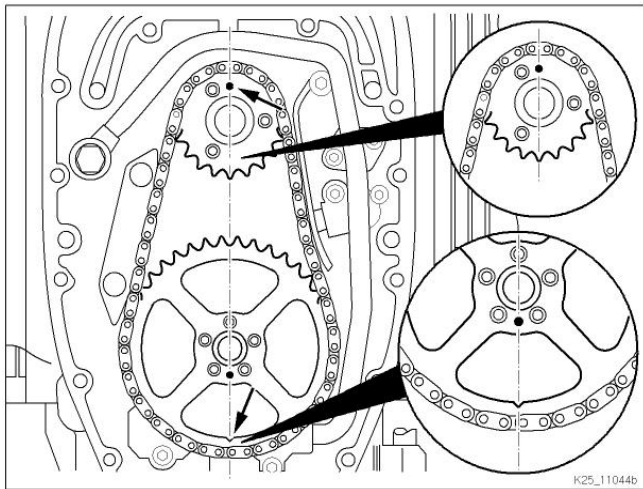
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

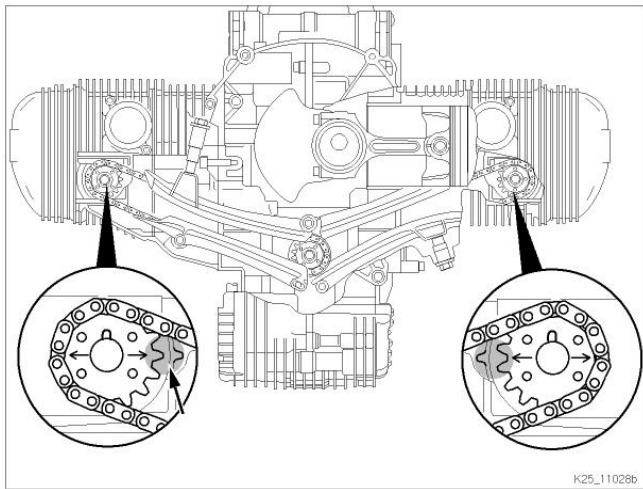
 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, left (cylinder No. 2)

- Make sure that the crankshaft and countershaft are in the "firing TDC, left cylinder" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the sprocket for the timing chain of the



countershaft is **down** and at the top the split line between the two halves of the crankcase is between two teeth.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **up**.
- » The valves in the left-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

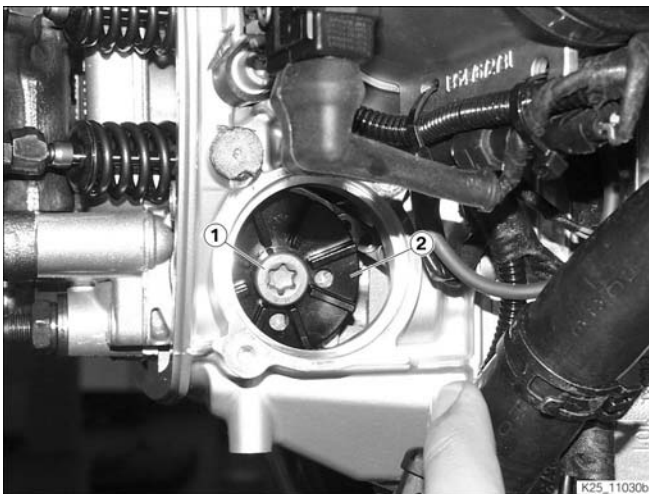


- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.



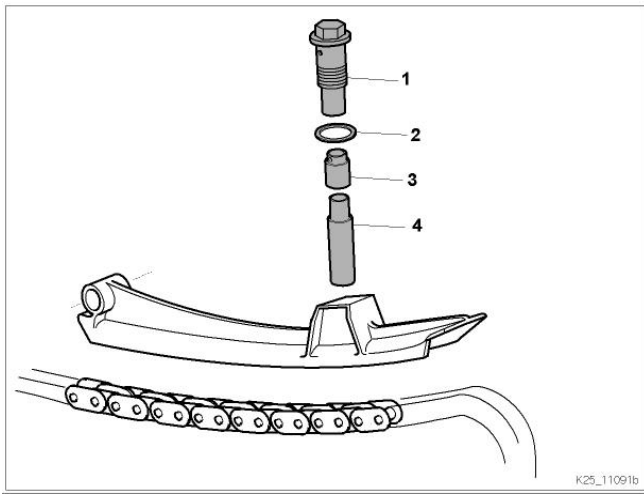
Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing left timing chain tensioner

- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore



up in the chain tensioner.

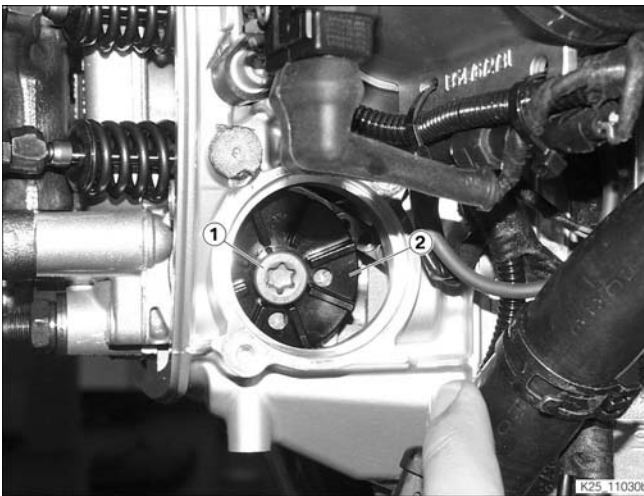
- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.
- » The chain tensioner must slide onto the piston without tilting.
- Screw chain tensioner (1) into the cylinder and tighten it.

Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	

(-) Securing left camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).

Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

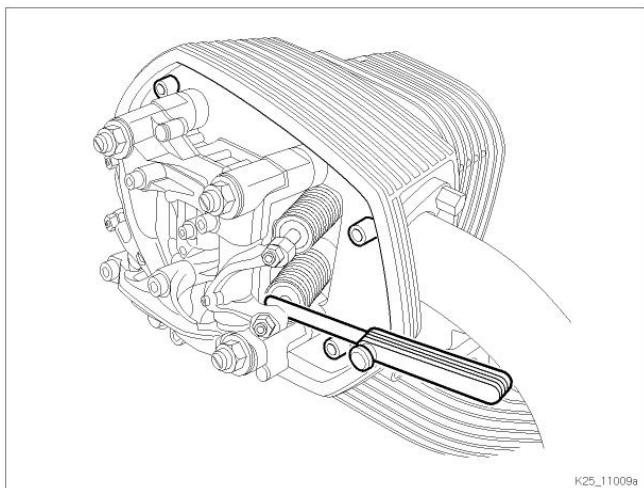
Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	

Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	
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Result: Valve clearance is out of tolerance.

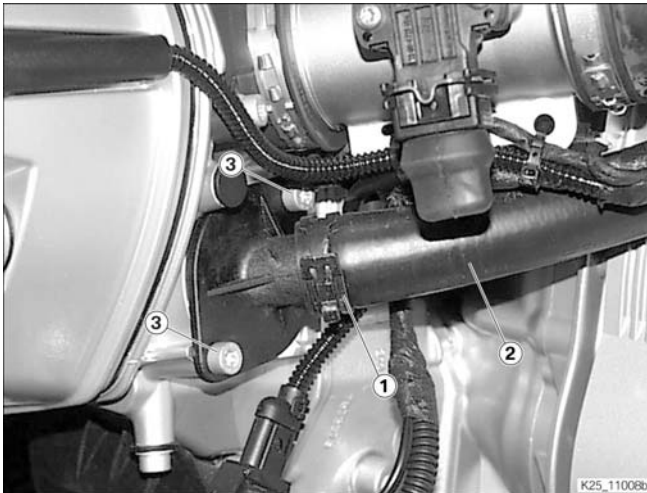
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing left camshaft cover



 **Attention**

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

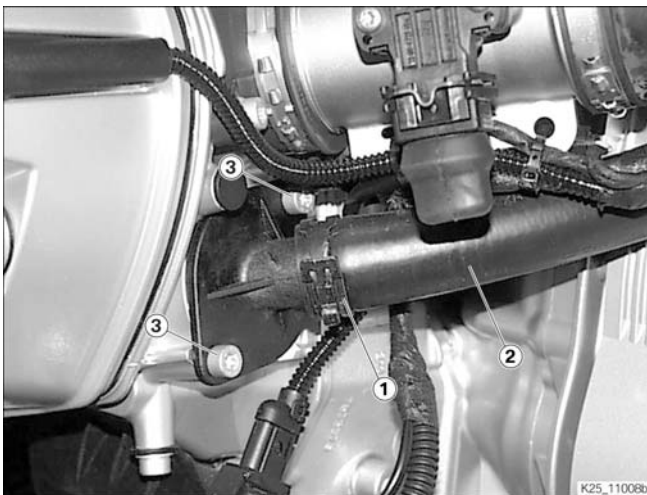
Avoidance: Deburr sharp edges of the housing.

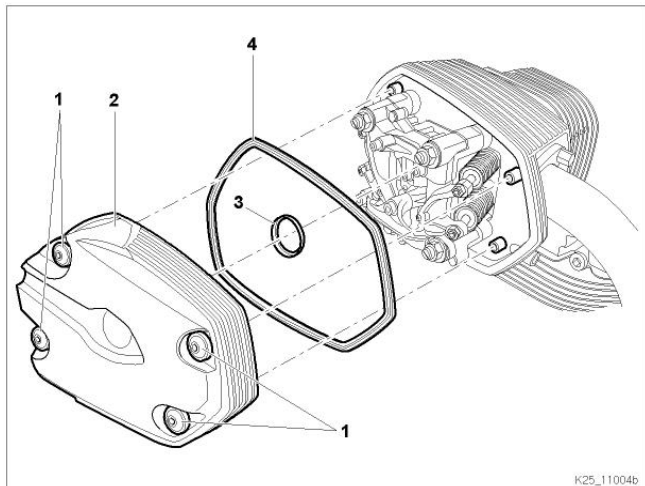
- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

► Connecting hose for crankcase breather

- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.


» The hose is located on the camshaft cover.



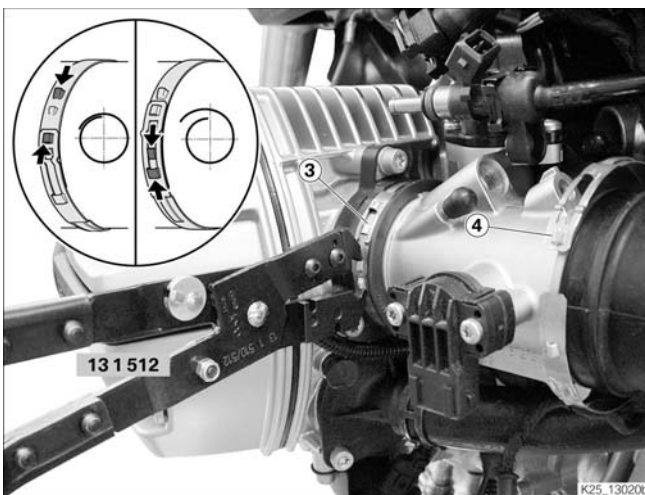


(-) Installing cylinder head cover

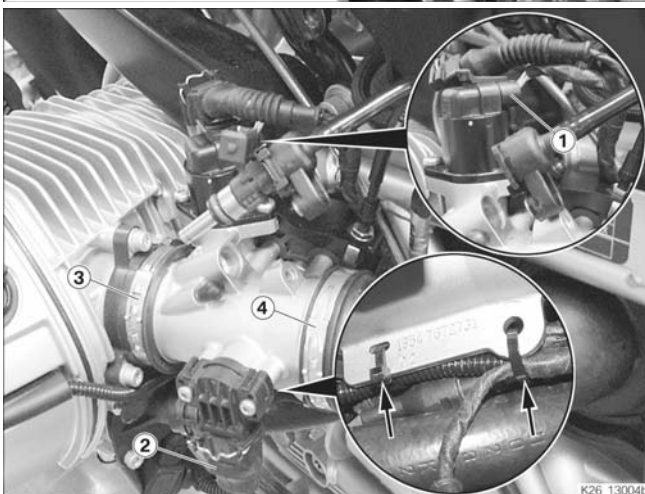
- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing left throttle-valve stub



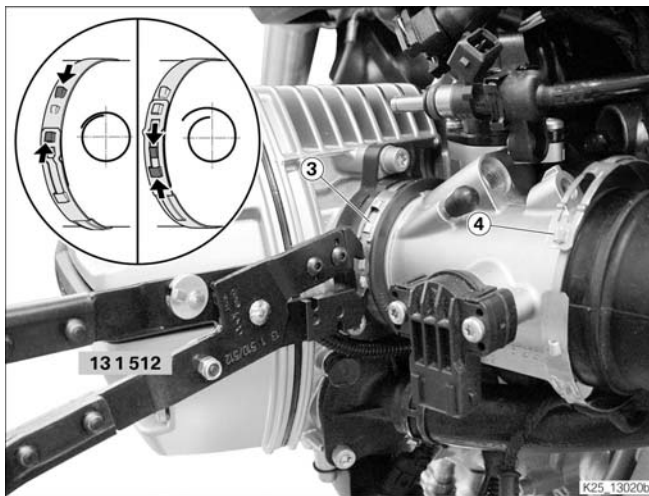
- Remove the cover from the intake.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamps (3) and close them with pliers (No. 13 1 512).



- Connect plug of left idle actuator (1).
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stub on left.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

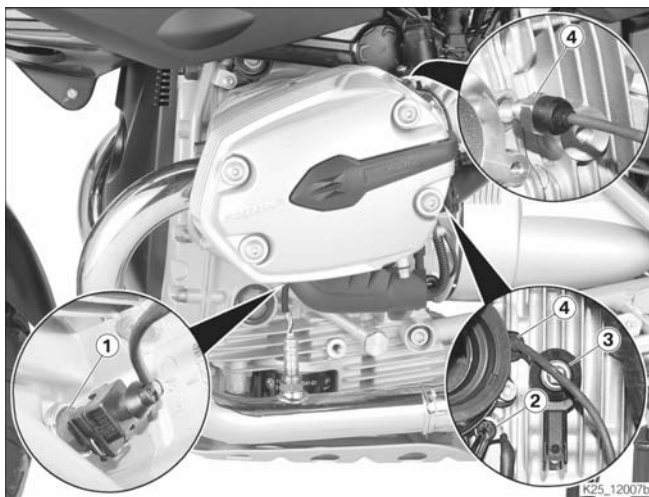
(-) Installing air intake pipe


- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512).



(-) Connecting plugs of engine sensors and switches, left

- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.

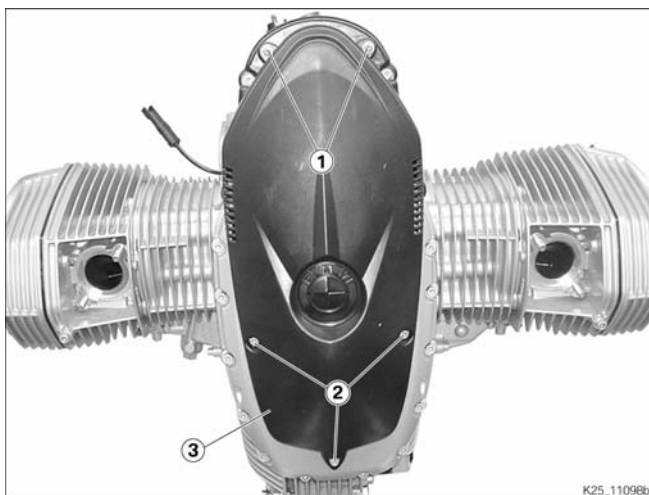



 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (3).
- Connect temperature sensor (4).

(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).

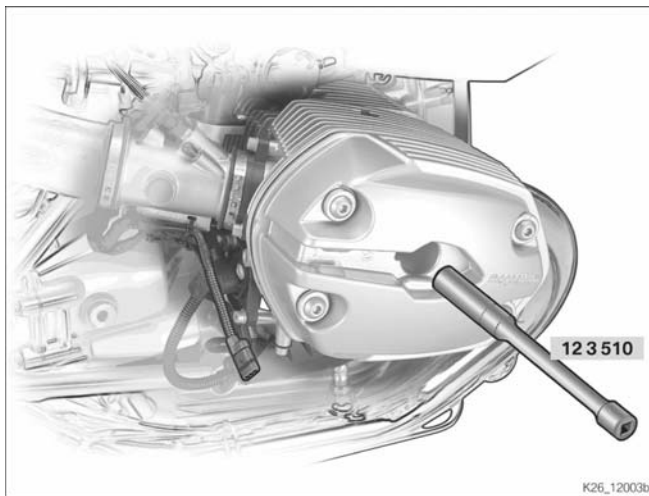


 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing primary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

--



Tightening torques

Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--



Technical data

Spark plug, manufacturer and designation	Bosch YR 5 LDE	
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(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.



Tightening torques

Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
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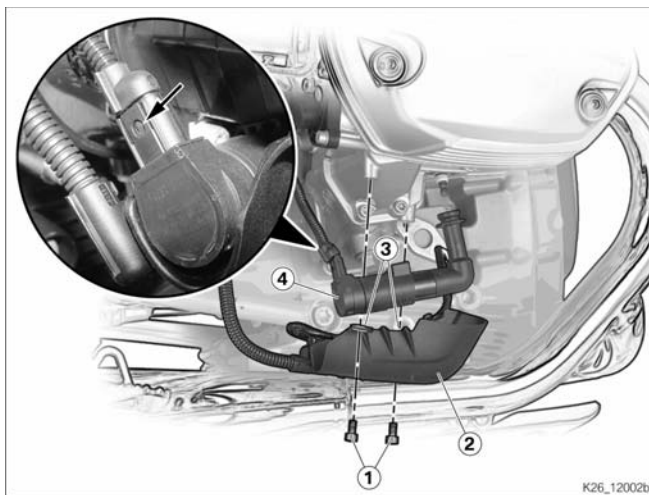


Technical data

Secondary spark plug, manufacturer and designation	Bosch YR 5 LDE	
--	----------------	--

(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.



Consumables/lubricants

Talcum powder	Assembly aid	
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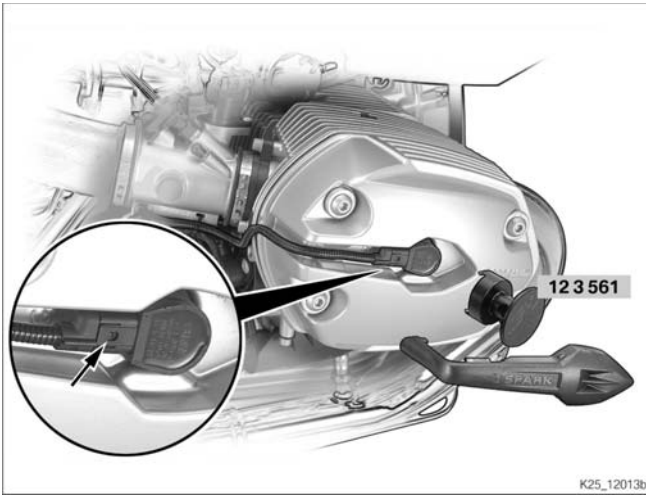
- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.



Tightening torques

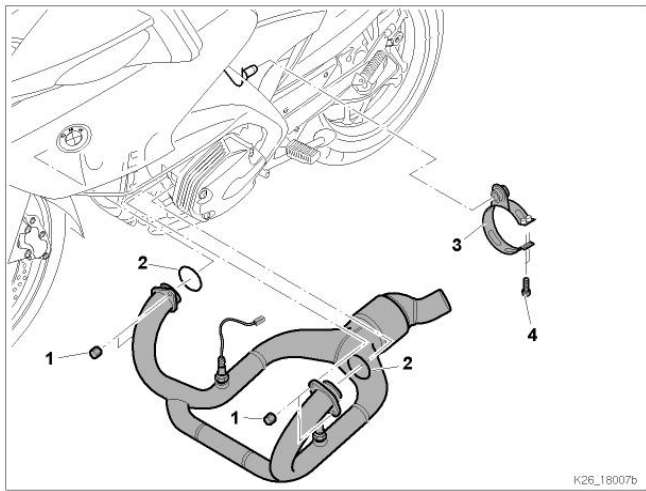
Cover, secondary spark plug coil to cylinder head,	8 Nm	
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M6 x 12




(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.




(-) Installing exhaust elbow


- Replace seals (2), apply thin layer of grease and fit in cylinder head.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

 Tightening torques		
Manifold to cylinder head, Acorn nut M8	21 Nm	

- Align the clamp (arrow) on the manifold and tighten screws (1).

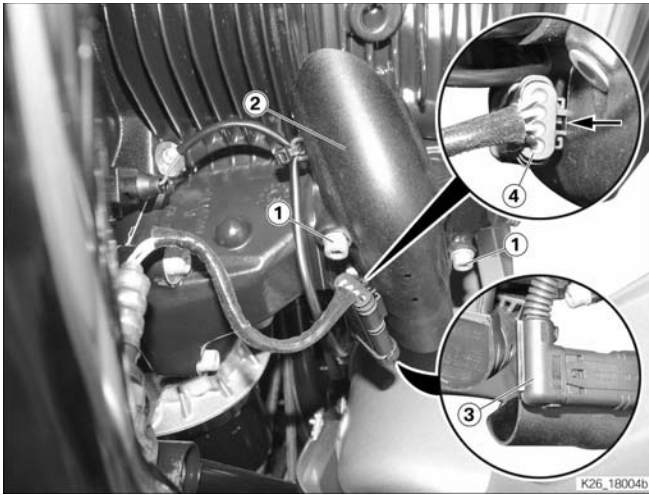


Tightening torques

Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	
--	------	--

► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).



Tightening torques

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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- Install front screw (1) in both bottom sections of the fairing.

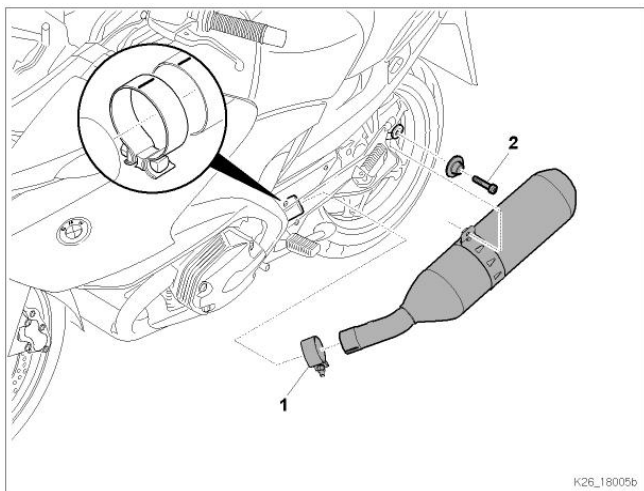


(-) Installing silencer

- Grease the inner face of Torca clamp (1).



Consumables/lubricants



K26_18005b



K28_18007d

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

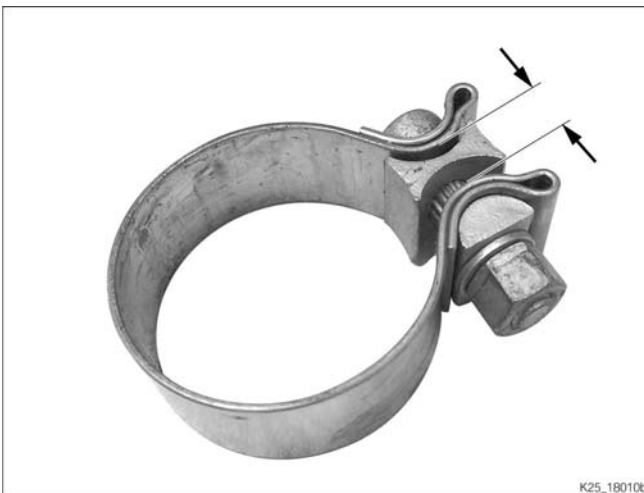
 Tightening torques		
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End silencer to footrest support, M8	19 Nm	
--------------------------------------	-------	--

- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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K25_18010b

► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

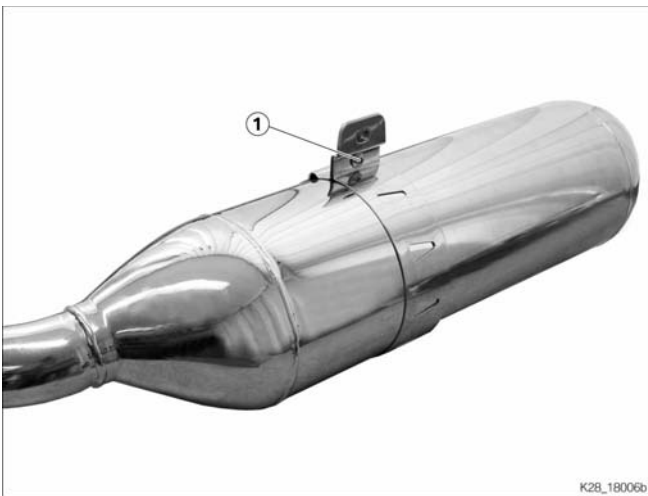
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




 **Attention**


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.


- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




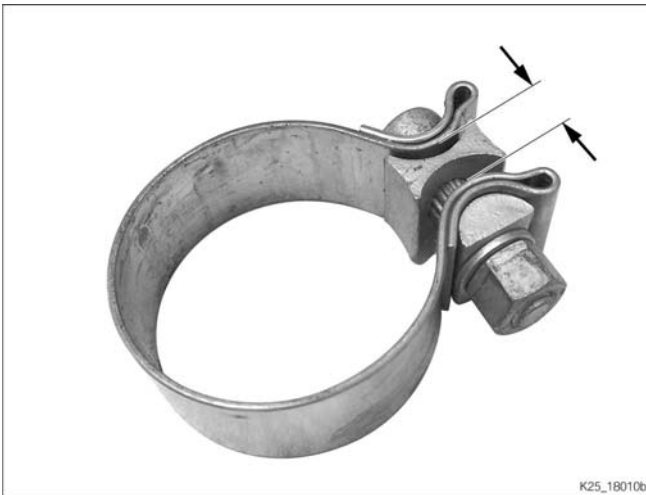
▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.

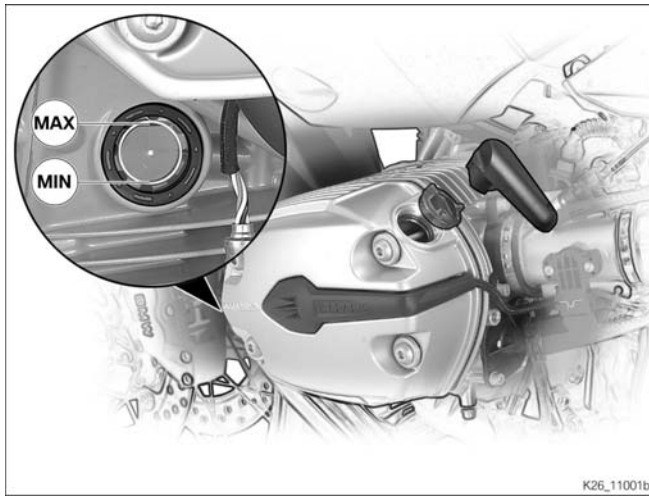
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	




(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.





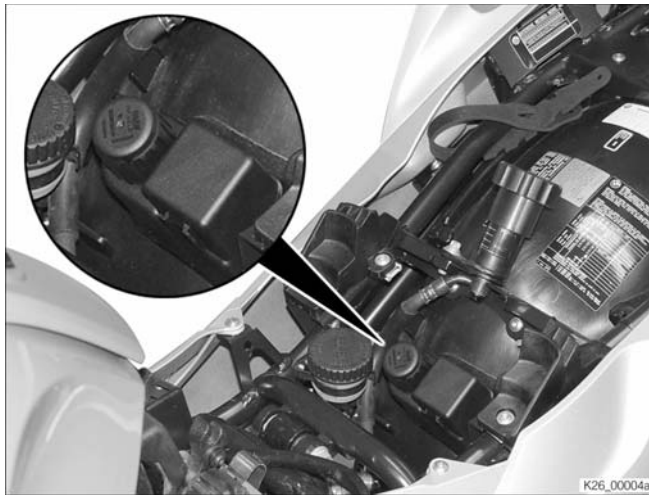
 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.

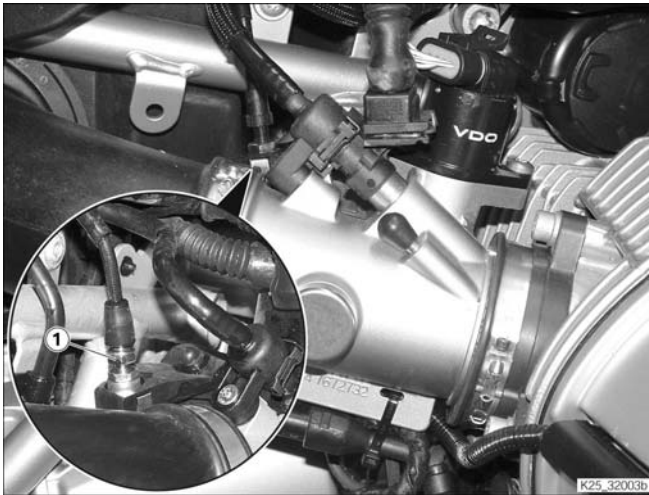


Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

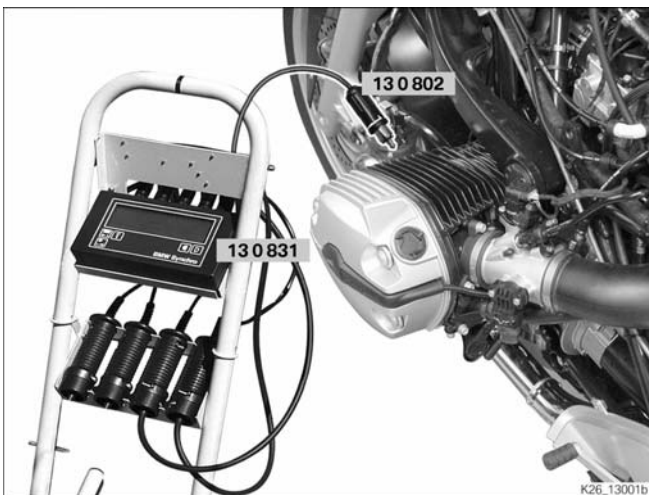
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

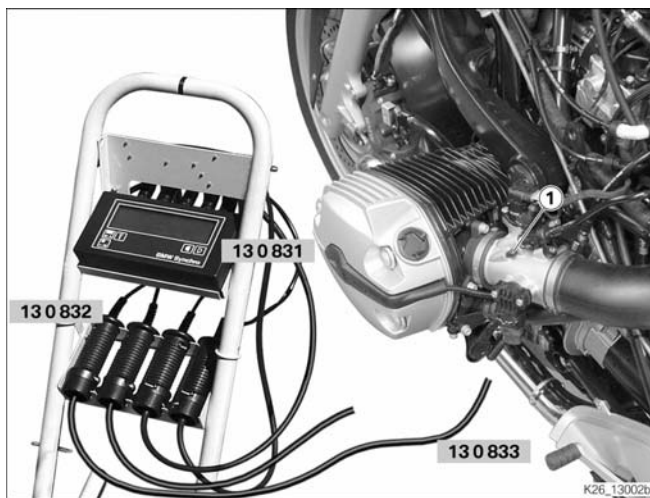


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- » The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



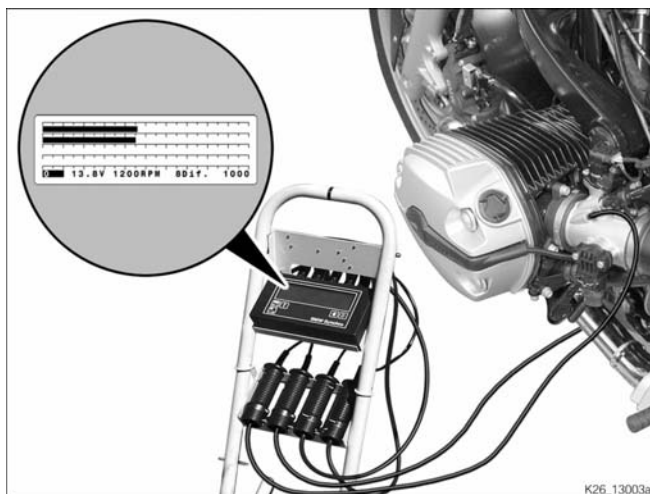
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

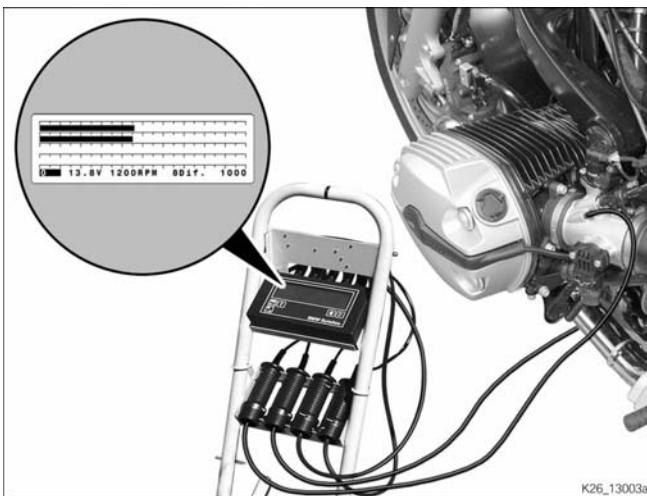
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

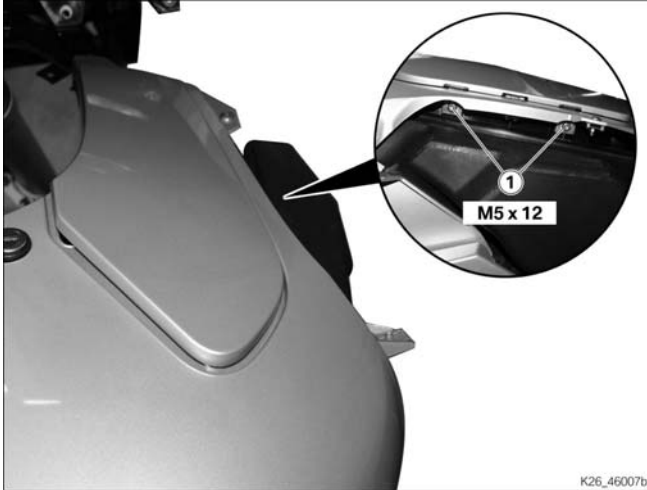
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).





(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



11 11 065 Replacing right cylinder



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



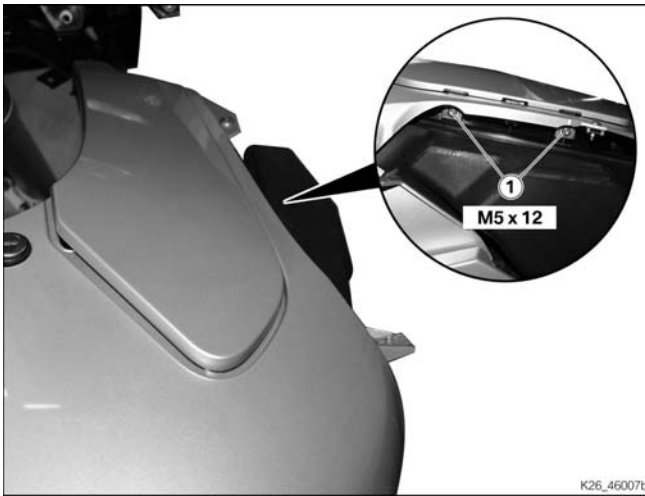
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



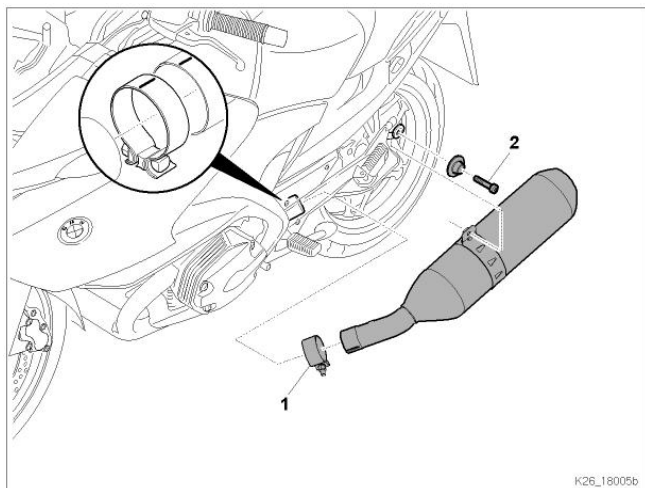
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

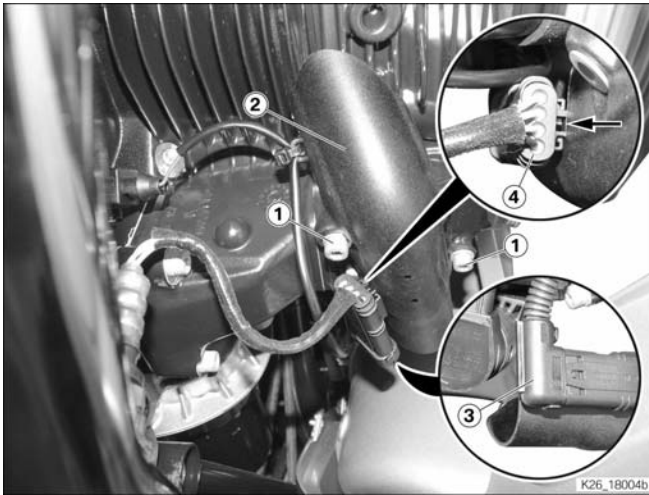
- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



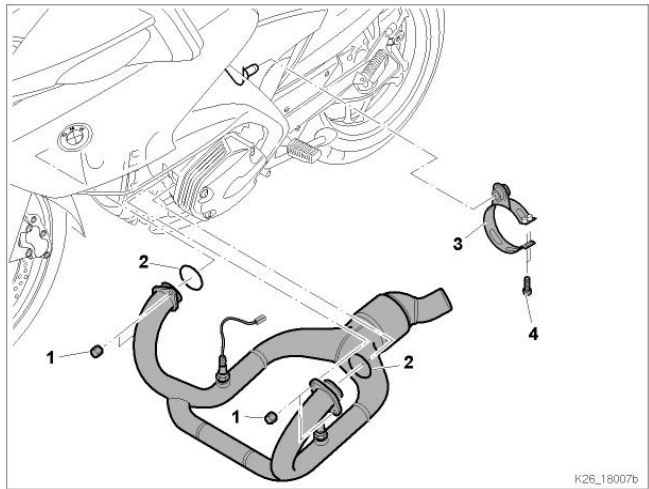
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.

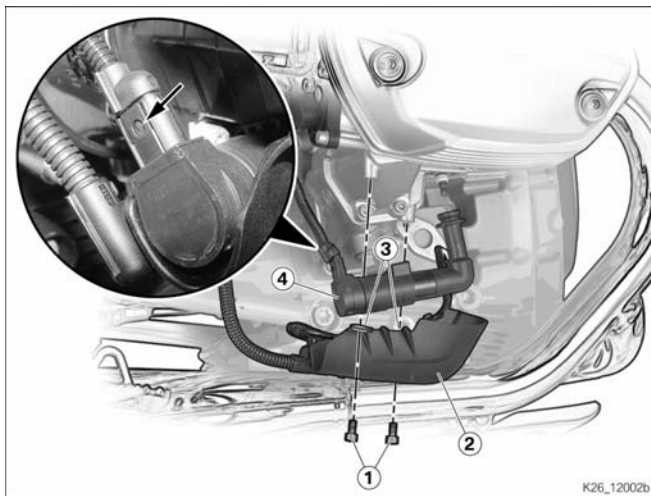
(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



- Slacken screws (1) and remove cover (2) with sleeves (3).



⚠ Attention

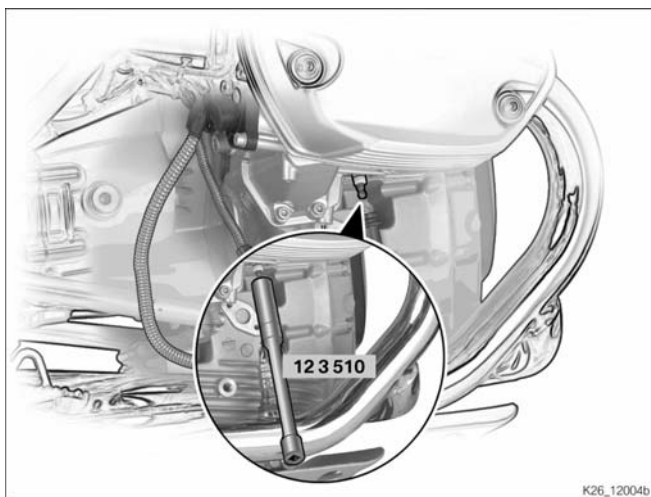
Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF



- Remove the primary spark plug cover.

⚠ Attention

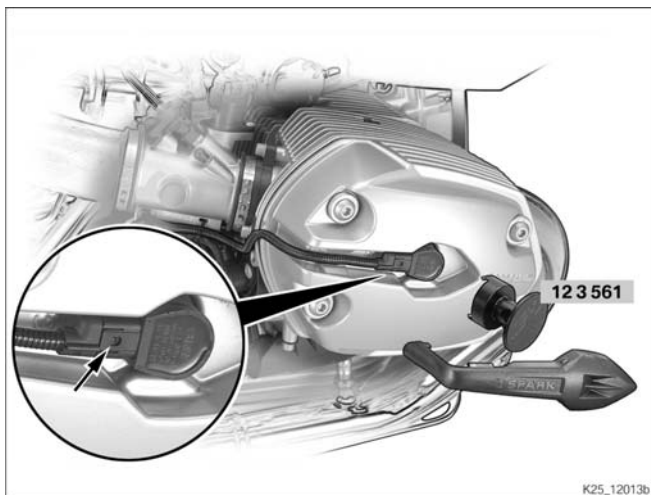
Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

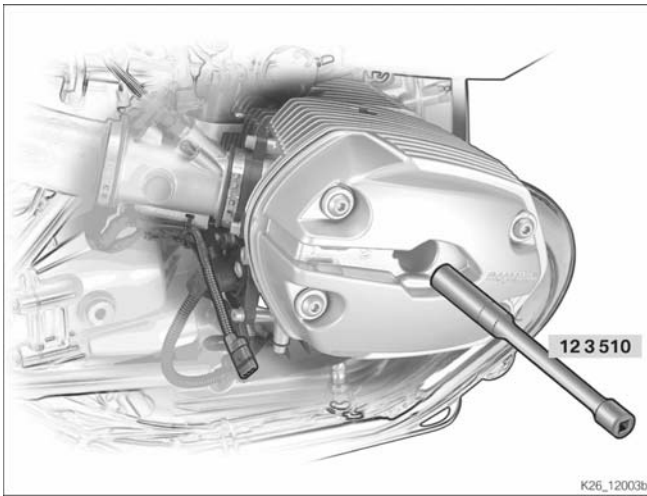
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing primary spark plug

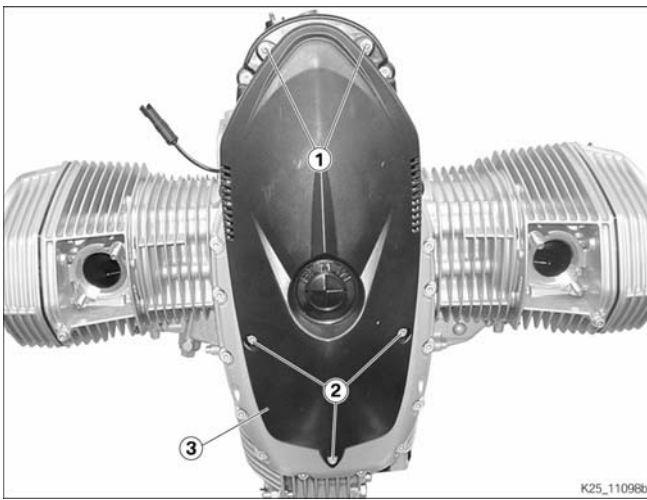
- Use spark plug socket (No. 12 3 510) to remove the





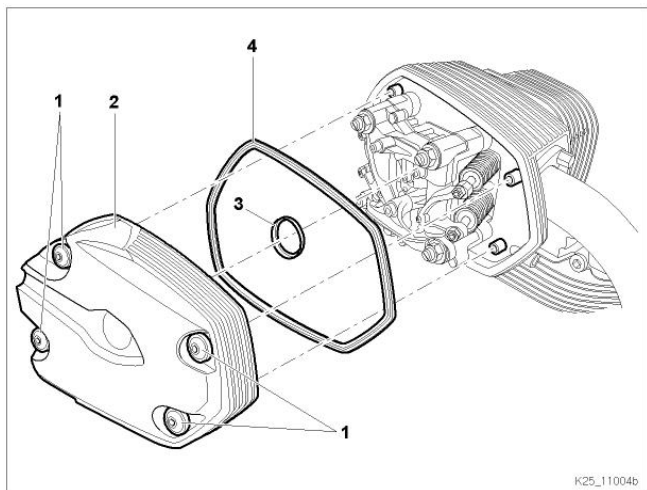
primary spark plug.

(-) Removing belt guard



- Remove screws (1) and (2).
- Remove belt guard (3).

(-) Removing cylinder head cover



- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

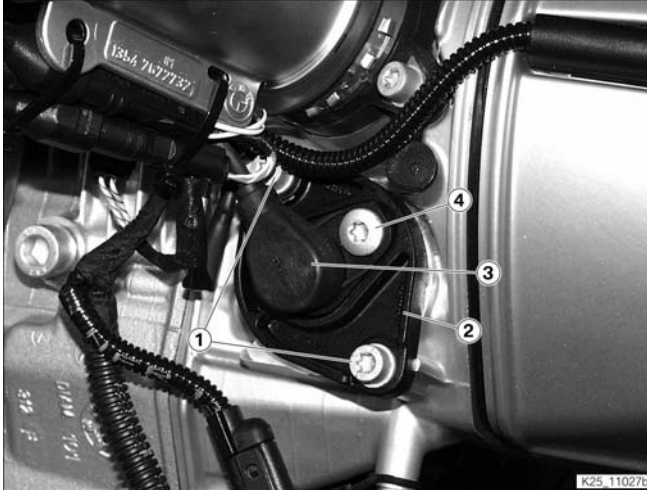


Technical data

Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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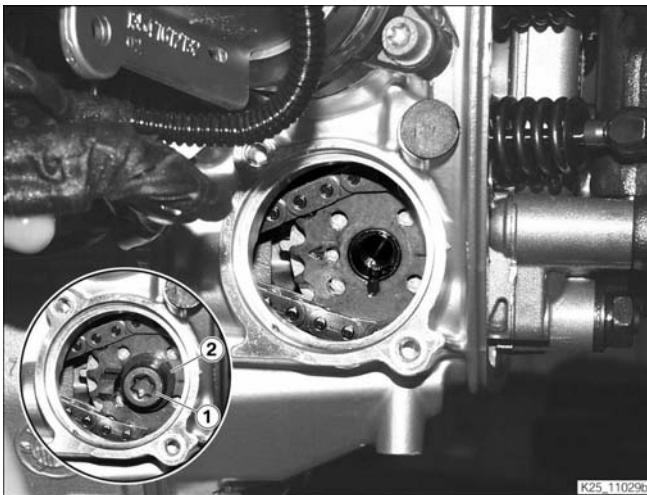
- Remove gaskets (3) and (4).

(-) Removing right camshaft cover



- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.

(-) Setting right cylinder to firing TDC



- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



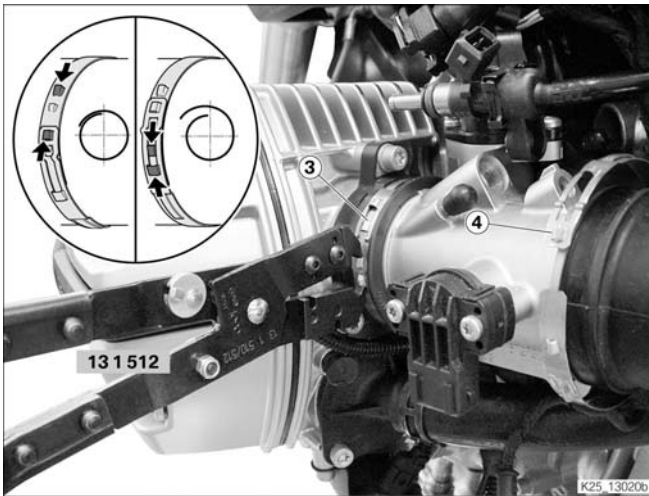
(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).



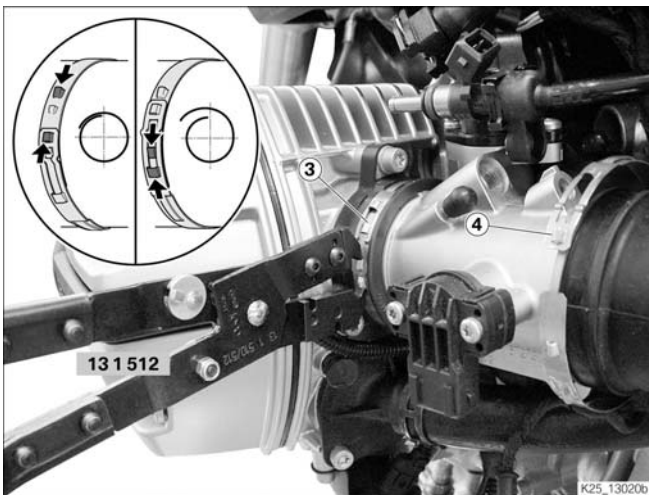
(-) Disconnecting intake air pipe from throttle-valve stub

- Open clips (4) on left and right with pliers (No. 13 1 512) .



(-) Disconnecting right throttle-valve stub

- Open hose clips (3) at the right throttle valve stub with pliers (No. 13 1 512) .



- Cut through the cable tie (arrow) on the right.
- Disconnect plug of right idle actuator (1).
- Pull off the throttle-valve stub on the right and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and



foreign matter from dropping into the engine.

(-) Removing trigger for camshaft sensor

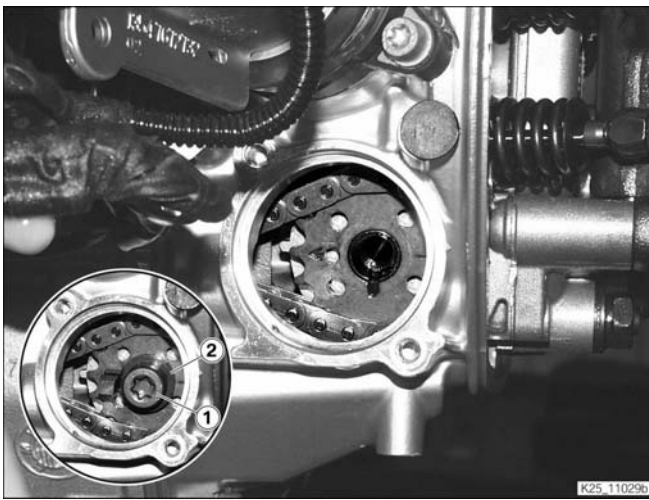
- Slacken screw (1).



Note

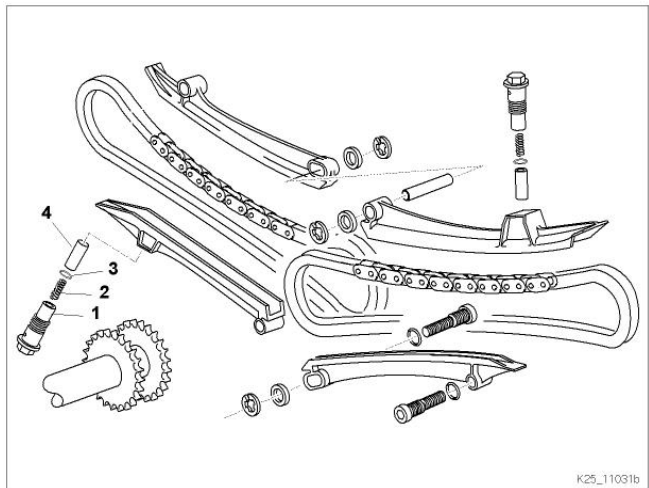
The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with trigger for camshaft sensor (2).



(-) Removing right chain tensioner

- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.



(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

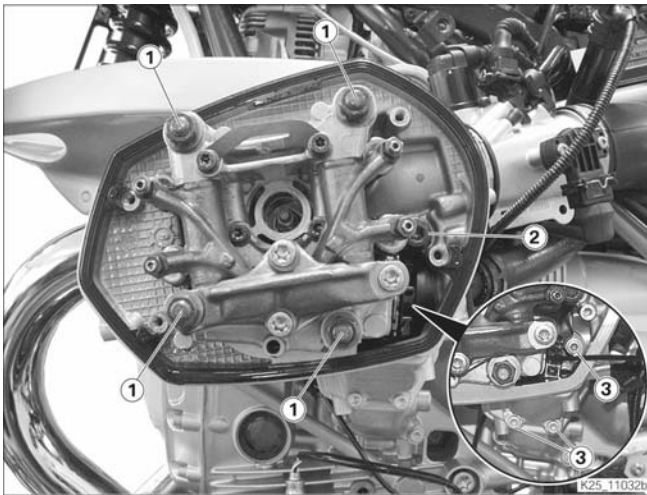
When the engine is being reassembled, it is easier to set

the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).

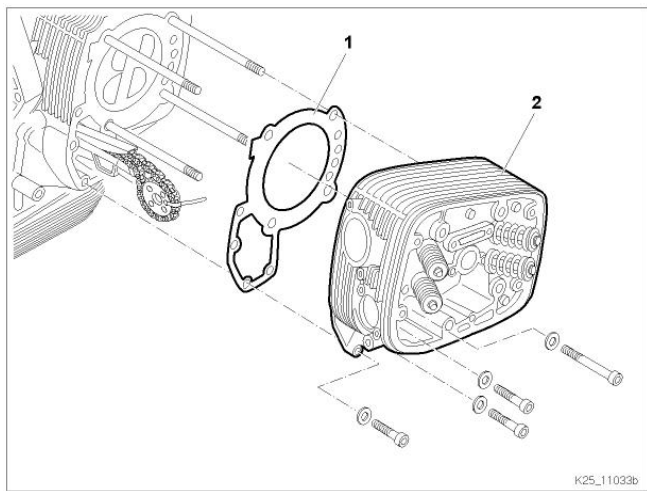


Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing right cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

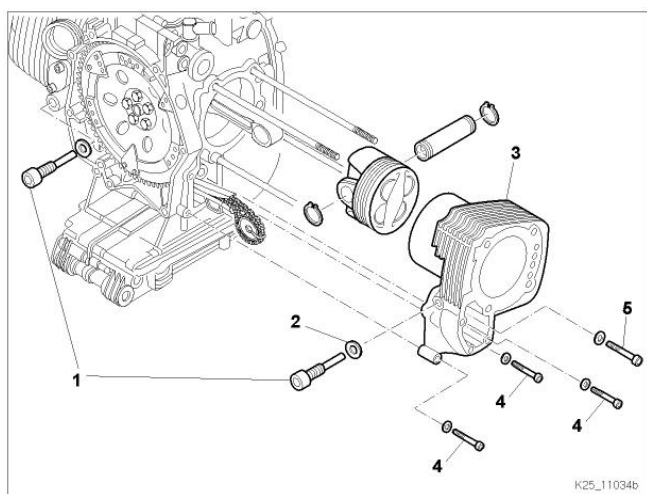
When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care



when laying down the assembly.

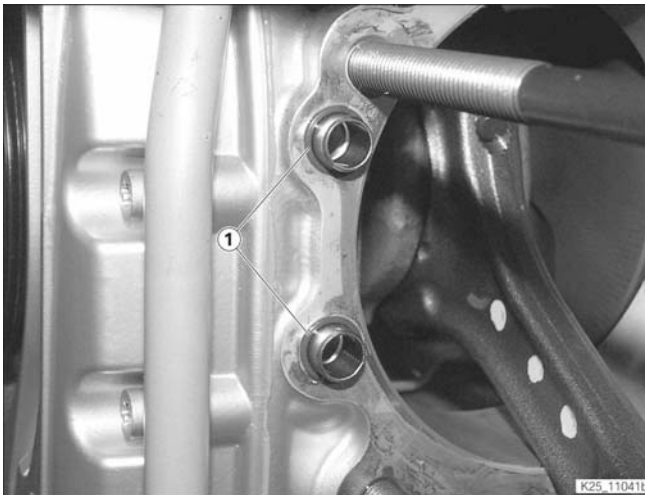
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Checking cylinders for wear

Test

- Visually inspect the friction faces for:
 - >> flaking of the coating
 - >> scores and wear marks

Result: Flaking or deep grooves are visible in the friction faces of the cylinder.

Measure:

- Replace cylinder complete with piston.


Result: No visual signs of wear or damage to the friction faces of the cylinder.

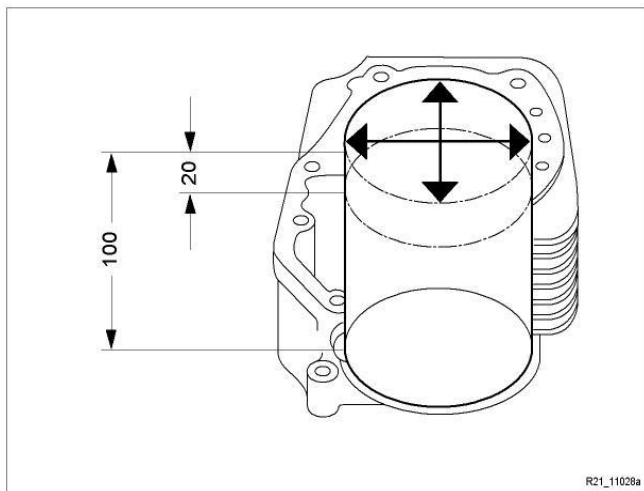
Measure:

- Measure the cylinder bore.

Test

- Measure the cylinder bore on three planes with internal calipers: measure on the same axis as the piston pin and at a right angle across the bore.

 Technical data			
Cylinder bore, tolerance group A	from top edge 20 mm	100.992 - 101 mm	
Value definition:	from top edge 100	100.992 - 101 mm	



When new	mm		
Cylinder bore, tolerance group A Value definition: Wear limit	from top edge 20 mm from top edge 100 mm	max. 101.05 mm max. 101.05 mm	
Cylinder bore, tolerance group B Value definition: When new	from top edge 20 mm from top edge 100 mm	101 - 101.008 mm 101 - 101.008 mm	
Cylinder bore, tolerance group B Value definition: Wear limit	from top edge 20 mm from top edge 100 mm	max. 101.058 mm max. 101.058 mm	
Cylinder bore, tolerance group A/B Value definition: When new	from top edge 20 mm from top edge 100 mm	100.992 - 101.008 mm 100.992 - 101.008 mm	
Cylinder bore, tolerance group A/B Value definition: Wear limit	from top edge 20 mm from top edge 100 mm	max. 101.058 mm max. 101.058 mm	
Permitted out-of-roundness of cylinder bore	from top edge 20 mm from top edge 100 mm	max. 0.01 mm max. 0.015 mm	

Result: Measured values are in excess of the wear limit or the cylinder evinces excessive out-of-round.

Measure:

- Replace cylinder complete with piston.

(-) Removing piston

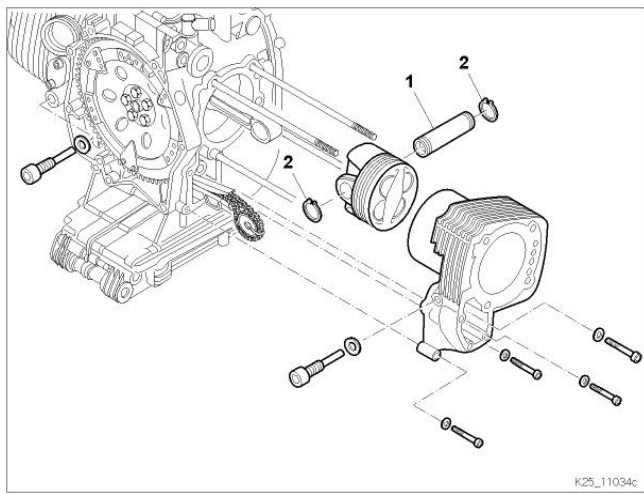
- Remove both circlips (2) from the piston pin.



Note

Remember to mark the exhaust side on the piston crown if you are going to reinstall the same pistons.

- * Pull out piston pin (1) in the forward direction of travel



- until the piston can be separated from the conrod.
- Remove the piston.

(-) Checking pistons for wear

Test

- Visually inspect the friction faces for:
 - » scores and wear marks

Result: Deep scores visible in the piston.

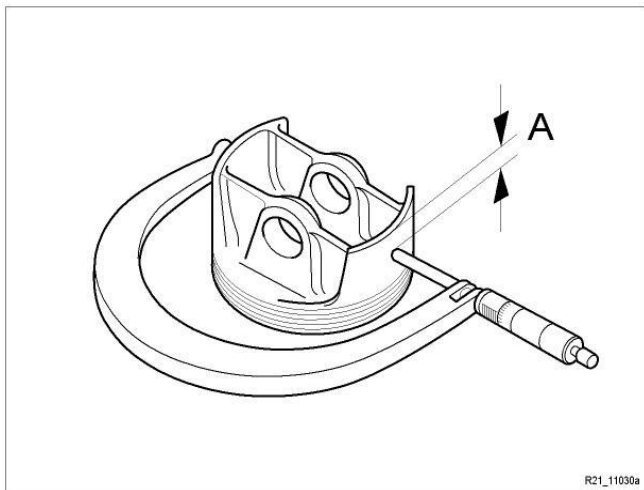
Measure:

- Replace piston and cylinder.

Result: No visual signs of wear or damage to the piston.


Measure:

- Measure the piston diameter.



Test

- Measure the piston diameter on the measuring plane with a caliper gauge: measure at a right angle to the axis of the piston pin.

 Technical data			
Piston diameter, tolerance group A Value definition: When new	At right angles to piston-pin axis, across bottom edge of piston 6 mm	100.977 - 100.989 mm	
Piston diameter, tolerance group A Value definition: Wear limit	At right angles to piston-pin axis, across bottom edge of piston 6 mm	min. 100.9 mm	
Piston	At right	100.965 -	

diameter, tolerance group B Value definition: When new	angles to piston- pin axis, across bottom edge of piston 6 mm	100.977 mm	
Piston diameter, tolerance group B Value definition: Wear limit	At right angles to piston- pin axis, across bottom edge of piston 6 mm	min. 100.89 mm	
Piston diameter, tolerance group AB Value definition: When new	At right angles to piston- pin axis, across bottom edge of piston 6 mm	100.973 - 100.981 mm	
Piston diameter, tolerance group AB Value definition: Wear limit	At right angles to piston- pin axis, across bottom edge of piston 6 mm	min. 100.895 mm	

Result: Measured values are lower than the wear limit.

Measure:

- Replace piston and cylinder.

Test

- Use the measured values for the cylinder and the piston to calculate the installed play of the piston.



Technical data

Piston installation clearance Value definition: When new		0.011 - 0.035 mm	
Piston		max. 0.12 mm	

installation clearance			
Value definition:			
Wear limit			

Result: Installed play of piston is greater than the wear limit.

Measure:

- Replace piston and cylinder.

(-) Checking piston rings for wear

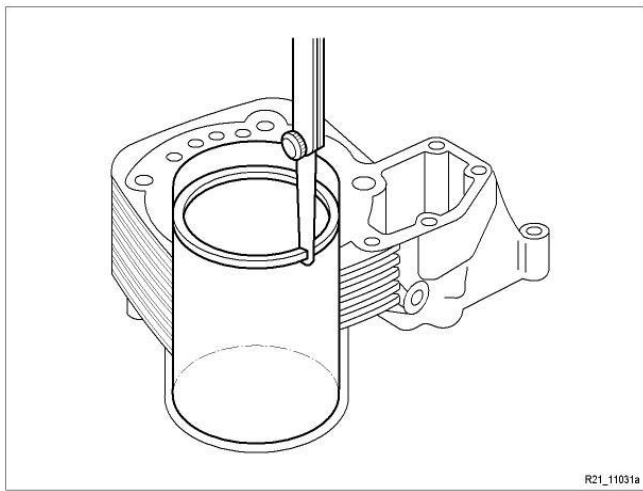
Precondition


- The cylinder bore must be in as-new condition or compliant with the dimensional specifications.




Test

- Insert the piston rings one at a time into the cylinder and use the piston to straighten the ring.



 Technical data			
Installed direction of piston rings		"Top" marking uppermost	

- » The piston ring is in the installed position in the cylinder.
- Use a feeler gauge to measure the piston-ring end gap.

 Technical data			
Piston ring 1st groove, end gap Value definition: When new		0.1 - 0.3 mm	
Piston ring 1st groove, end gap Value definition: Wear limit		max. 0.8 mm	
Piston ring 2nd groove, end gap Value definition: When new		0.1 - 0.3 mm	

Piston ring 2nd groove, end gap Value definition: Wear limit		max. 0.8 mm	
Piston ring 3rd groove, end gap Value definition: When new		0.3 - 0.6 mm	
Piston ring 3rd groove, end gap Value definition: Wear limit		max. 1.2 mm	


Result: Piston-ring end gap is greater than the wear limit.

Measure:

- Replace the piston rings.

(-) Cleaning sealing faces, cylinder base

- Remove all traces of old sealant from the cylinder base and the crankcase, paying particular attention to the grooves in the crankcase.
- Clean and degrease the sealing faces of the cylinder base and the crankcase.

 Consumables/lubricants		
Brake cleaner	Cleaners	83 11 9 407 848

(-) Installing piston in cylinder



! Attention

Nature: There is only one tolerance group (A/B) for replacement pistons and cylinders. There are two other tolerance groups (A and B) for components installed ex-works. Piston and cylinder must belong to the same tolerance group.

Avoidance: Always replace piston and cylinder as a paired set.

! Attention

Nature: In order to ensure low-vibration, smooth engine operation, all the pistons must

belong to the same weight class.

Avoidance: Always use pistons of the same weight class in any one engine.

- Determine the correct weight class (1) of the piston and use a piston of the appropriate weight class.



Note

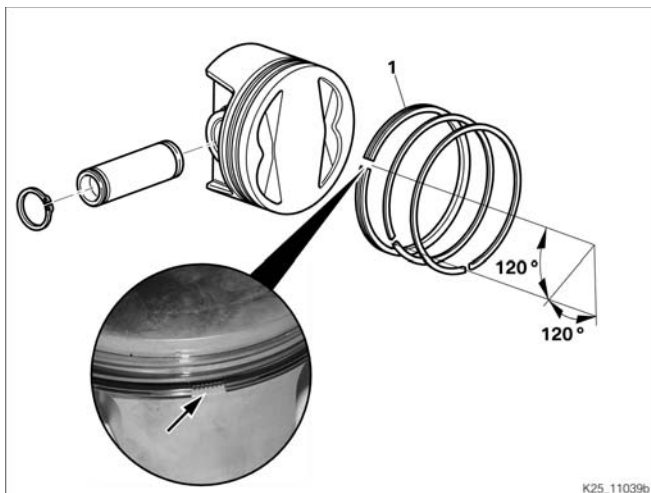
The weight class is stamped on the piston crown and is legible only if the piston is new.

If the symptoms are such that only one replacement cylinder with piston has to be installed, the weight of the other piston has to be ascertained by weighing.



Technical data

Difference in weight within a weight class (weight classes + and -)		max. 10 g	
Value definition: Complete with piston pin and piston rings			



► **Positioning piston rings**

- Position oil wiper ring (1) with the end faces (arrow) up in the installed position.
- Position the other rings with the end gaps offset by the specified angle.



Technical data

Installed direction of piston rings		"Top" marking uppermost	
Offset of piston-ring gaps		120 °	

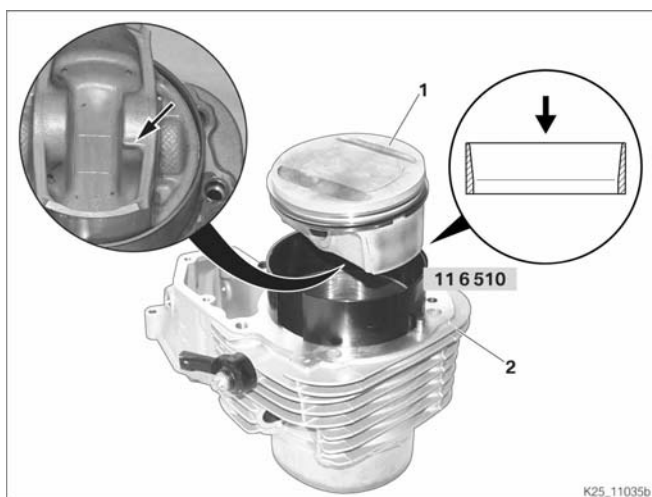


- Coat the friction face of the cylinder and the friction face of the piston skirt with oil.



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9
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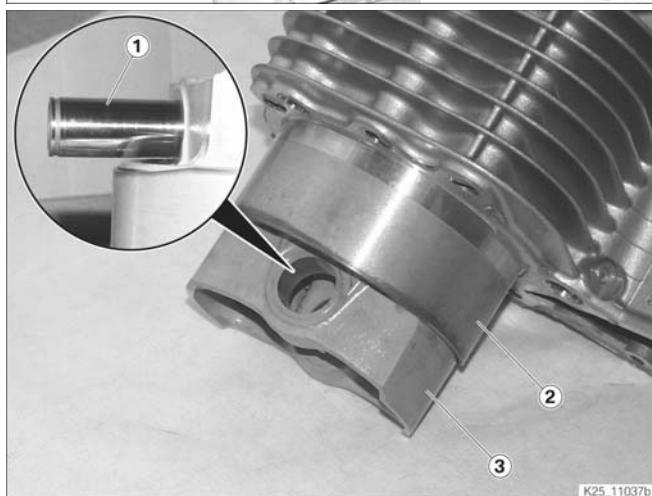
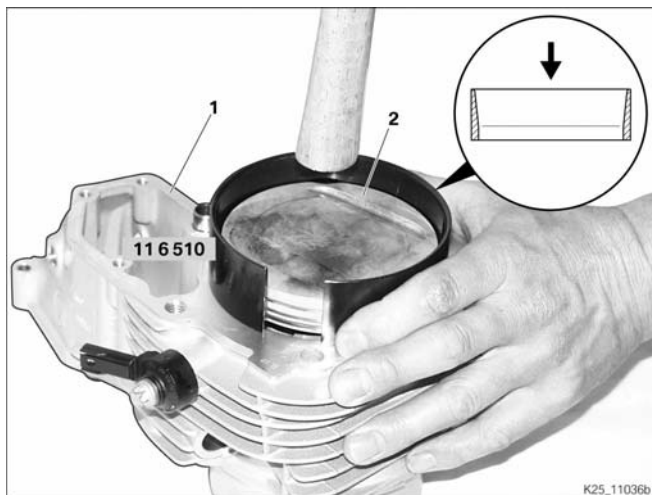
- Place the cylinder, base down, on a smooth, level and firm working surface.
- Set sliding sleeve for piston rings (No. 11 6 510) with the tapered end up on the cylinder.
- Insert the piston with the cast nose (arrow) pointing toward the exhaust side into sliding sleeve (No. 11 6 510) and carefully press it through the taper and into the cylinder.



Technical data

Installation direction of piston		Arrow on piston crown and/or cast lug pointing to exhaust side	
----------------------------------	--	--	--

- » The piston rings are preloaded.
- » The piston skirt is held in position by the cylinder.
- Press sliding sleeve (No. 11 6 510) against the cylinder and carefully tap the piston into the cylinder.
- » The piston is full inserted into the cylinder.
- Remove sliding sleeve for piston rings (No. 11 6 510) .

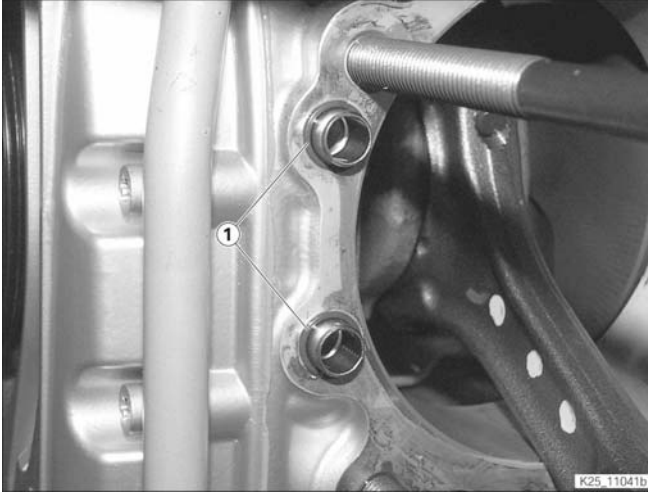


- Push piston (3) through cylinder (2) just far enough to allow piston pin (1) to be inserted. Make sure that the piston rings do not project past the end of the cylinder liner.

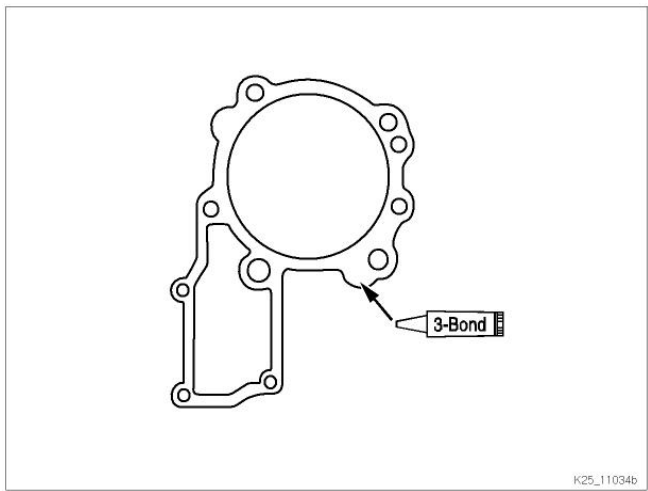
(-) Installing right cylinder

Precondition


- Crankshaft is locked at TDC.

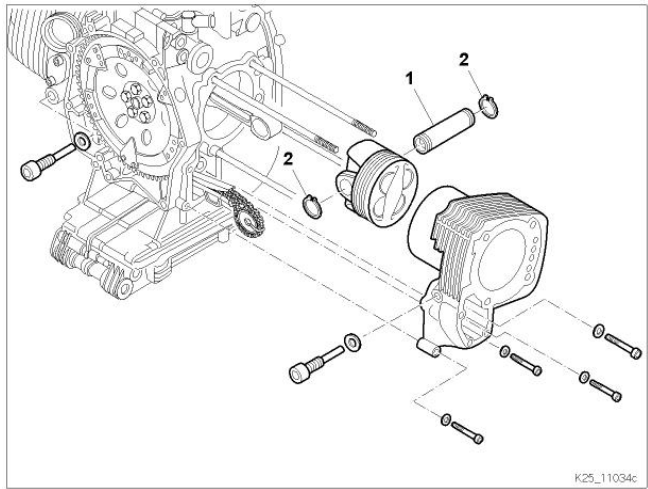


- Slip new O-rings (1) over the reamed sleeves and into the crankcase.




- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376



- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.

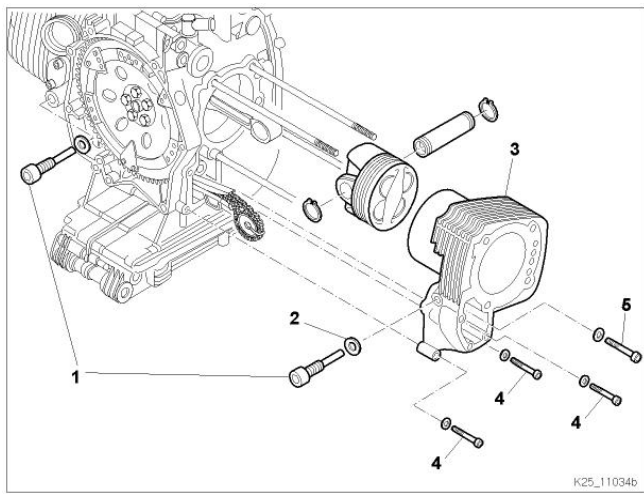
 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685


- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).




Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



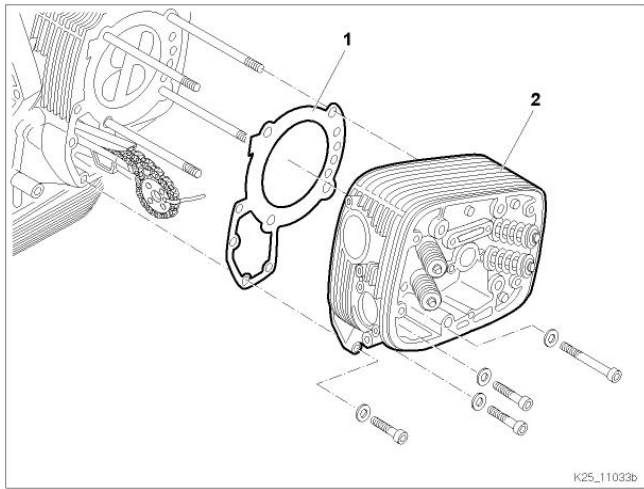
 Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain side rail (1) with new seal (2).

 Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

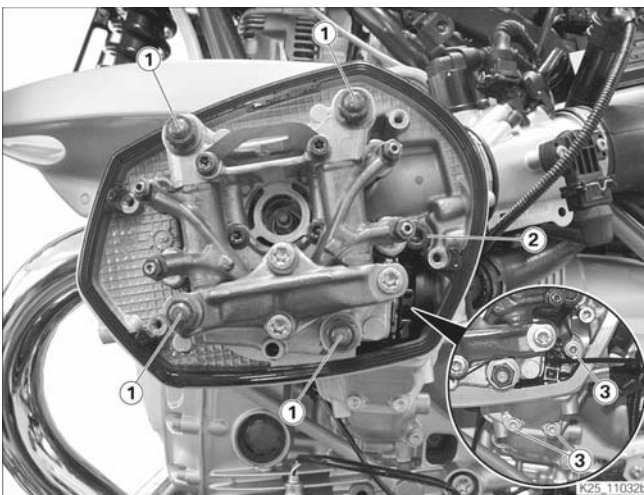
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.


Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

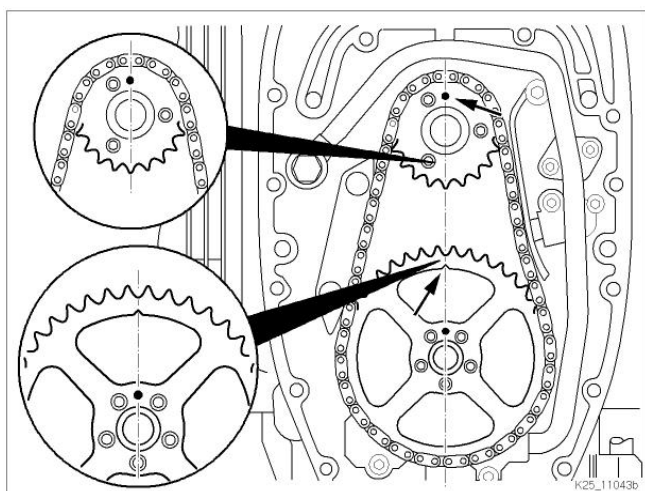
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



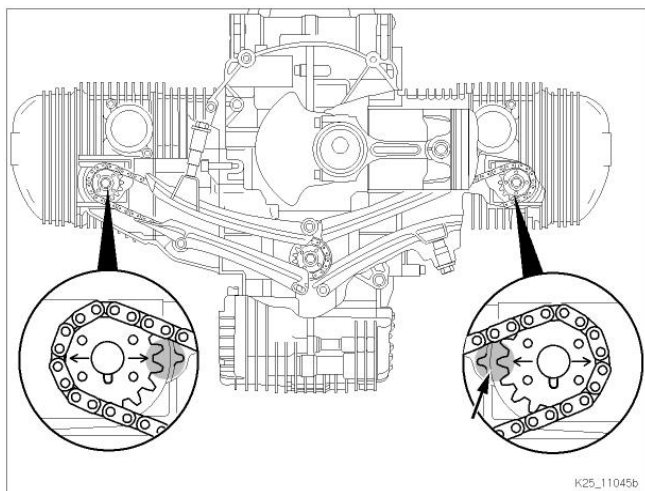
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, right (cylinder No. 1)



- Make sure that the crankshaft and countershaft are in the **"firing TDC, right cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

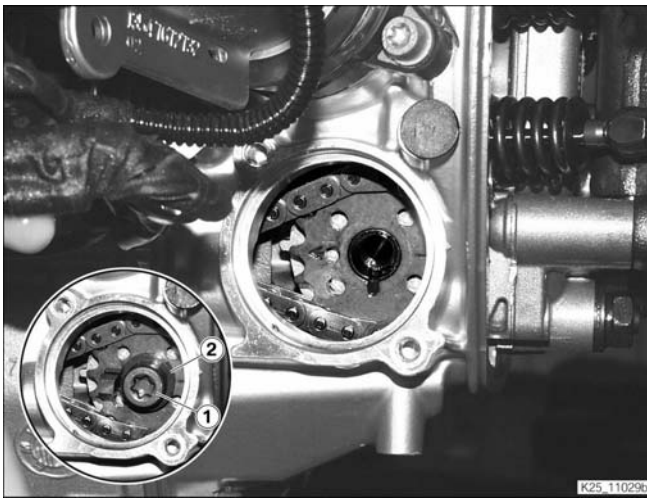
- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.





- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



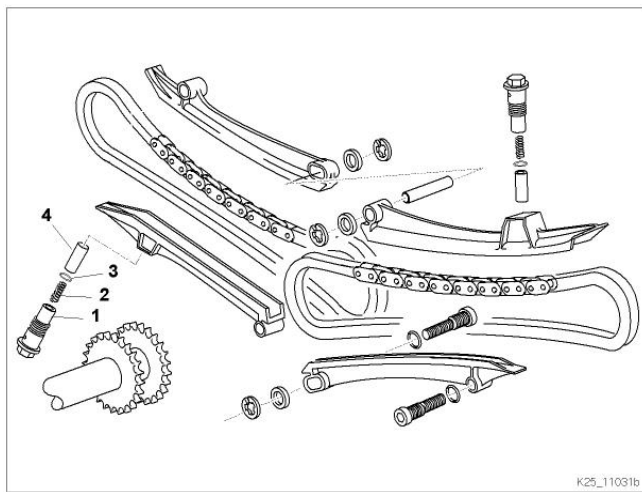
▶ Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.




- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.



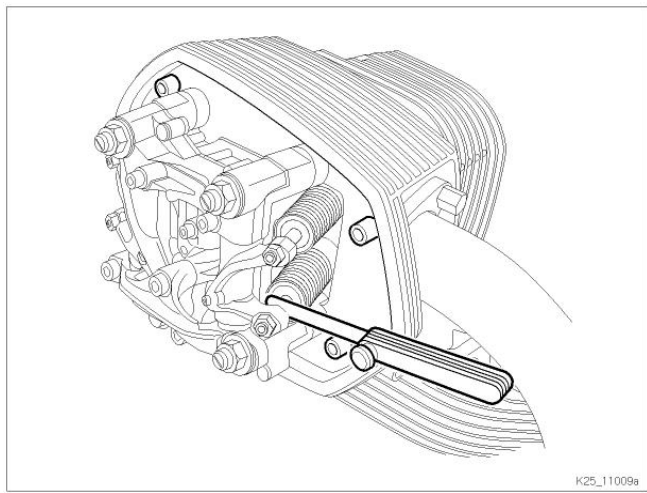
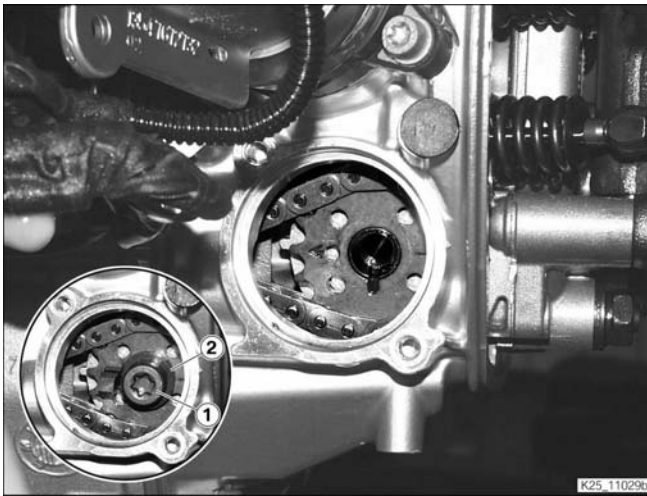
 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance


Test

- Measure valve clearance with feeler gauge.



Note


You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.

 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

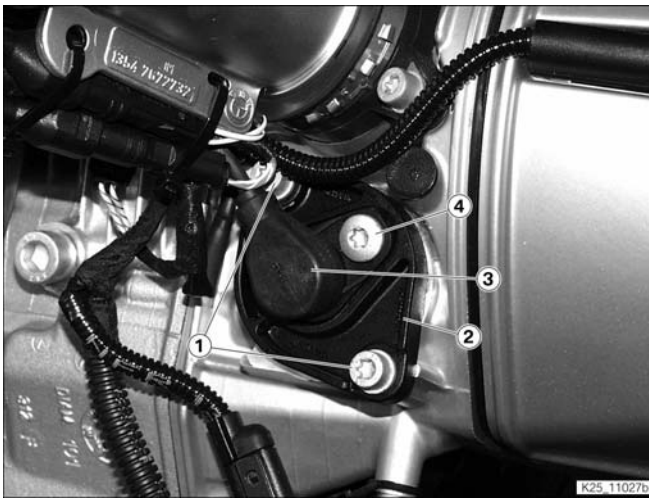
 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



Attention

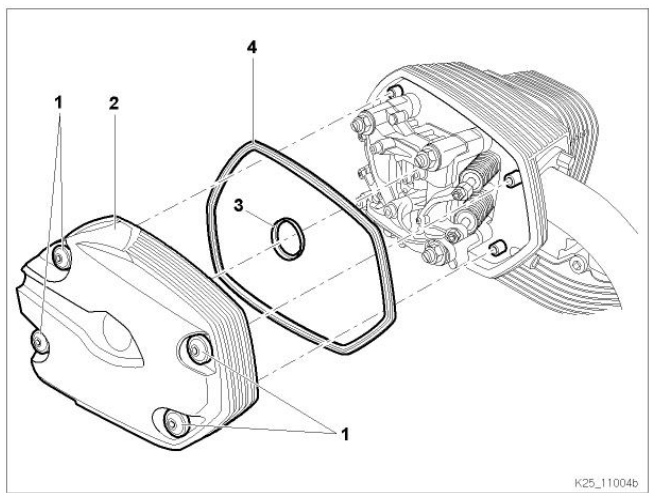


Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.


Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

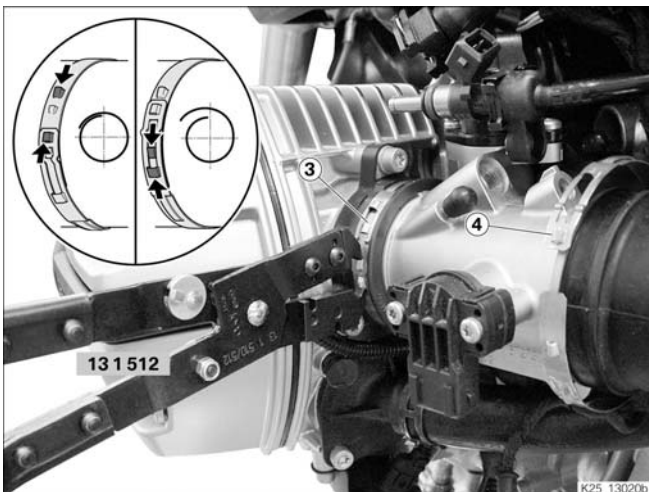
(-) Installing cylinder head cover



- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

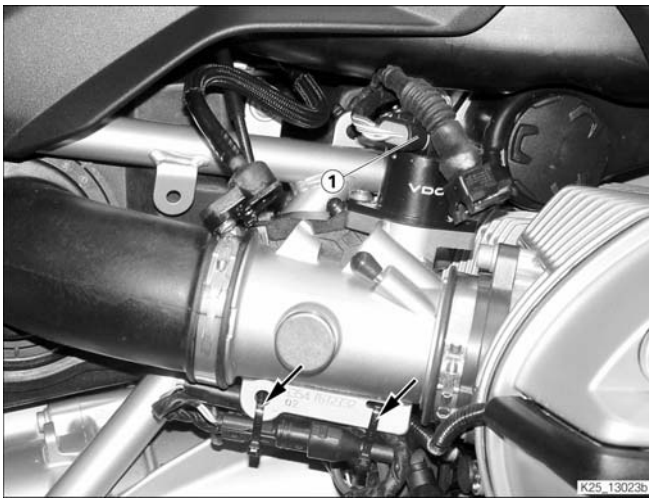
 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing right throttle-valve stub



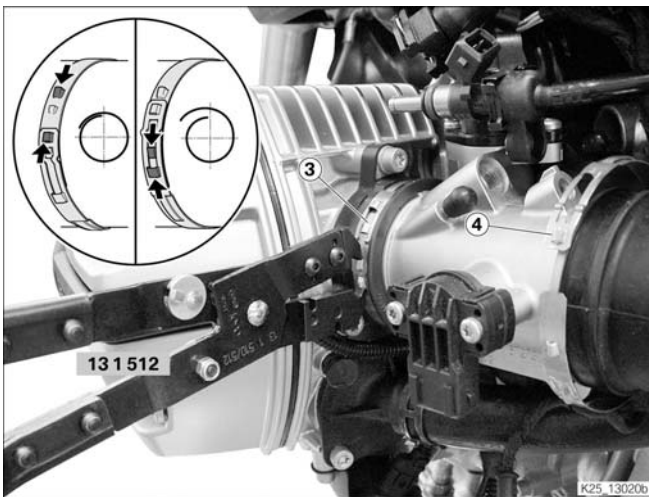
- Remove the cover from the intake.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamp (3) and close it with pliers (No. 13 1 512).

- Connect plug of right idle actuator (1).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stub on right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.



(-) Installing air intake pipe


- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512) .



(-) Connecting plugs of engine sensors, right

- Secure earth lead (1) to the cylinder head.




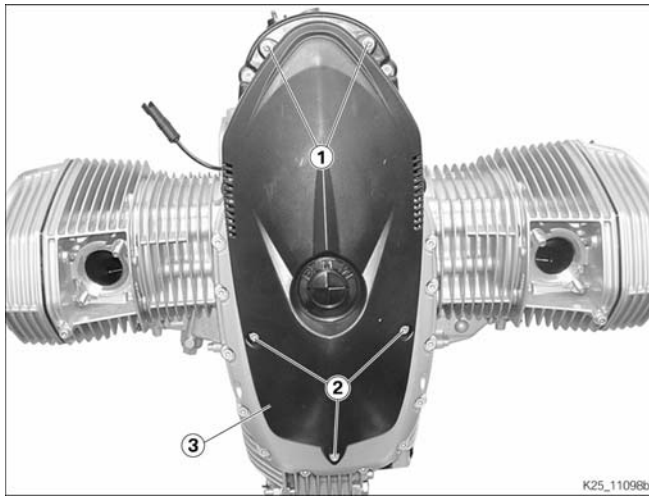
 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

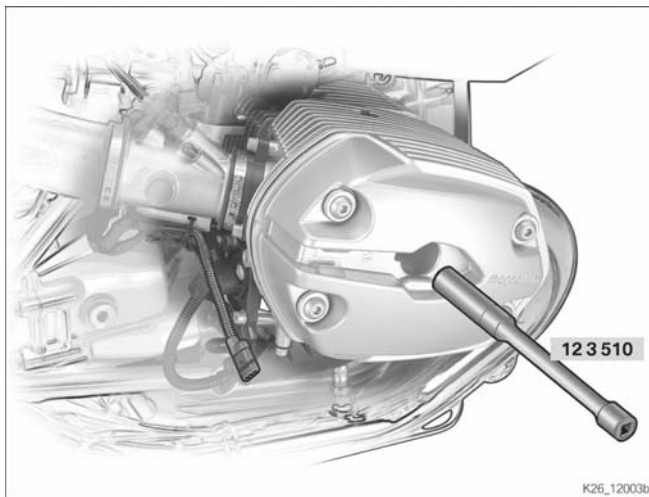
(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		





Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
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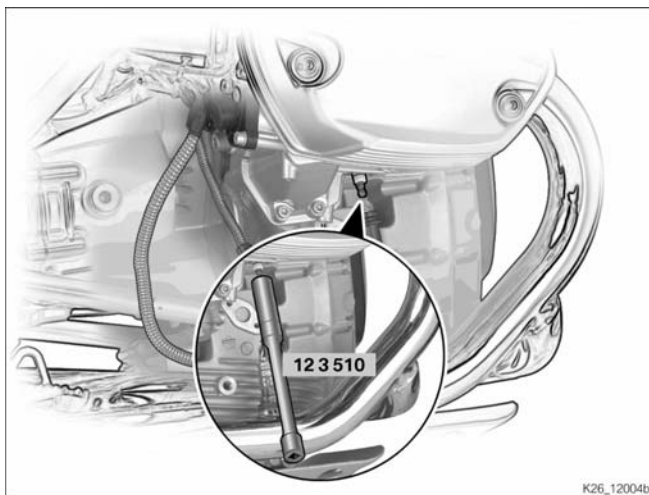


(-) Installing primary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.


 Tightening torques		
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	


 Technical data			
Spark plug, manufacturer and designation		Bosch YR 5 LDE	

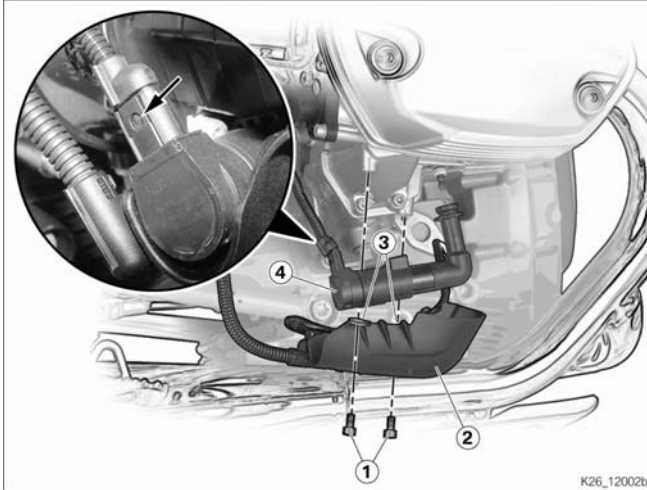


(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.


 Tightening torques		
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	

 Technical data			
Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE	




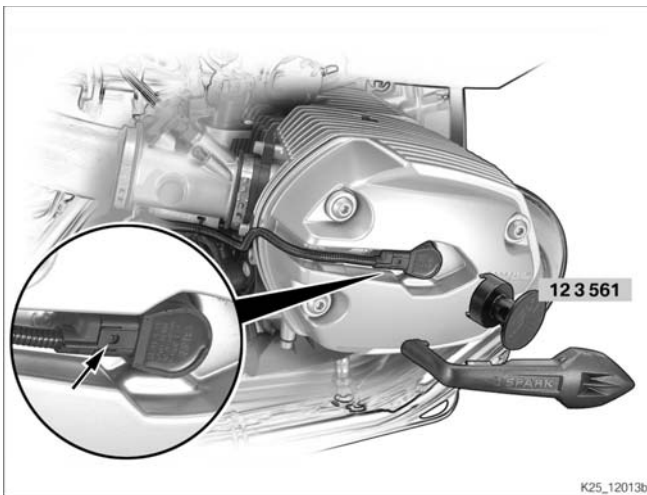
(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.

 Consumables/lubricants		
Talcum powder	Assembly aid	

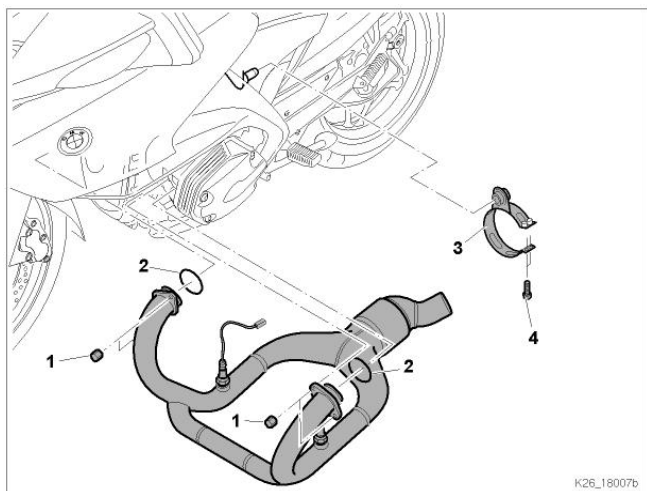
- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	




(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.



(-) Installing exhaust elbow

- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).



Tightening torques

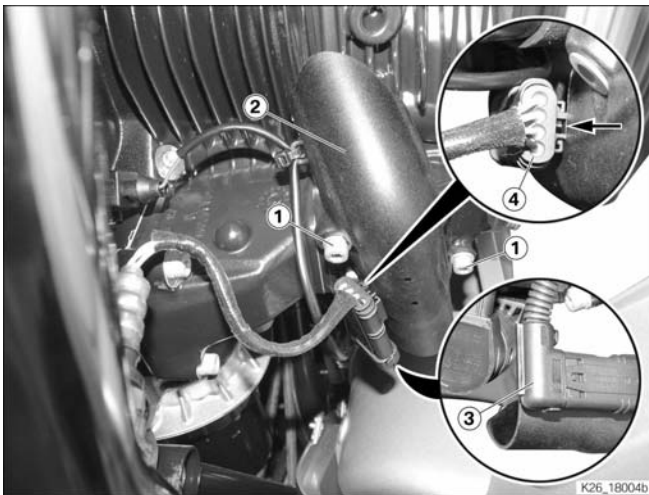
Manifold to cylinder head, Acorn nut M8	21 Nm	
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- Align the clamp (arrow) on the manifold and tighten screws (1).



Tightening torques

Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	
--	------	--



► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).



Tightening torques

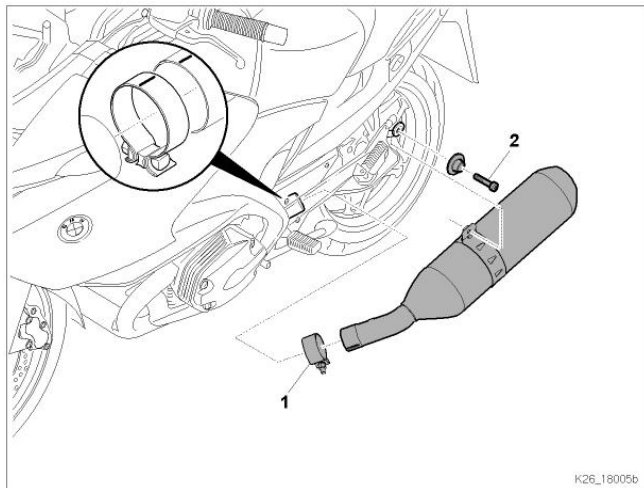
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
--	------	--


- Install front screw (1) in both bottom sections of the fairing.




◀ (-) Installing silencer

- Grease the inner face of Torca clamp (1).




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

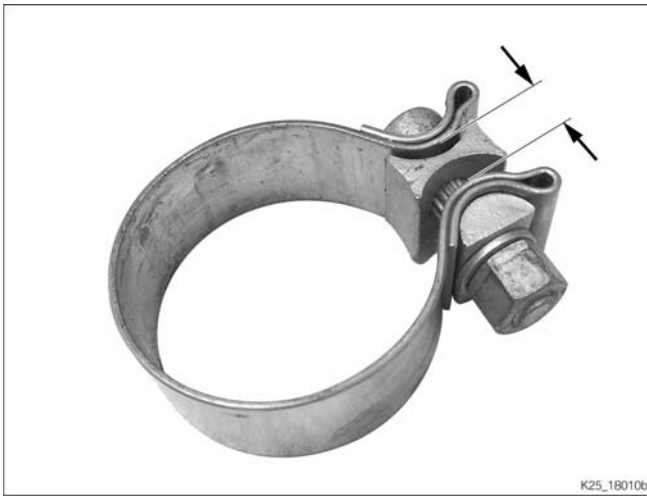
 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


▶ Checking Torca clamp on silencer



- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

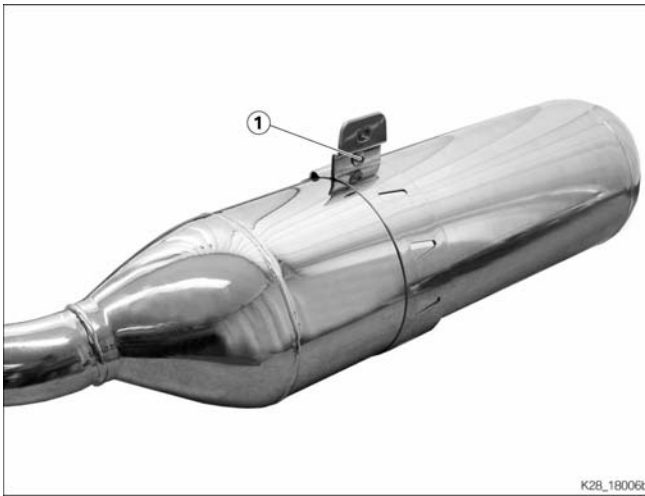


Attention


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.


Open the clamp far enough and grease it lightly.




- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

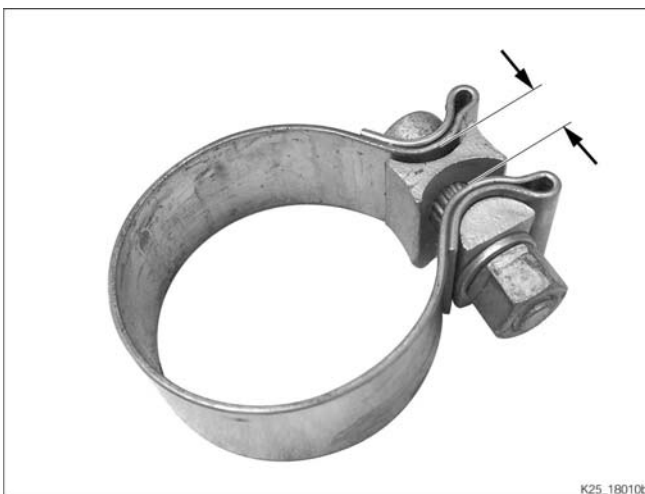



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

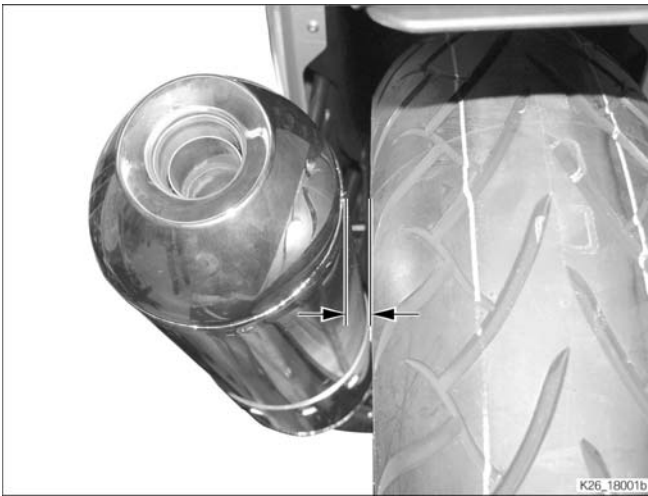
Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.



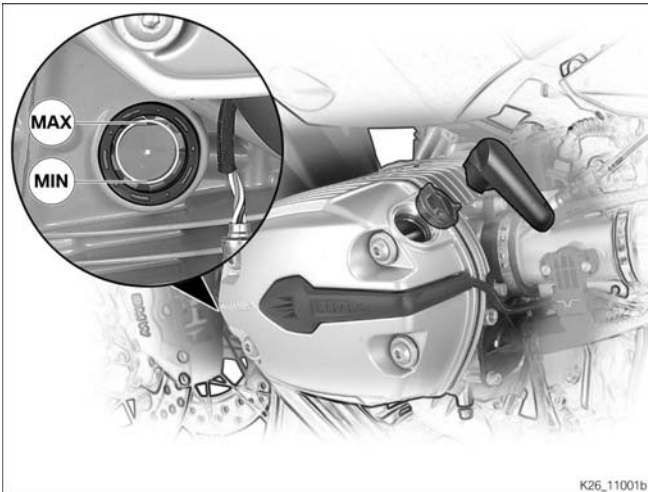
Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



Technical data

Oil level, engine		Maximum = top ring mark on sight glass	
Consumables/lubricants			
Engine oil, 20W-50			
		Minimum = bottom ring mark on sight glass	

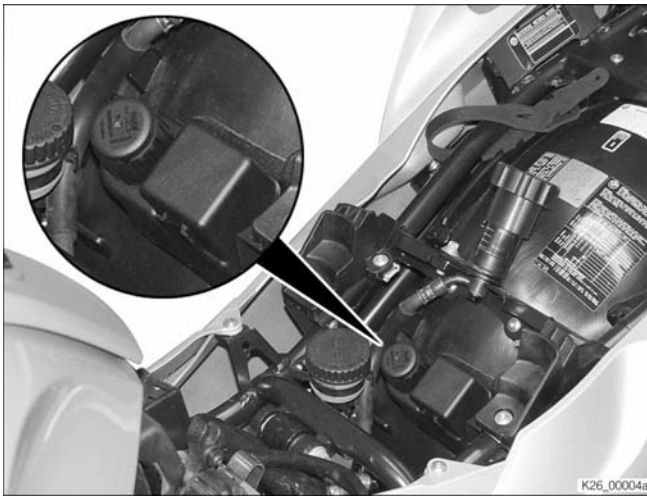
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
---	--	------------	--

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the

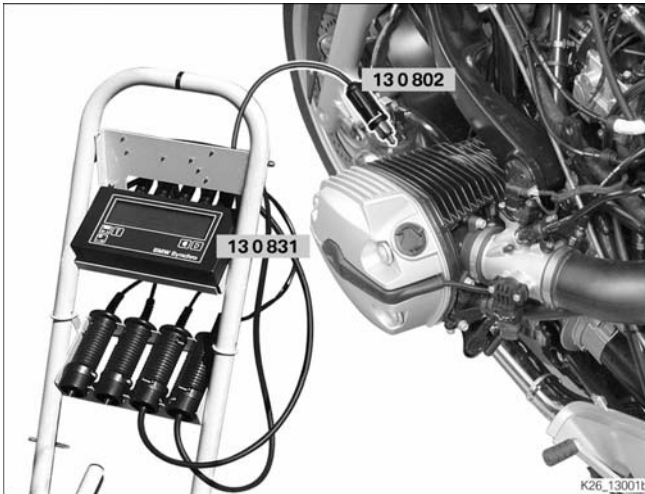
throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



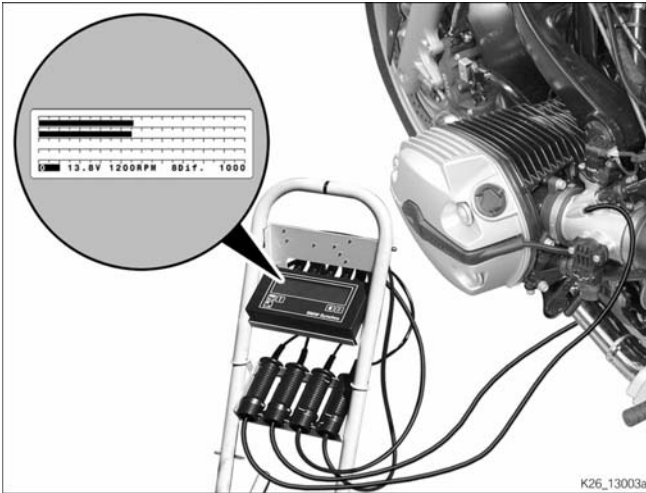
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to

synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

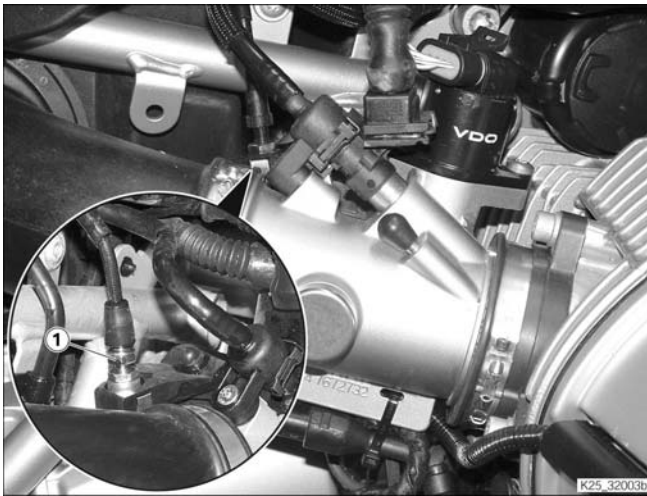
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change



- **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

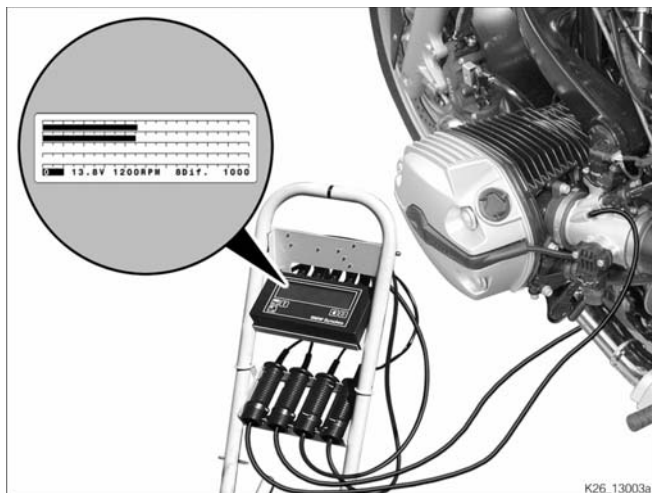
- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic

system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

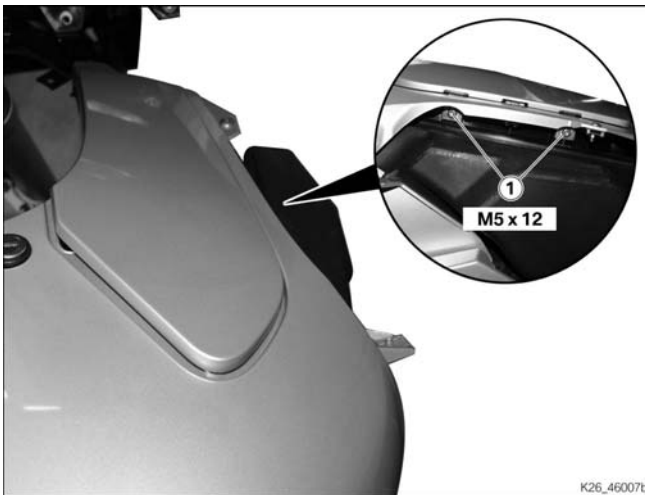
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

11 11 067 Sealing left cylinder



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



K26_46009b

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

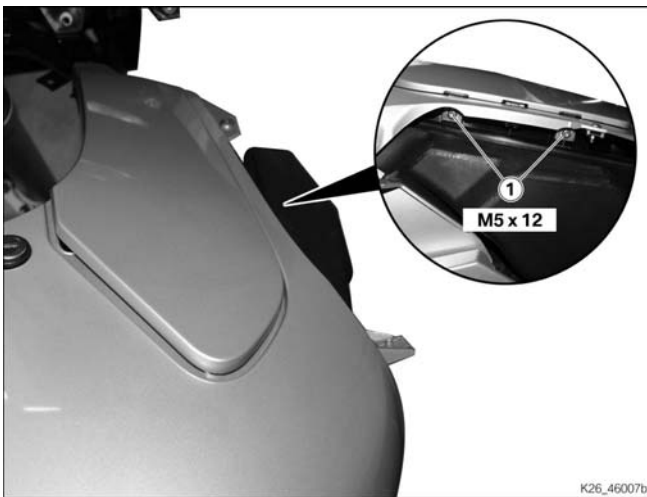
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



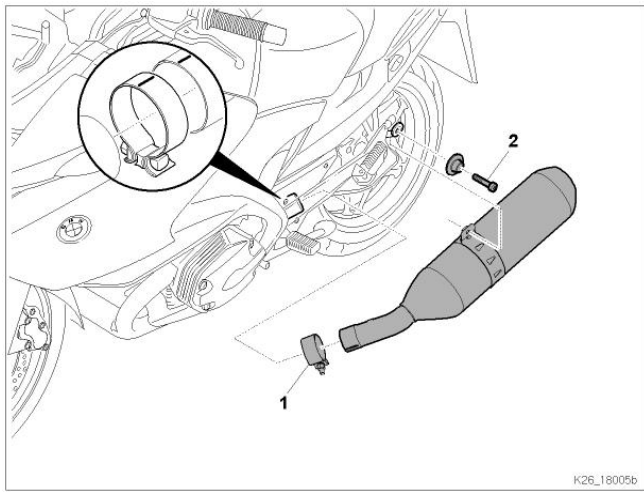
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



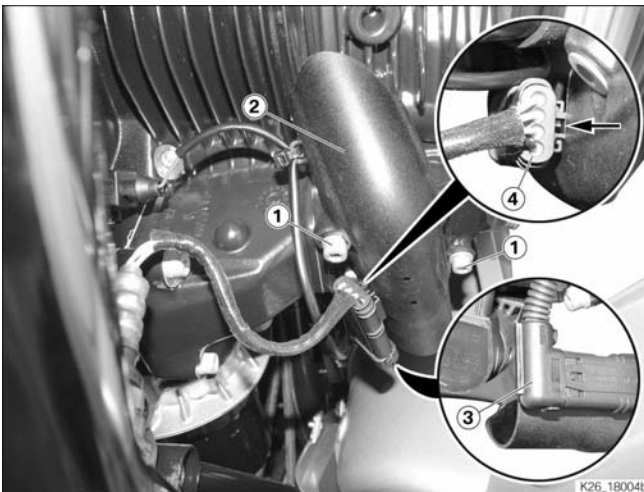
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

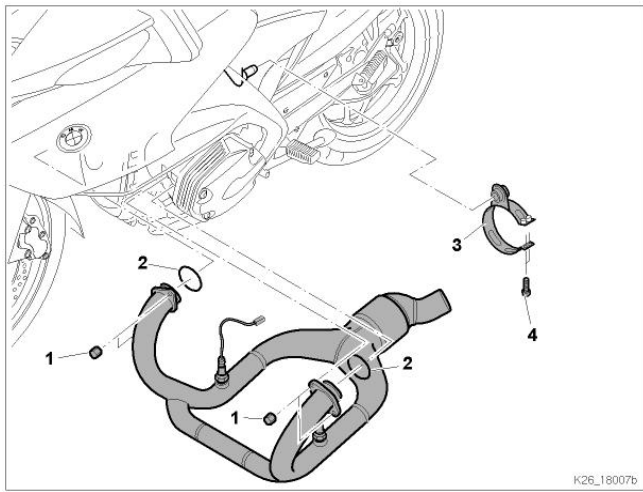
- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.



(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



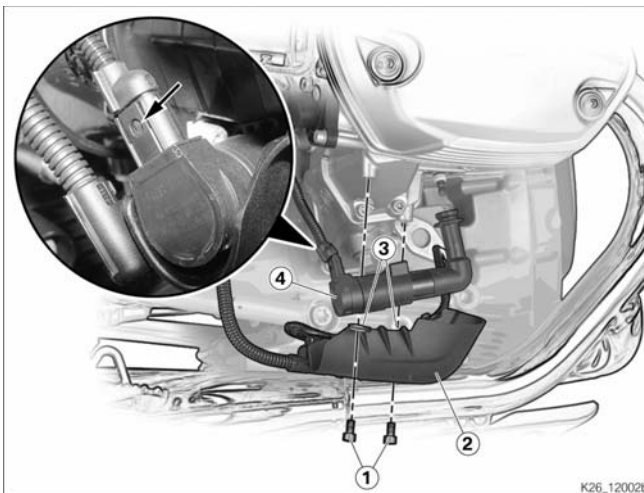
- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

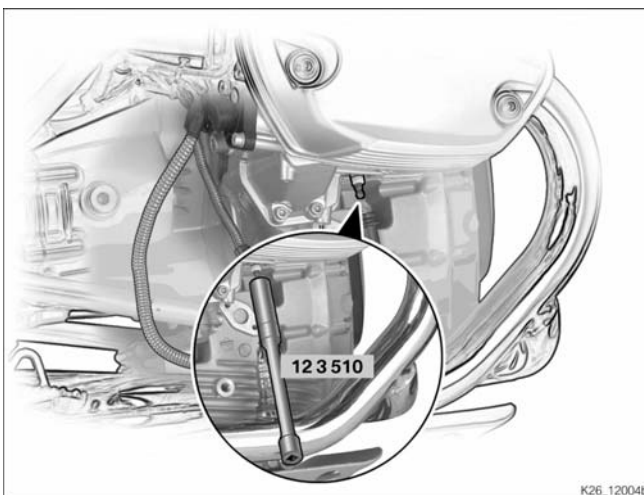
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

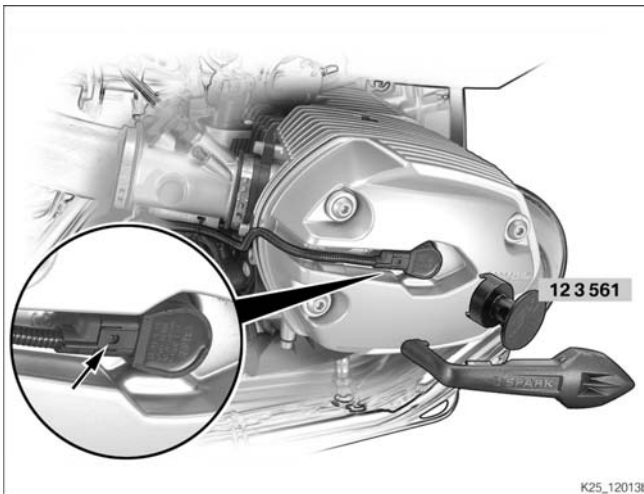


- Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

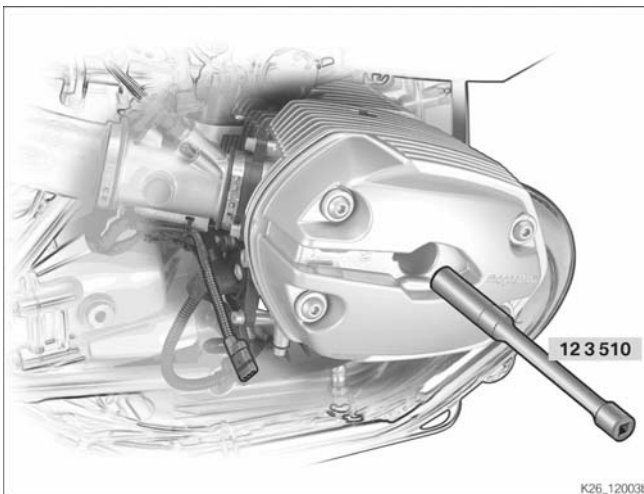
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

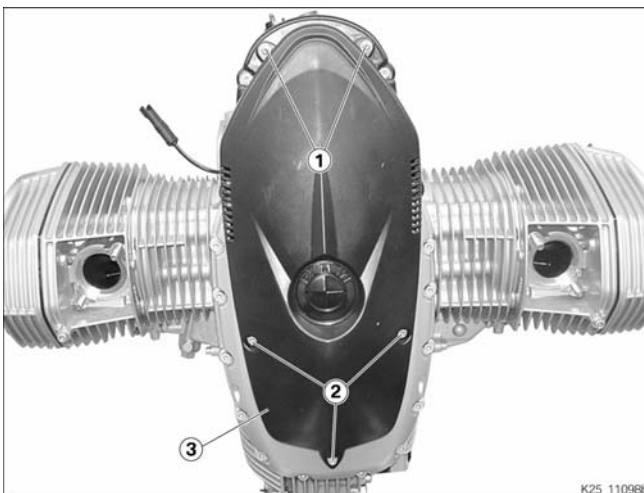
(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the primary spark plug.



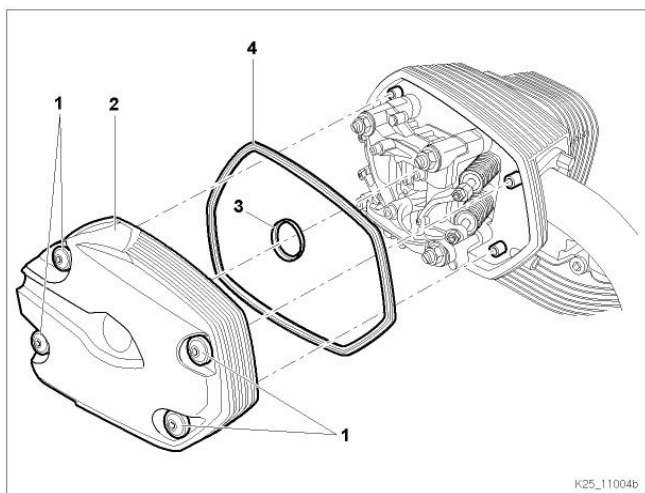
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

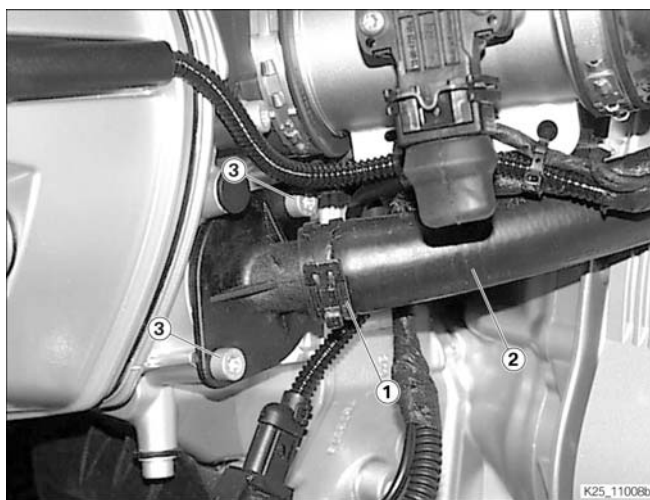
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

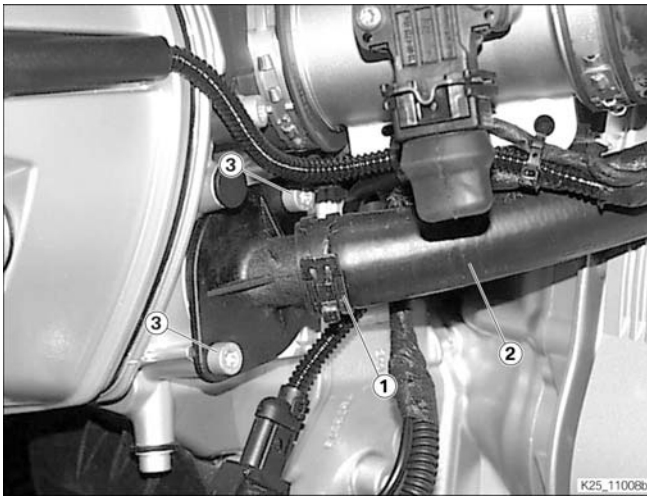
(-) Removing left camshaft cover

► **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



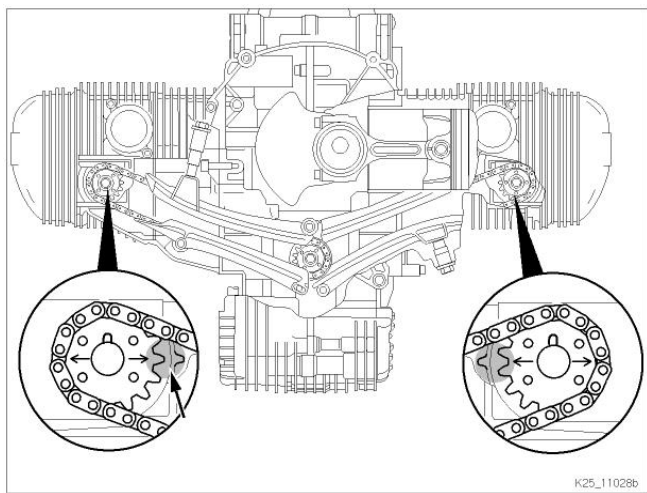
(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.



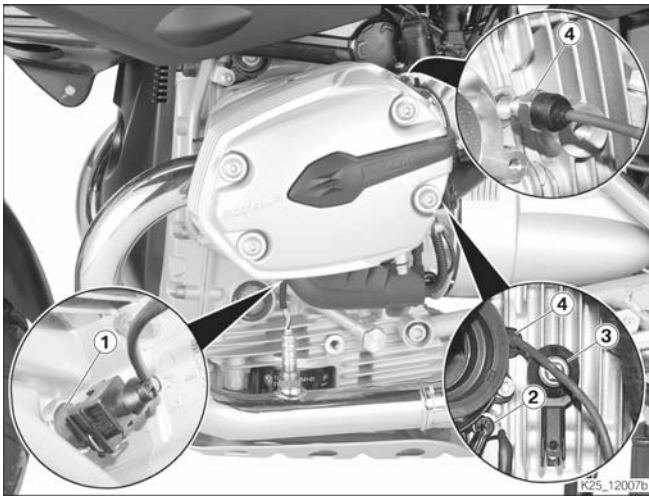
- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



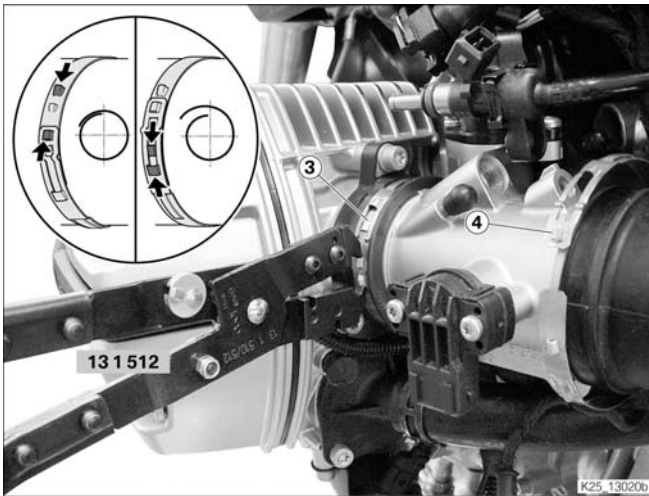
(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).



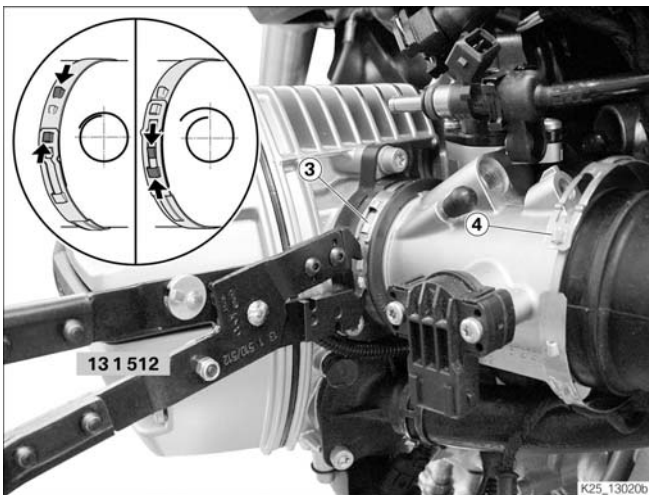
(-) Disconnecting intake air pipe from throttle-valve stub

- Open clips (4) on left and right with pliers (No. 13 1 512) .

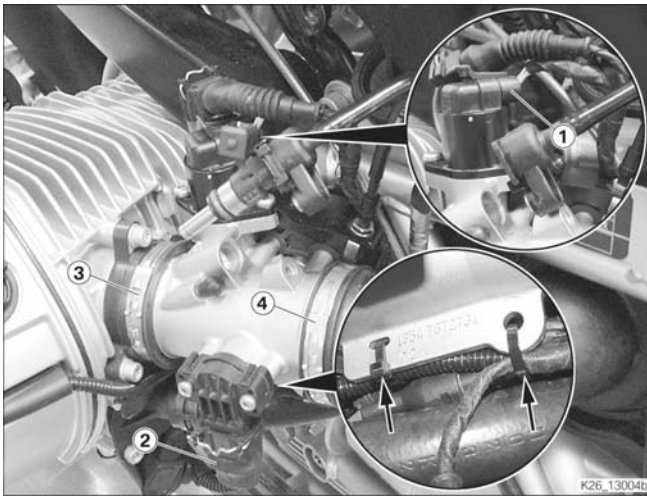


(-) Disconnecting left throttle-valve stub

- Open hose clips (3) at the left throttle valve stub with pliers (No. 13 1 512) .



- Cut through the cable tie (arrow) on the left.
- Disconnect plug of left idle actuator (1).
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the throttle-valve stub on the left and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.



- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

(-) Removing breather plate

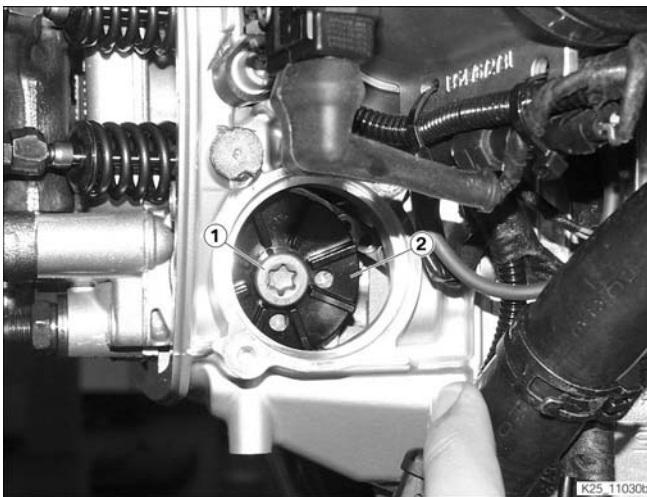
- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).



(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

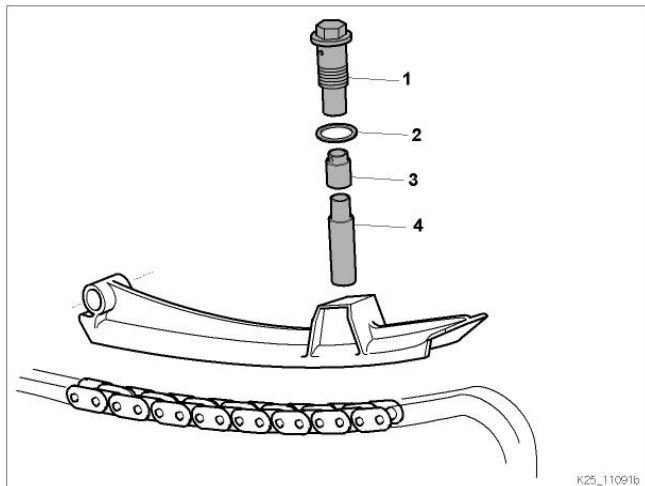
- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

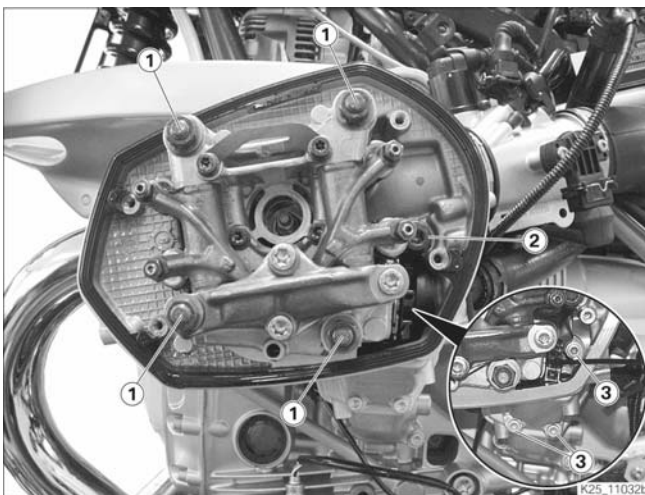
When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.



(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



(-) Removing left cylinder head

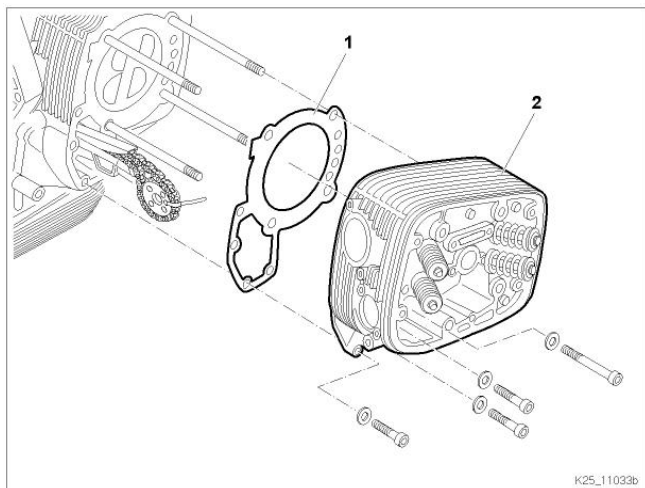
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

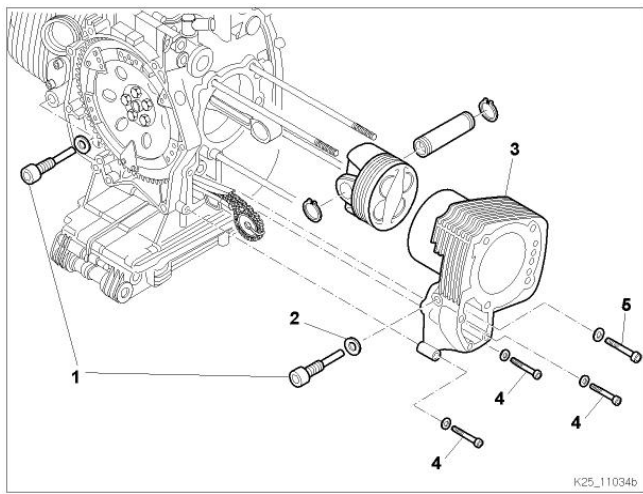
- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.

(-) Removing left cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.



- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

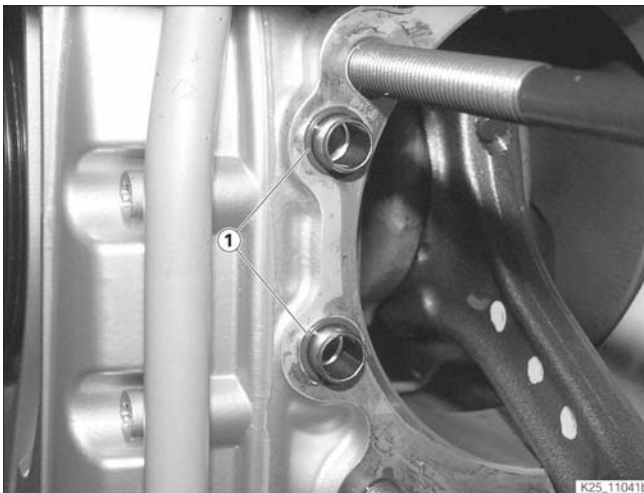
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Removing piston

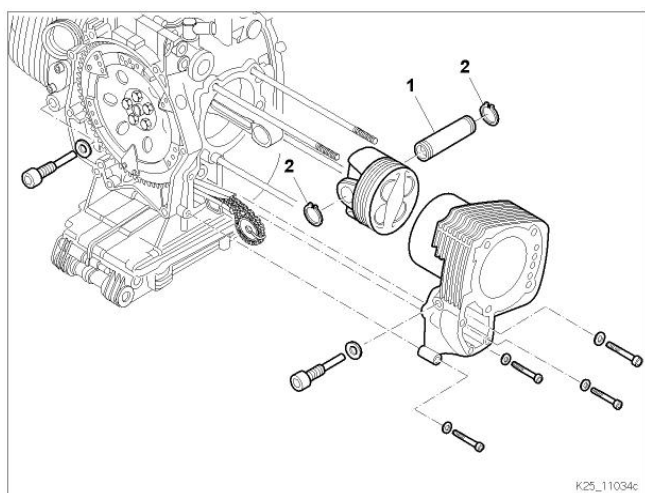
- Remove both circlips (2) from the piston pin.



Note

Remember to mark the exhaust side on the piston crown if you are going to reinstall the same pistons.

- Pull out piston pin (1) in the forward direction of travel until the piston can be separated from the conrod.
- Remove the piston.



(-) Cleaning sealing faces, cylinder base

- Remove all traces of old sealant from the cylinder base and the crankcase, paying particular attention to the grooves in the crankcase.
- Clean and degrease the sealing faces of the cylinder base and the crankcase.



Consumables/lubricants

Brake cleaner	Cleaners	83 11 9 407 848
---------------	----------	--------------------

(-) Installing piston in cylinder



Attention

Nature: There is only one tolerance group (A/B) for replacement pistons and cylinders. There are two other tolerance groups (A and B) for components installed ex-works. Piston and cylinder must belong to the same tolerance group.

Avoidance: Always replace piston and cylinder as a paired set.



Attention

Nature: In order to ensure low-vibration, smooth engine operation, all the pistons must belong to the same weight class.

Avoidance: Always use pistons of the same weight class in any one engine.

- Determine the correct weight class (1) of the piston and use a piston of the appropriate weight class.



Note

The weight class is stamped on the piston crown and is

legible only if the piston is new.

If the symptoms are such that only one replacement cylinder with piston has to be installed, the weight of the other piston has to be ascertained by weighing.

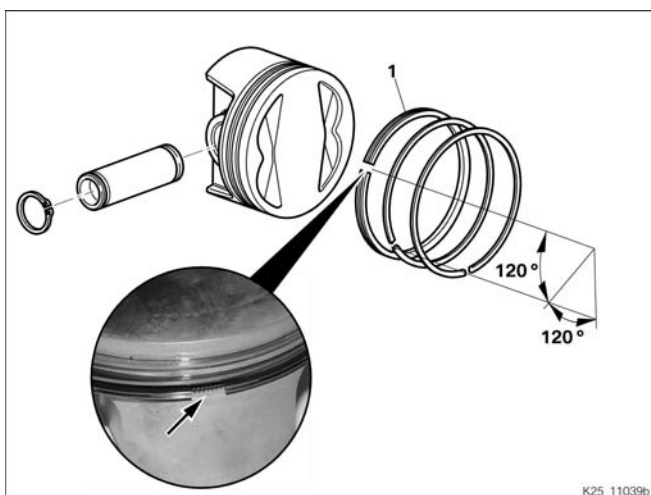


Technical data

Difference in weight within a weight class (weight classes + and -)		max. 10 g	
Value definition:			
Complete with piston pin and piston rings			

► Positioning piston rings

- Position oil wiper ring (1) with the end faces (arrow) up in the installed position.
- Position the other rings with the end gaps offset by the specified angle.



K25_11039b

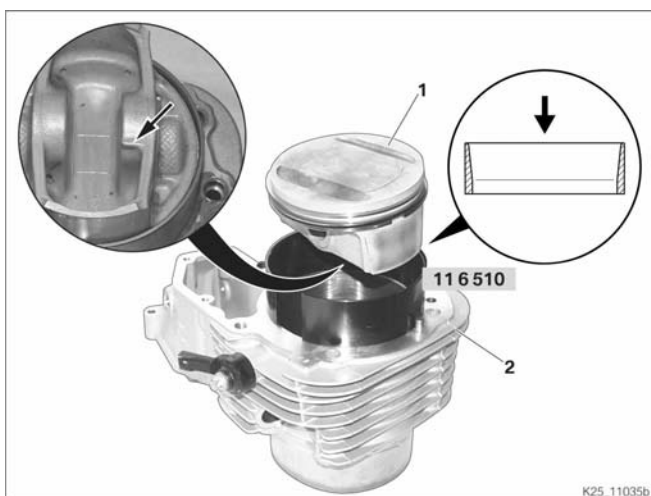


Technical data

Installed direction of piston rings		"Top" marking uppermost	
Offset of piston-ring gaps		120 °	



- Coat the friction face of the cylinder and the friction face of the piston skirt with oil.



K25_11035b



Consumables/lubricants

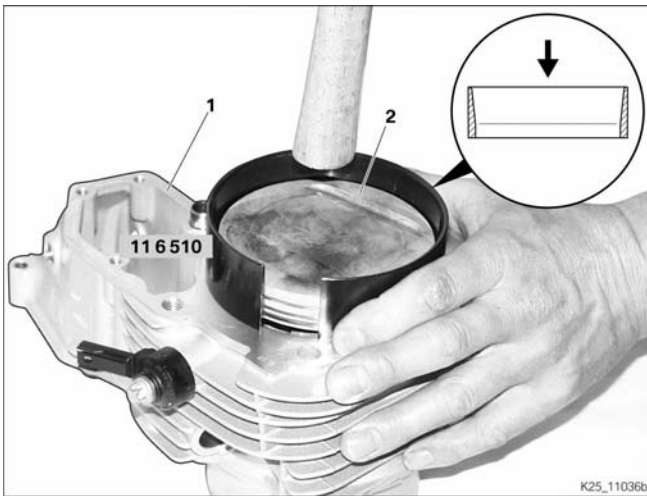
Engine oil, 20W-50	Engine oil	81 22 9 407 685
--------------------	------------	--------------------

- Place the cylinder, base down, on a smooth, level and firm working surface.
- Set sliding sleeve for piston rings (No. 11 6 510) with the tapered end up on the cylinder.
- Insert the piston with the cast nose (arrow) pointing toward the exhaust side into sliding sleeve (No. 11 6 510) and carefully press it through the taper and into the cylinder.

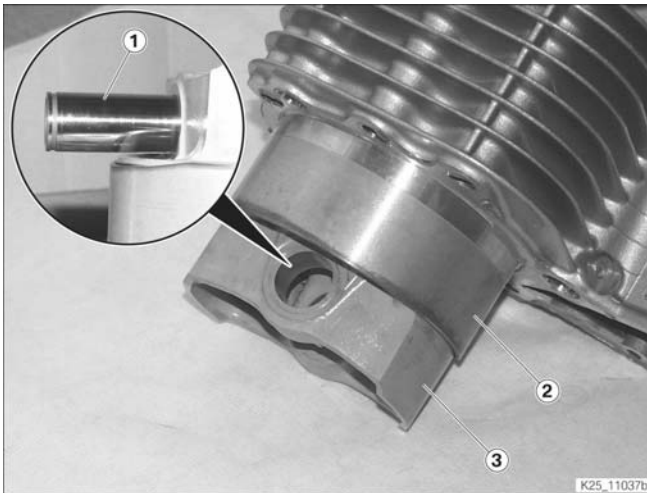


Technical data

Installation direction of piston		Arrow on piston crown and/or cast lug pointing to exhaust side	
----------------------------------	--	--	--



- » The piston rings are preloaded.
- » The piston skirt is held in position by the cylinder.
 - Press sliding sleeve (No. 11 6 510) against the cylinder and carefully tap the piston into the cylinder.
- » The piston is full inserted into the cylinder.
 - Remove sliding sleeve for piston rings (No. 11 6 510) .



- Push piston (3) through cylinder (2) just far enough to allow piston pin (1) to be inserted. Make sure that the piston rings do not project past the end of the cylinder liner.

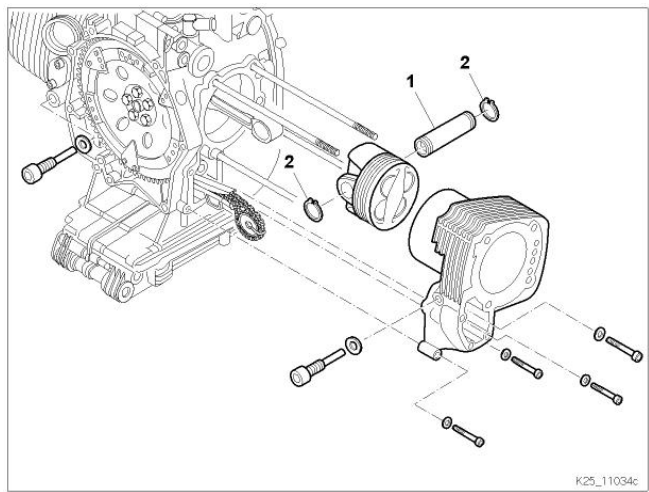
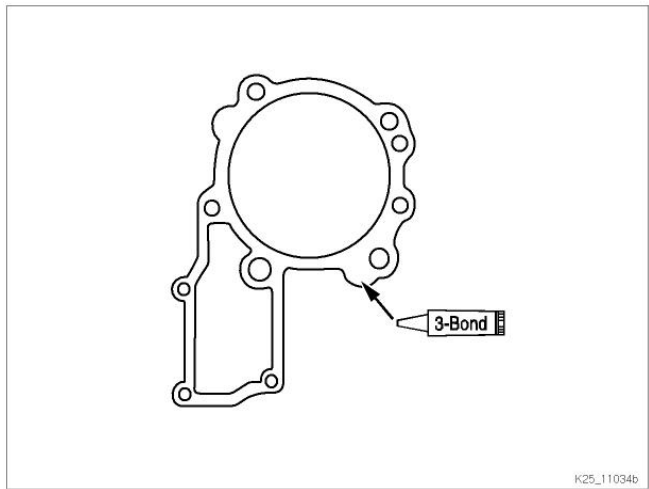
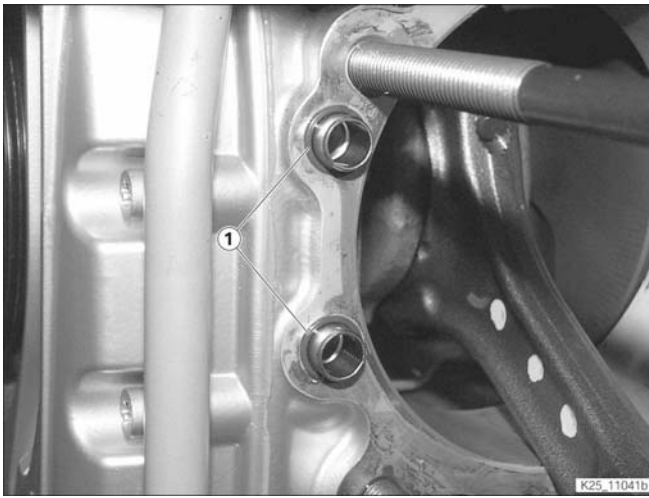
(-) Installing left cylinder

Precondition


- Crankshaft is locked at TDC.




- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.

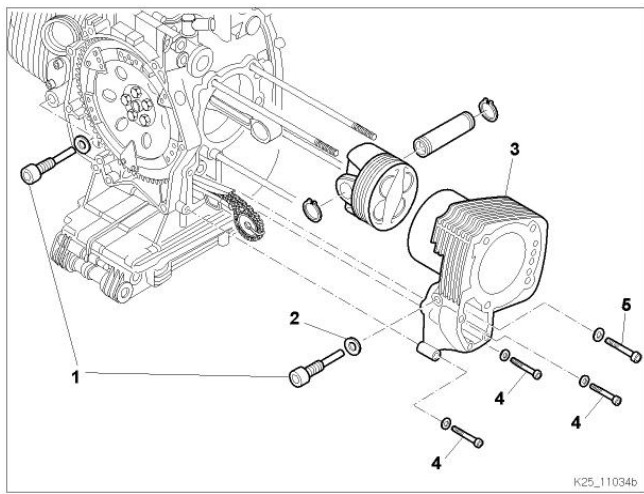
 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

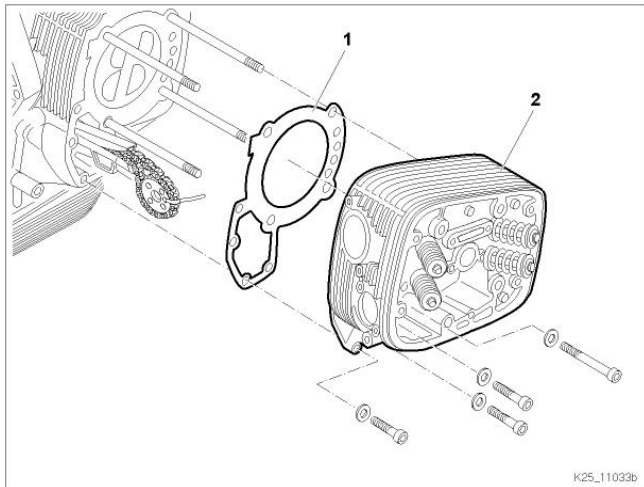


Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain side rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing left cylinder head



- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.

⚠ Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

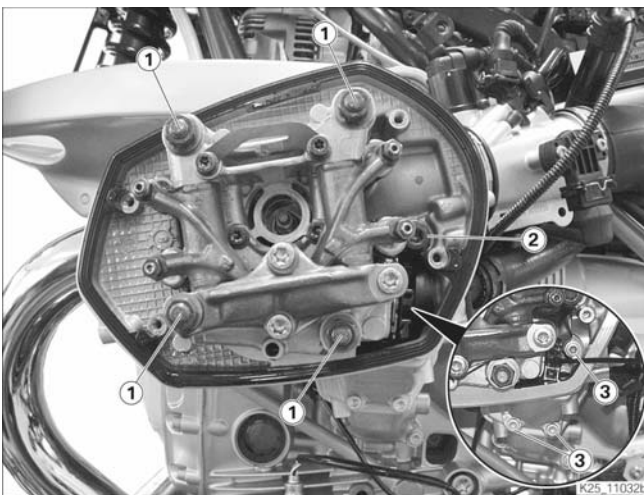
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.


⚠ Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

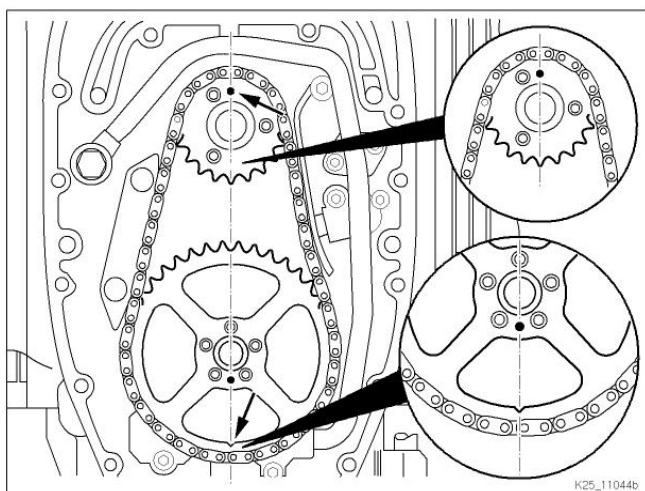
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



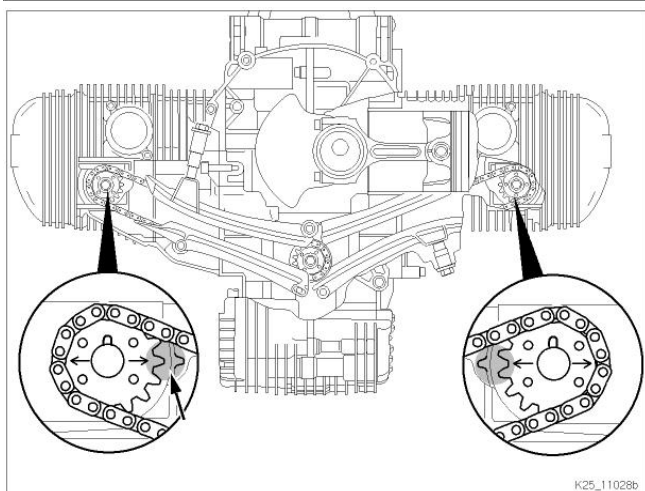
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, left (cylinder No. 2)



- Make sure that the crankshaft and countershaft are in the **"firing TDC, left cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the sprocket for the timing chain of the countershaft is **down** and at the top the split line between the two halves of the crankcase is between two teeth.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **up**.
- » The valves in the left-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

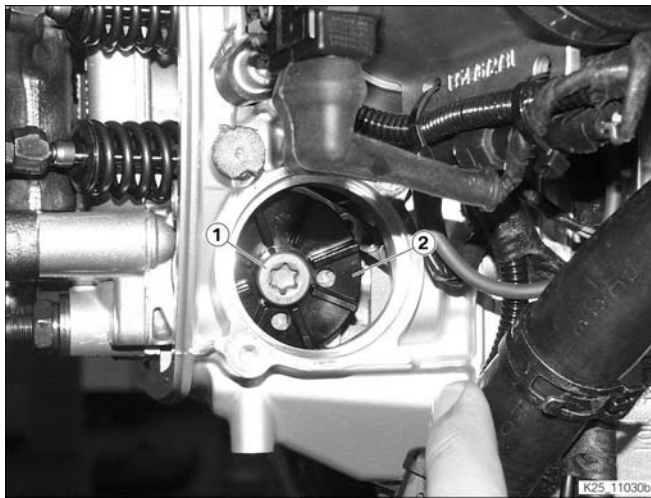
- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.





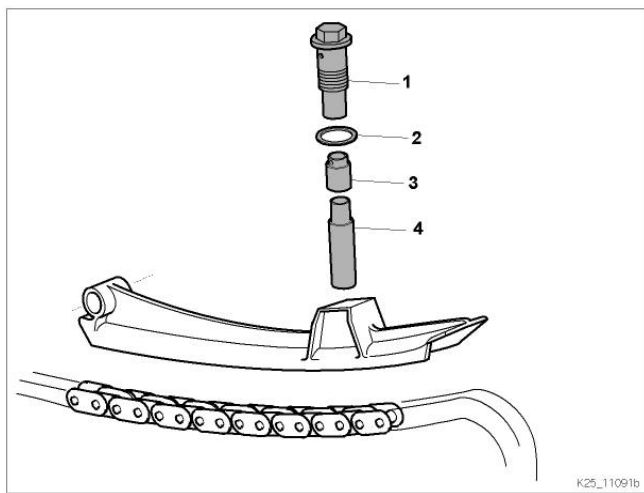
- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.




Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

(-) Installing left timing chain tensioner



- Install piston (4) in the cylinder.
 - Install piston (3) with chamfered side with the oil bore up in the chain tensioner.
 - Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.
- » The chain tensioner must slide onto the piston without tilting.
- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	


(-) Securing left camshaft sprocket

Precondition

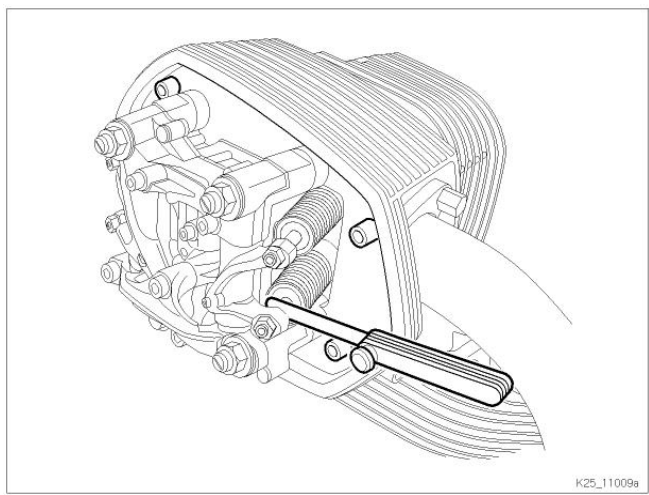
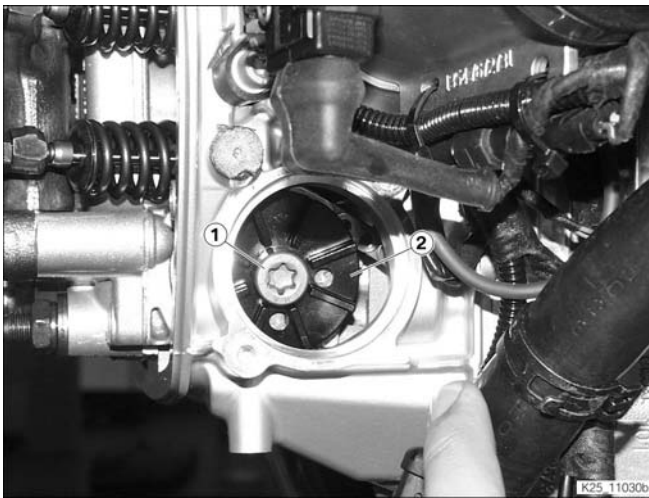
- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance


Test

- Measure valve clearance with feeler gauge.



Note


You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.

 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

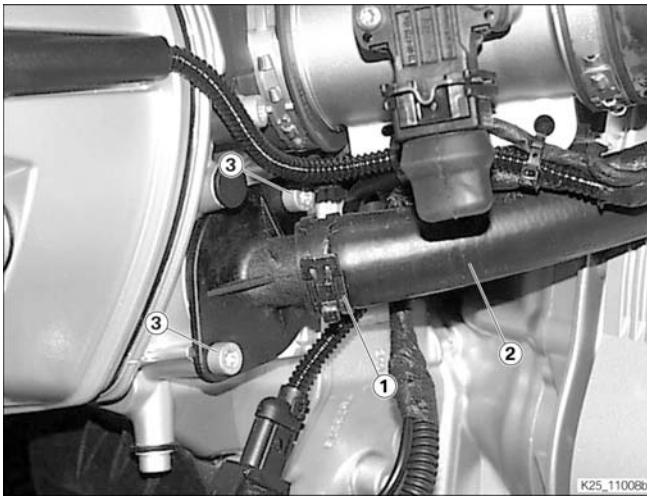
 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing left camshaft cover



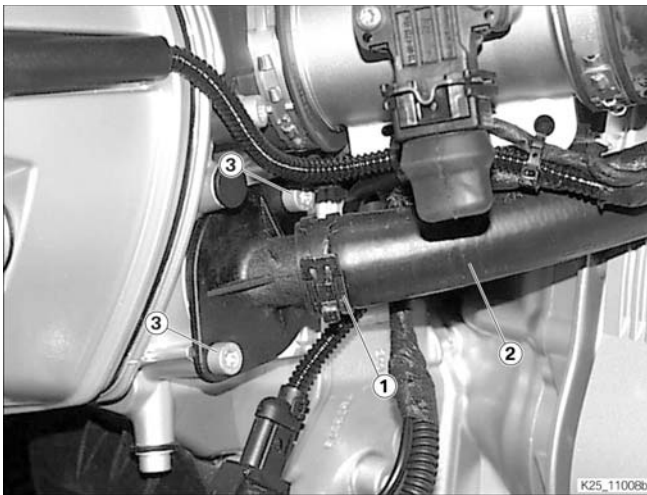
Attention



Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

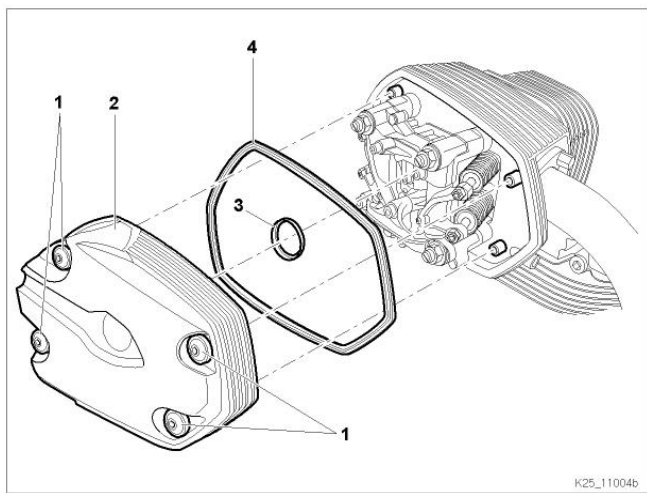
Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).




► **Connecting hose for crankcase breather**

- Connect hose (2) to the camshaft cover.
 - Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



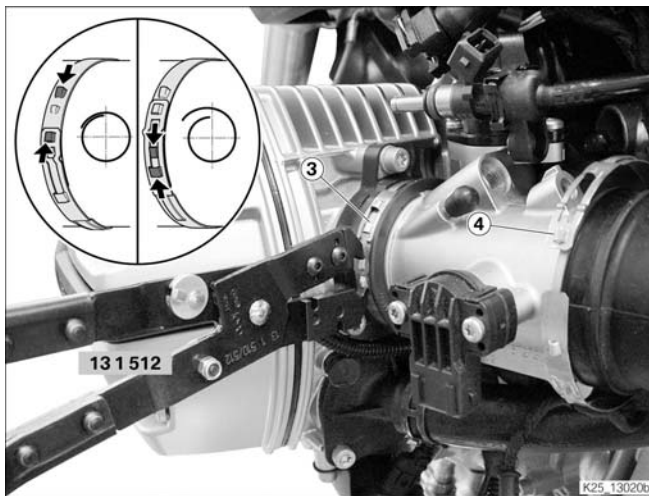
◄ **(-) Installing cylinder head cover**

- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

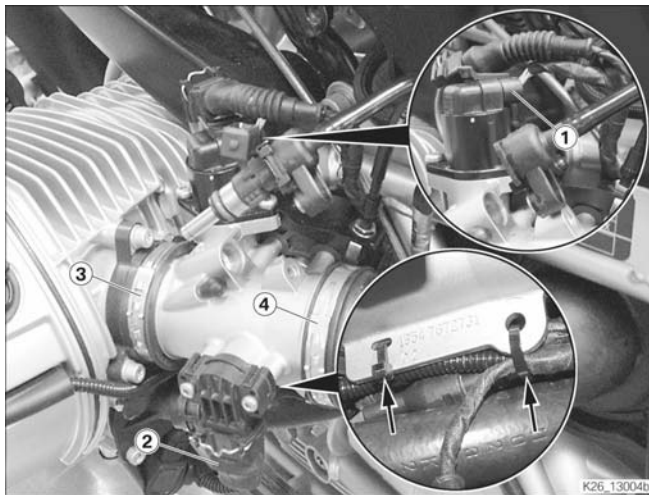
 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing left throttle-valve stub

- Remove the cover from the intake.
- Introduce the throttle-valve stub into the air intake and position it correctly.

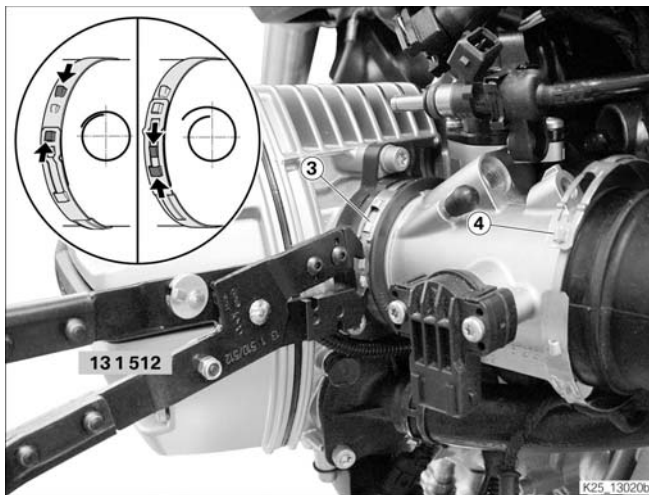


- Align hose clamps (3) and close them with pliers (No. 13 1 512) .



- Connect plug of left idle actuator (1).
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stub on left.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.


(-) Installing air intake pipe

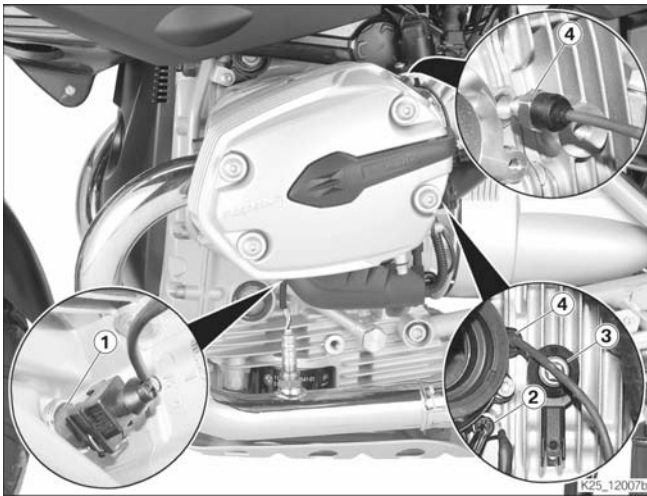


- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512) .

(-) Connecting plugs of engine sensors and switches, left

- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.

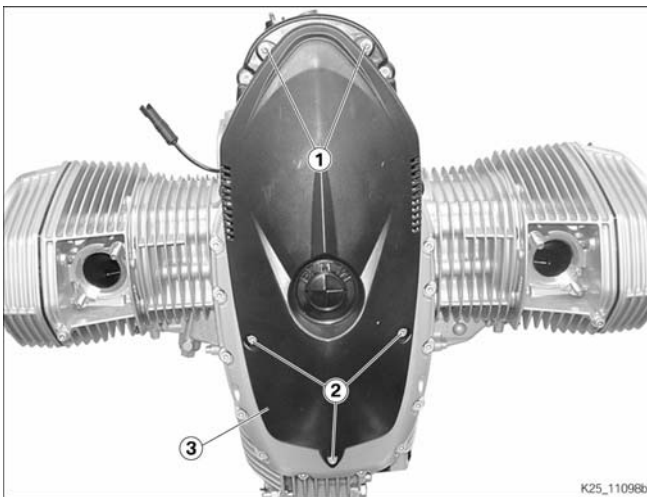
	Tightening torques		




left and right, M6 x 10	8 Nm	
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- Connect knock sensor (3).
- Connect temperature sensor (4).

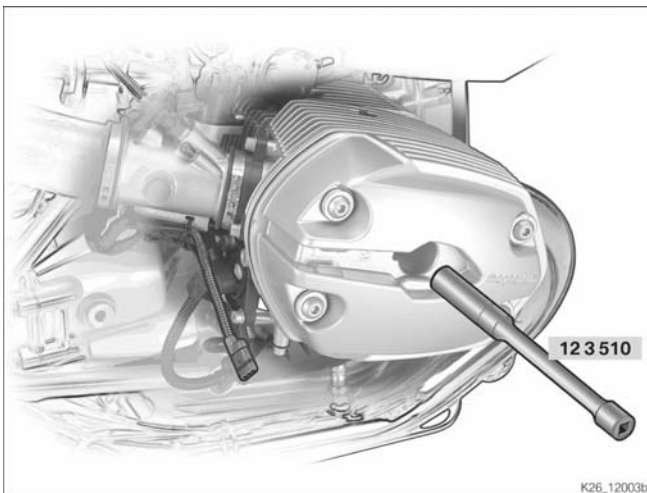
(-) Installing belt guard




- Install belt guard (3) and secure with screws (1) and (2).


 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing primary spark plug



- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

 Tightening torques		
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	

 Technical data			
Spark plug, manufacturer and designation		Bosch YR 5 LDE	

(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.



 Tightening torques		
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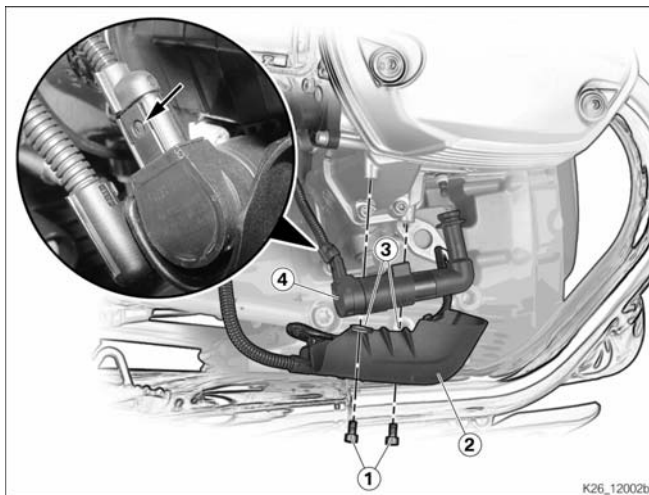
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--

 Technical data		
---	--	--

Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE
--	--	----------------

(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.



 Consumables/lubricants		
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Talcum powder	Assembly aid	
---------------	--------------	--

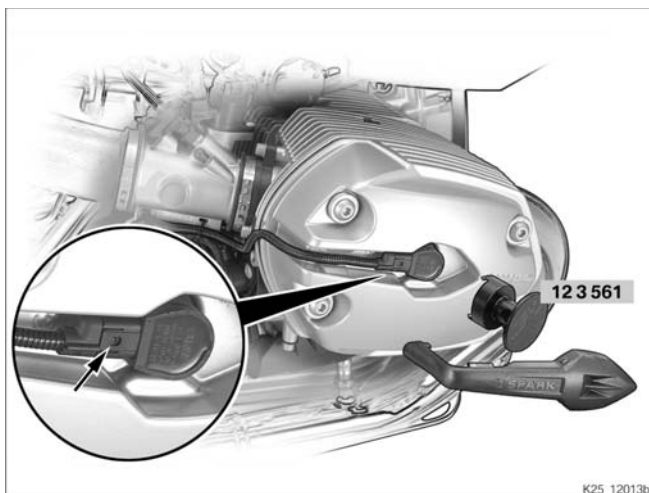
- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
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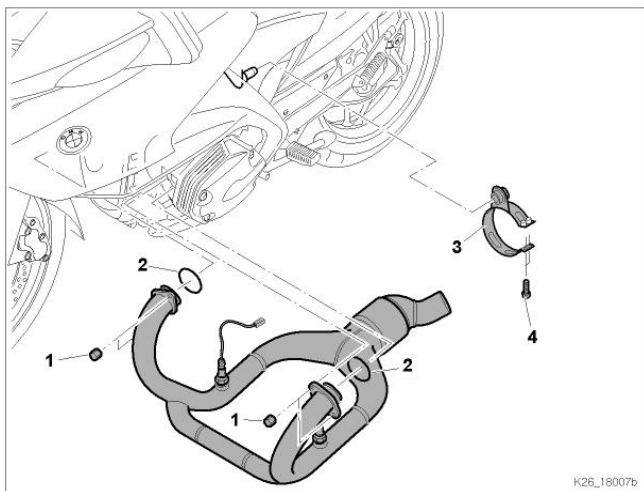
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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(-) Installing direct ignition coil


- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.




(-) Installing exhaust elbow




- Replace seals (2), apply thin layer of grease and fit in cylinder head.

 <p style="text-align: center;">Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).

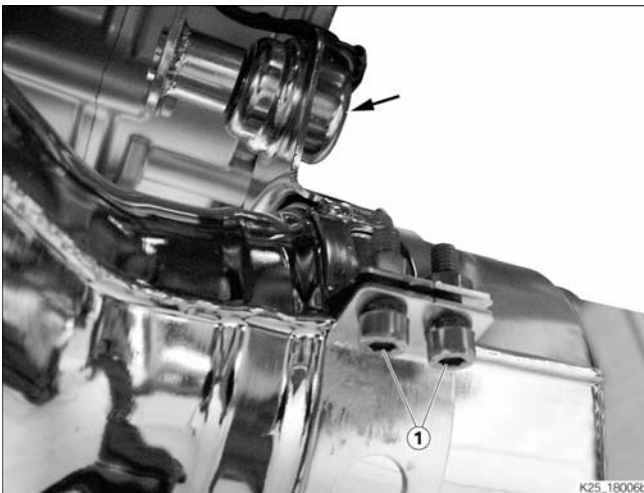
 <p style="text-align: center;">Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

 <p style="text-align: center;">Tightening torques</p>		
Manifold to cylinder head, Acorn nut M8	21 Nm	

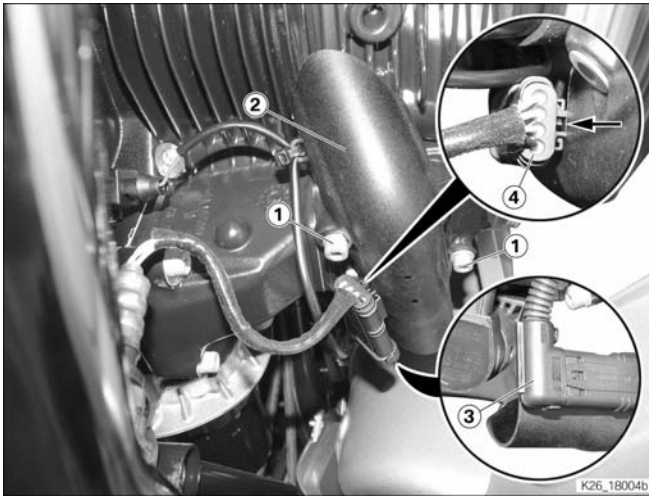
- Align the clamp (arrow) on the manifold and tighten screws (1).


 <p style="text-align: center;">Tightening torques</p>		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	



► **Securing both oxygen sensor plugs**

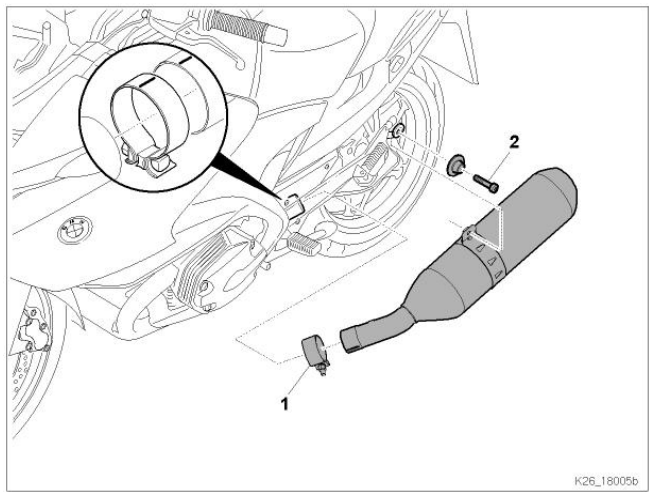
- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).



 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	




- Install front screw (1) in both bottom sections of the fairing.




(-) Installing silencer

- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

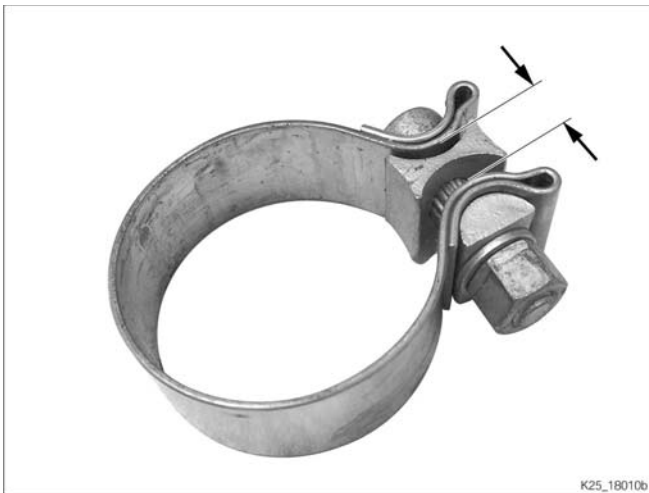
- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**

Test

- Check distance (*arrows*) between silencer and rear wheel.



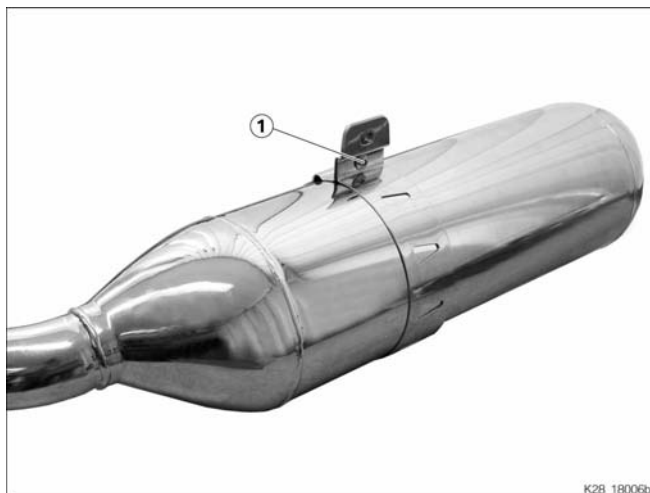
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



! Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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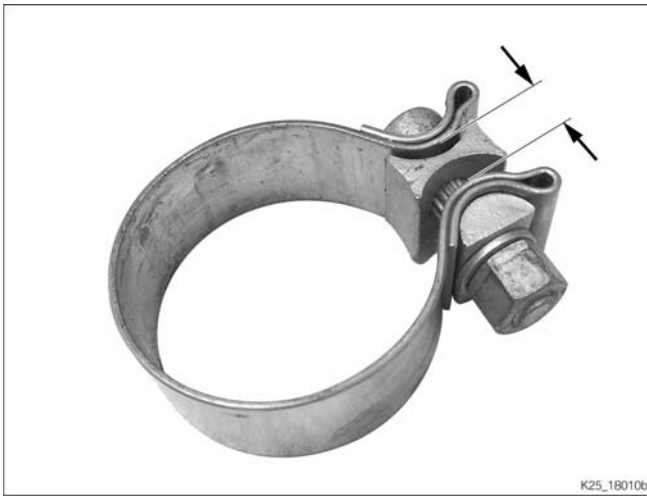



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.


Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.




 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
Consumables/lubricants			
Engine oil, 20W-50			
		Minimum = bottom ring	

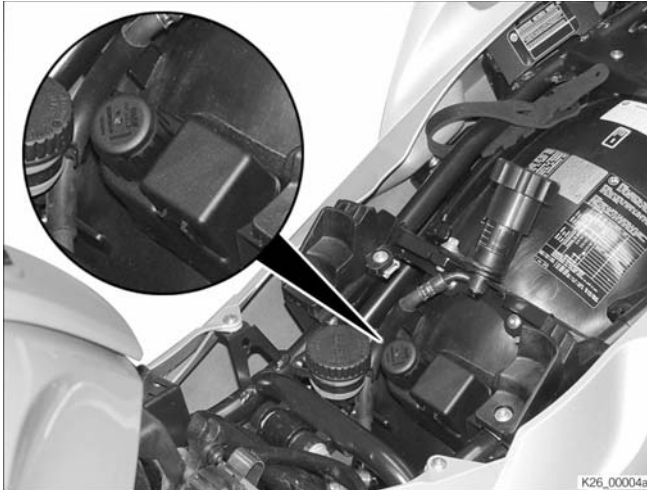
		mark on sight glass	
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(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

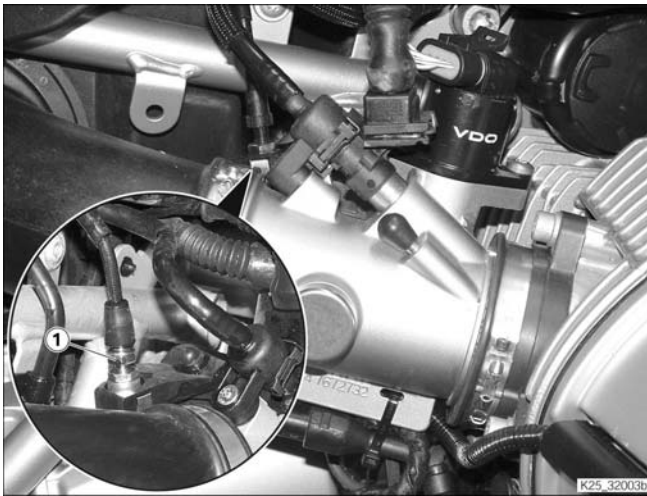
Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

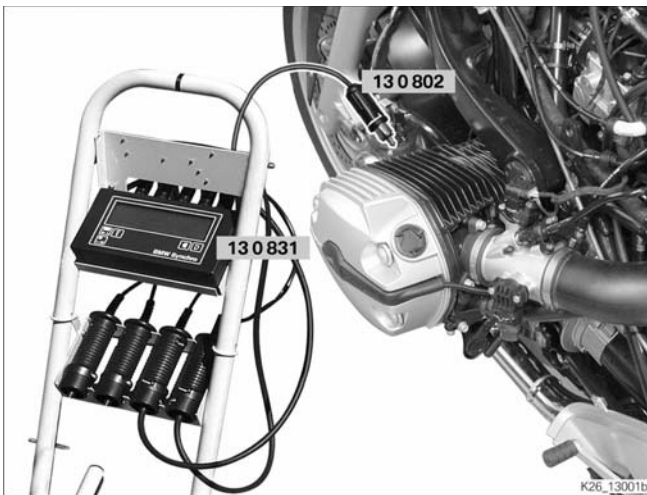
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

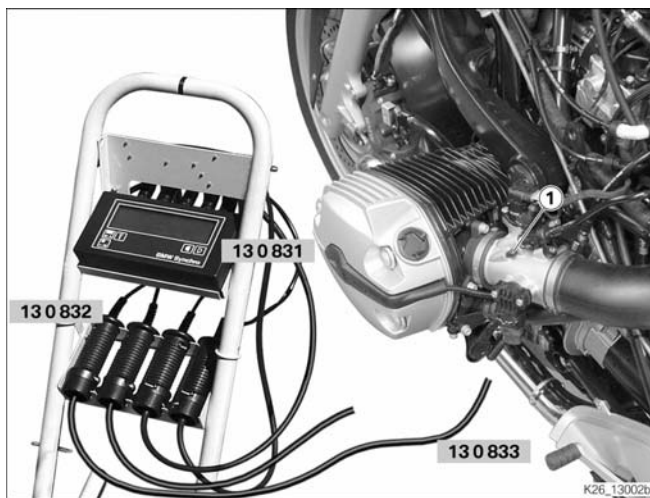


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



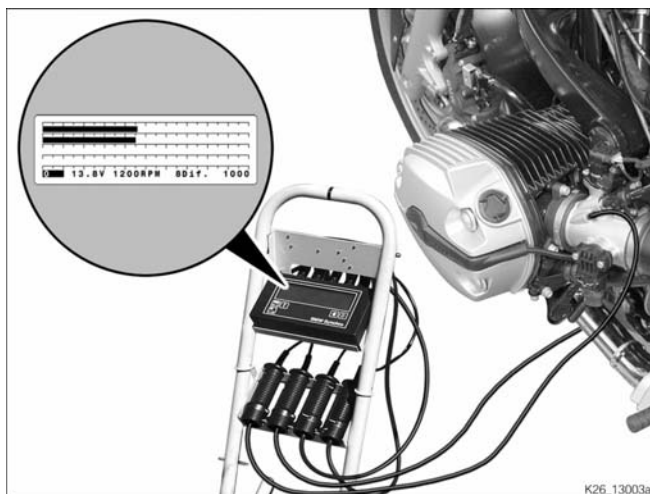
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

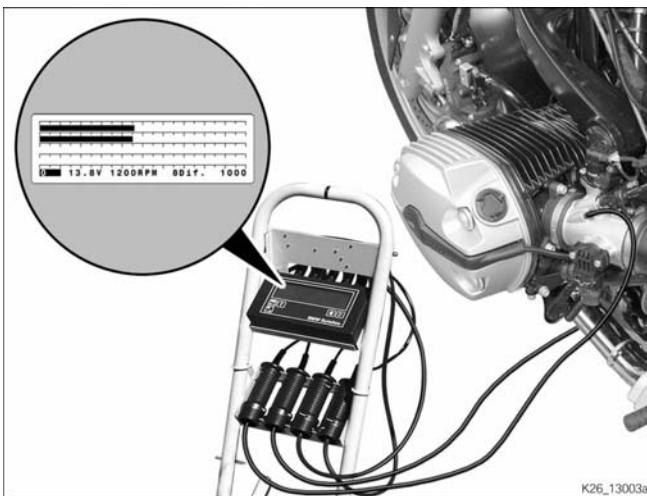
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

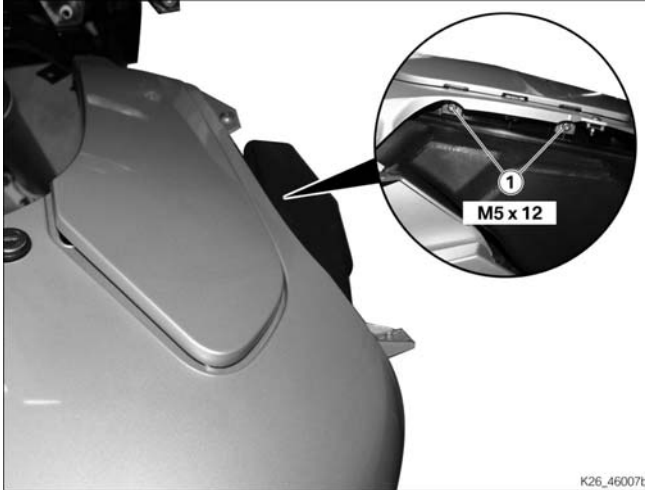
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).





(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



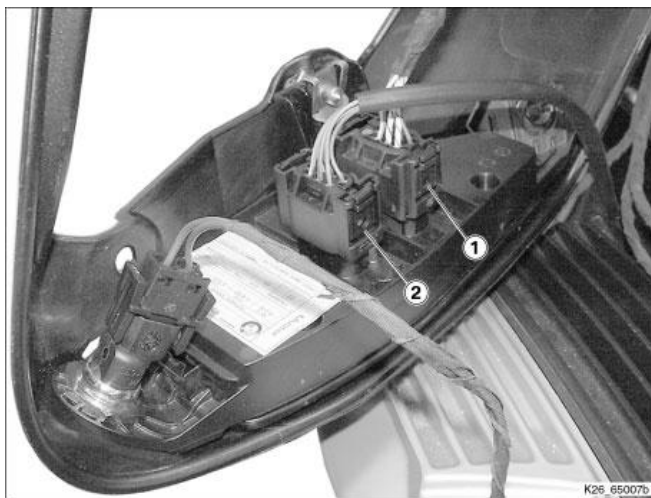
(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



11 11 070 Sealing right cylinder



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



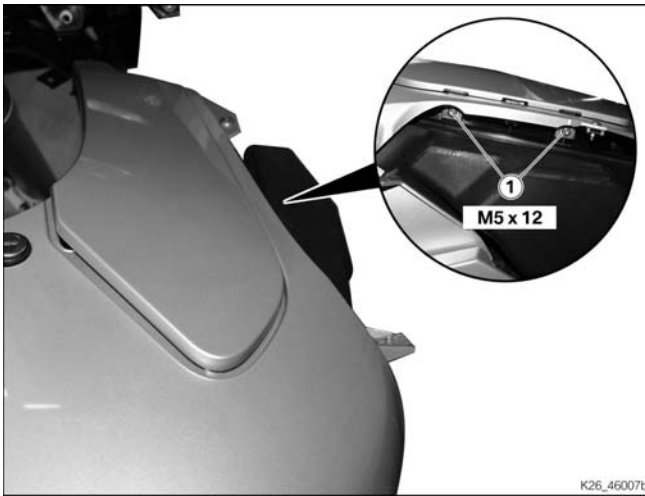
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



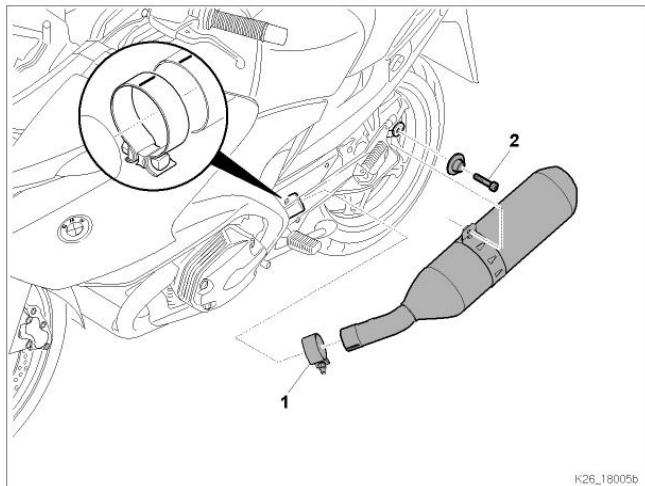
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

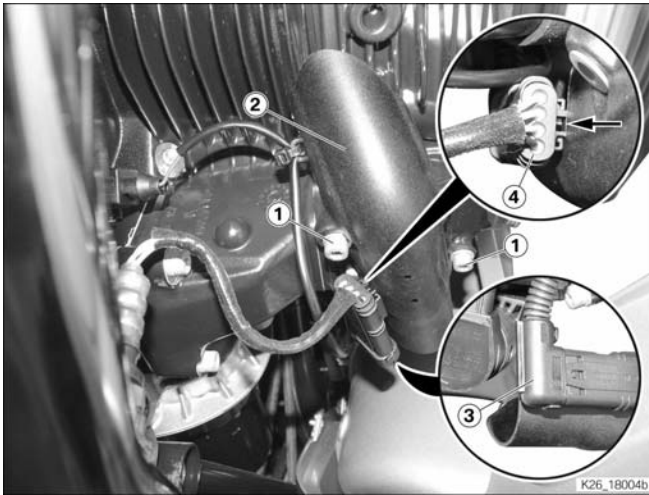
- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



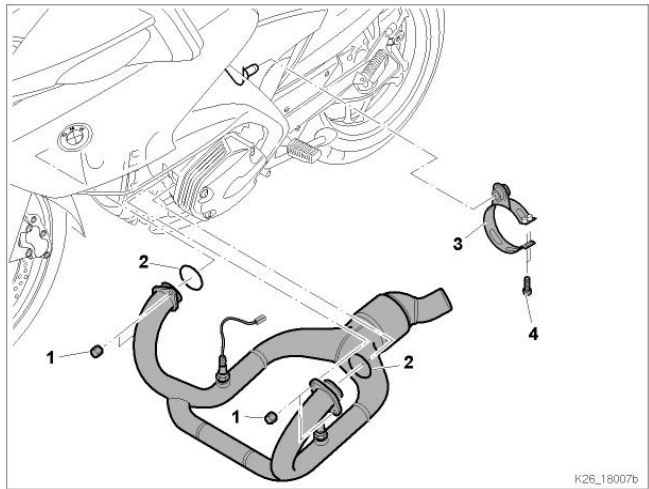
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.

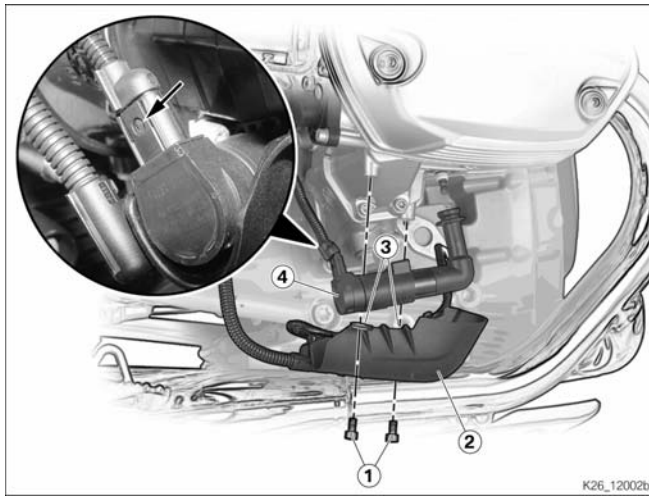
(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



- Slacken screws (1) and remove cover (2) with sleeves (3).



⚠ Attention

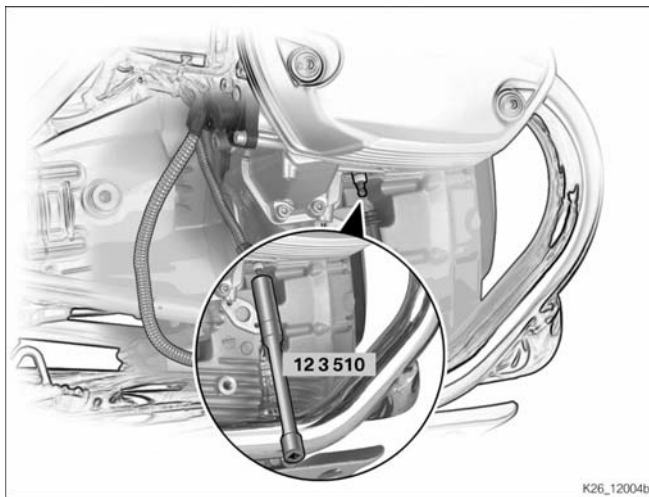
Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

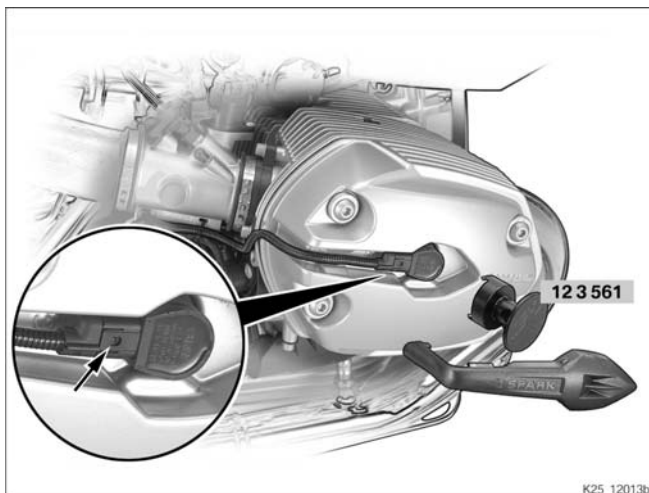


- Remove the primary spark plug cover.

⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

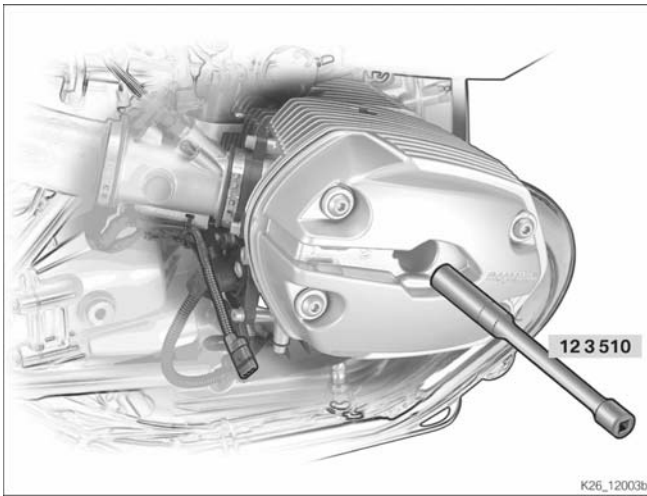
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

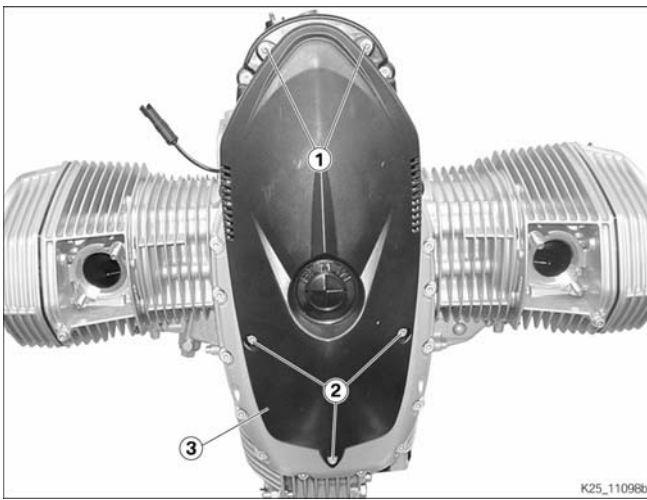
(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the



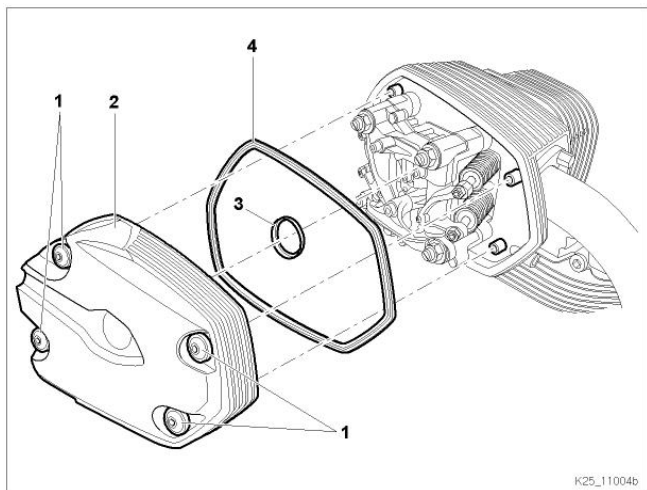
primary spark plug.

(-) Removing belt guard



- Remove screws (1) and (2).
- Remove belt guard (3).

(-) Removing cylinder head cover



- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

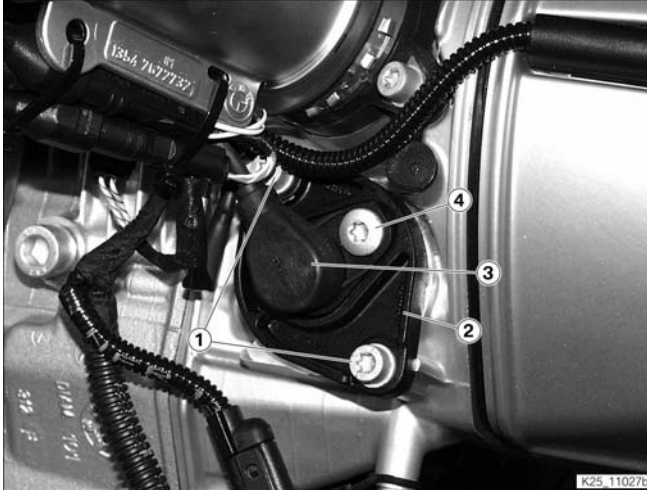


Technical data

Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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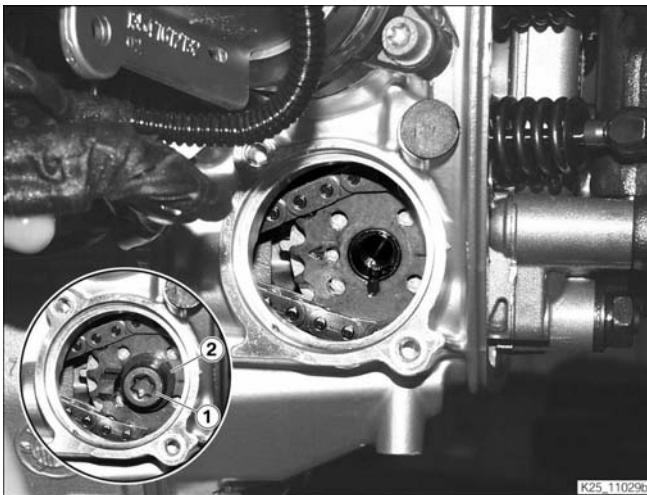
- Remove gaskets (3) and (4).

(-) Removing right camshaft cover



- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.

(-) Setting right cylinder to firing TDC



- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



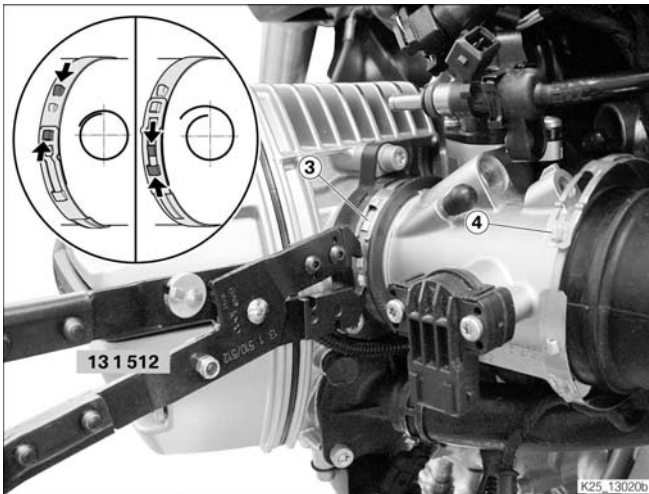
(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).



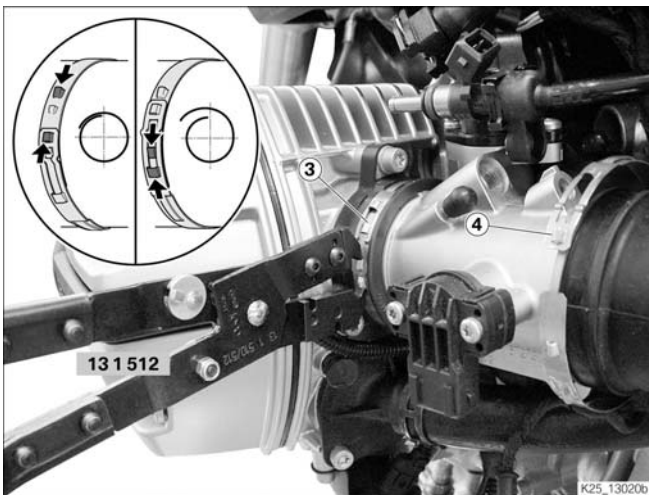
(-) Disconnecting intake air pipe from throttle-valve stub

- Open clips (4) on left and right with pliers (No. 13 1 512) .



(-) Disconnecting right throttle-valve stub

- Open hose clips (3) at the right throttle valve stub with pliers (No. 13 1 512) .



- Cut through the cable tie (arrow) on the right.
- Disconnect plug of right idle actuator (1).
- Pull off the throttle-valve stub on the right and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and



foreign matter from dropping into the engine.

(-) Removing trigger for camshaft sensor

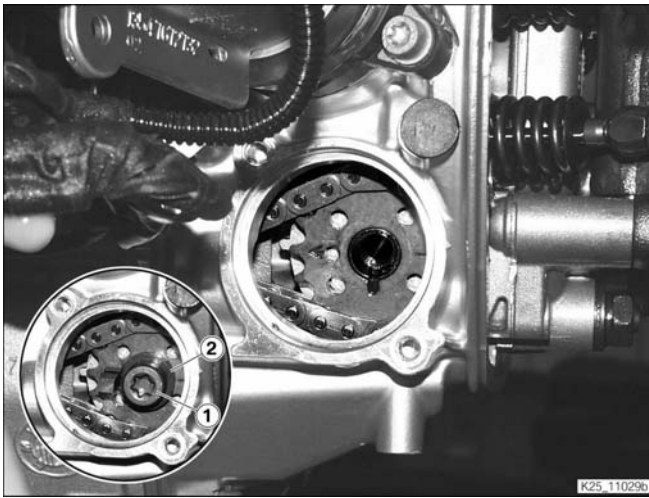
- Slacken screw (1).



Note

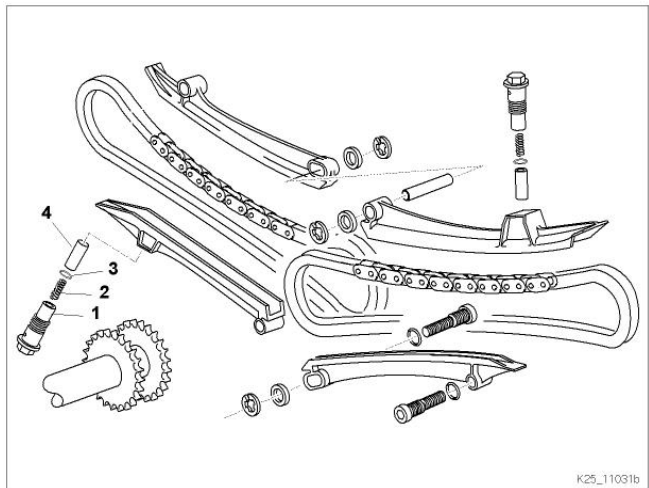
The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with trigger for camshaft sensor (2).



(-) Removing right chain tensioner

- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.



(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

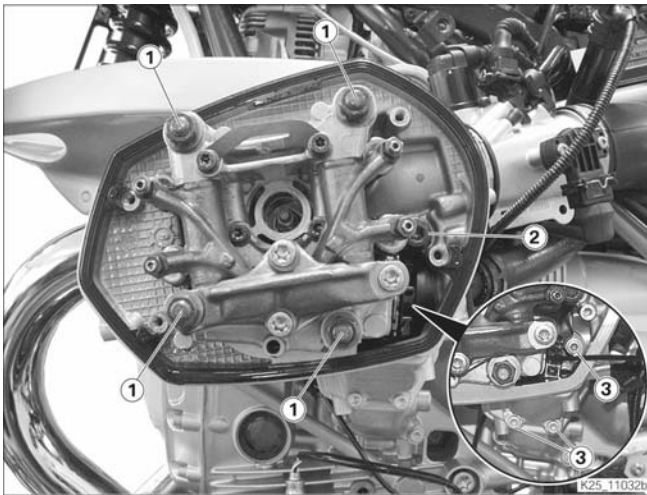
When the engine is being reassembled, it is easier to set

the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).

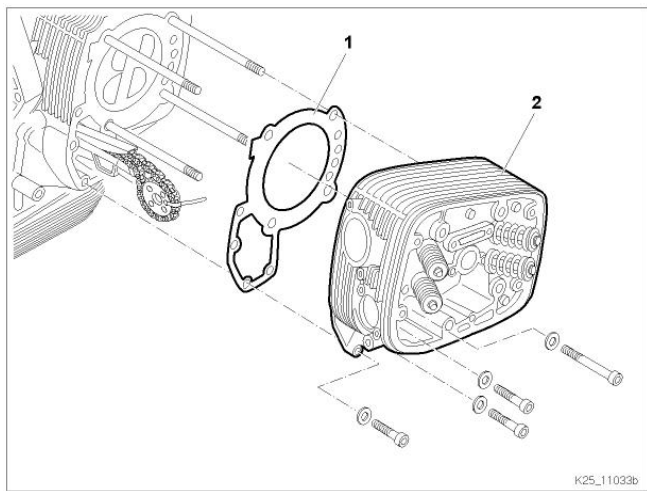


Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing right cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

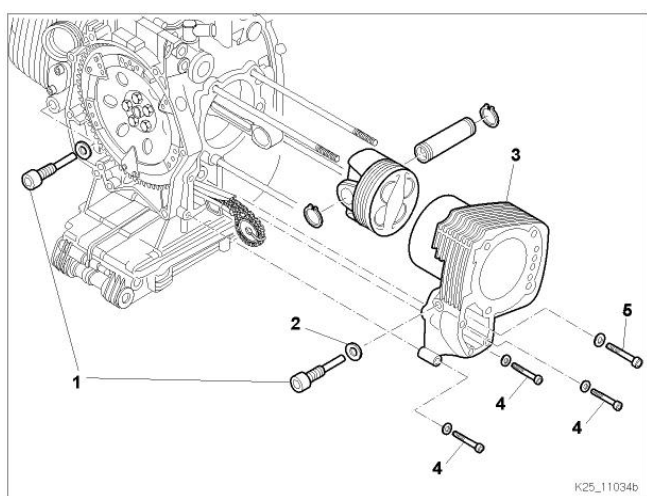
When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care



when laying down the assembly.

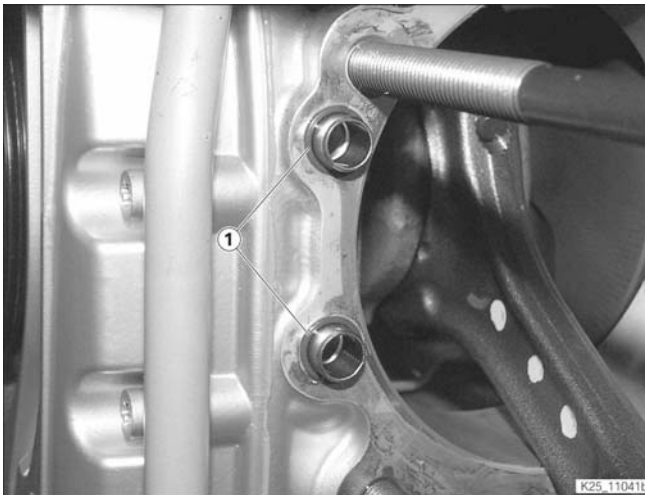
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Removing piston

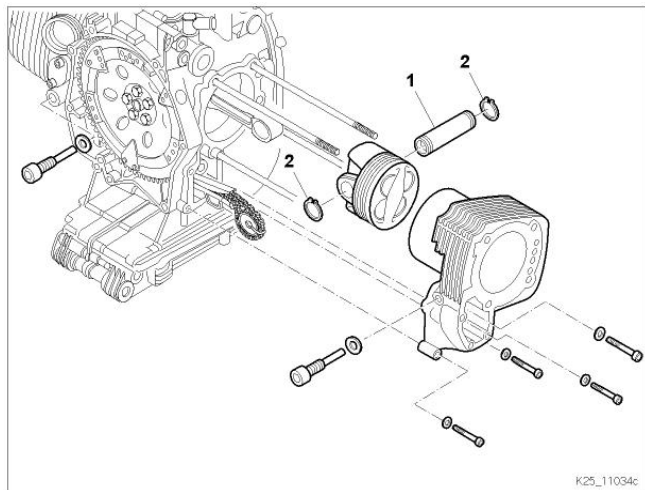
- Remove both circlips (2) from the piston pin.



Note

Remember to mark the exhaust side on the piston crown if you are going to reinstall the same pistons.

- Pull out piston pin (1) in the forward direction of travel until the piston can be separated from the conrod.
- Remove the piston.



(-) Cleaning sealing faces, cylinder base

- Remove all traces of old sealant from the cylinder base and the crankcase, paying particular attention to the grooves in the crankcase.
- Clean and degrease the sealing faces of the cylinder base and the crankcase.



Consumables/lubricants

Brake cleaner	Cleaners	83 11 9
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(-) Installing piston in cylinder



Attention

Nature: There is only one tolerance group (A/B) for replacement pistons and cylinders. There are two other tolerance groups (A and B) for components installed ex-works. Piston and cylinder must belong to the same tolerance group.

Avoidance: Always replace piston and cylinder as a paired set.



Attention

Nature: In order to ensure low-vibration, smooth engine operation, all the pistons must belong to the same weight class.

Avoidance: Always use pistons of the same weight class in any one engine.

- Determine the correct weight class (1) of the piston and use a piston of the appropriate weight class.



Note

The weight class is stamped on the piston crown and is legible only if the piston is new.

If the symptoms are such that only one replacement cylinder with piston has to be installed, the weight of the other piston has to be ascertained by weighing.

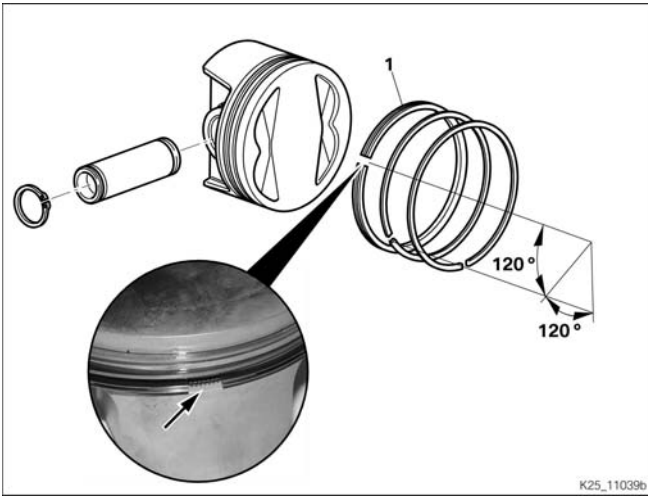


Technical data

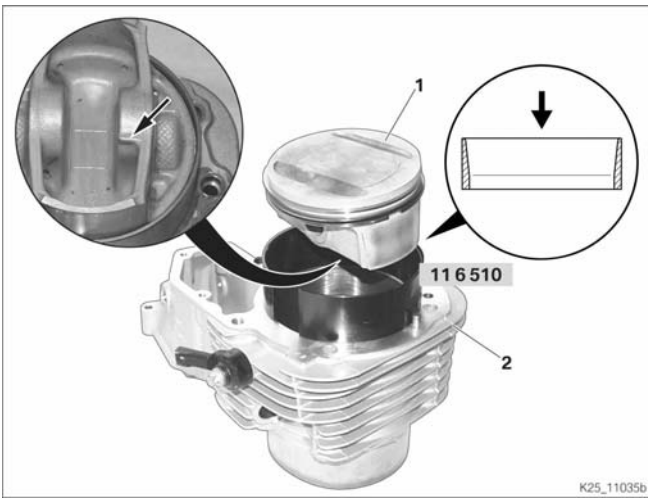
Difference in weight within a weight class (weight classes + and -)		max. 10 g	
Value definition:			
Complete with piston pin and piston rings			

► Positioning piston rings

- Position oil wiper ring (1) with the end faces (arrow) up in the installed position.
- Position the other rings with the end gaps offset by the specified angle.



K25_11039b



K25_11035b



Technical data

Installed direction of piston rings		"Top" marking uppermost	
Offset of piston-ring gaps		120 °	



- Coat the friction face of the cylinder and the friction face of the piston skirt with oil.



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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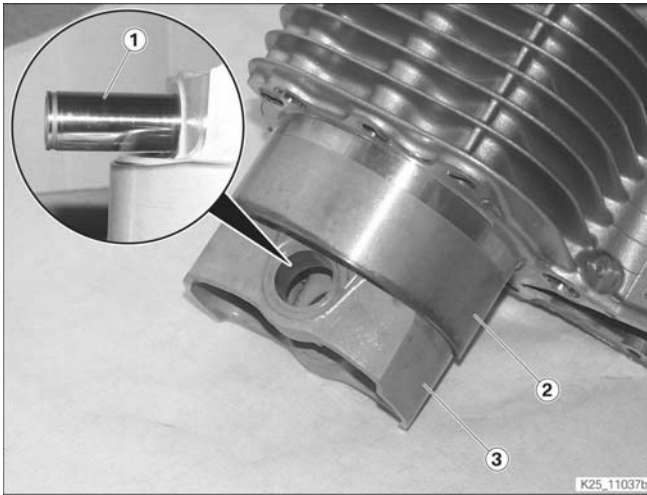
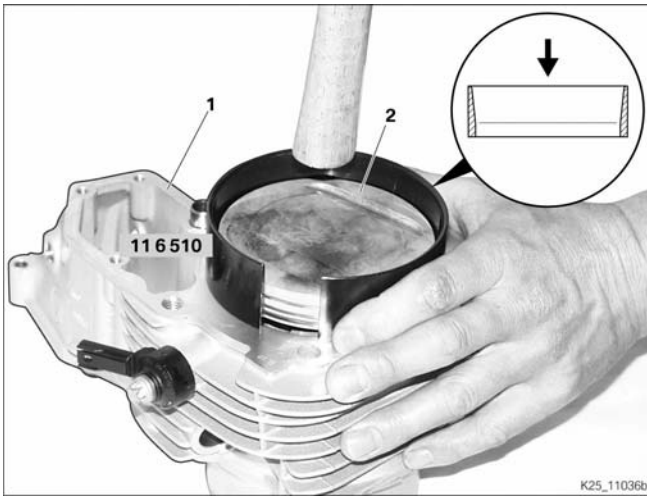
- Place the cylinder, base down, on a smooth, level and firm working surface.
- Set sliding sleeve for piston rings (No. 11 6 510) with the tapered end up on the cylinder.
- Insert the piston with the cast nose (arrow) pointing toward the exhaust side into sliding sleeve (No. 11 6 510) and carefully press it through the taper and into the cylinder.



Technical data

Installation direction of piston		Arrow on piston crown and/or cast lug pointing to exhaust side	
----------------------------------	--	--	--

- » The piston rings are preloaded.
- » The piston skirt is held in position by the cylinder.
- Press sliding sleeve (No. 11 6 510) against the cylinder and carefully tap the piston into the cylinder.
- » The piston is full inserted into the cylinder.
- Remove sliding sleeve for piston rings (No. 11 6 510) .



- Push piston (3) through cylinder (2) just far enough to allow piston pin (1) to be inserted. Make sure that the piston rings do not project past the end of the cylinder liner.

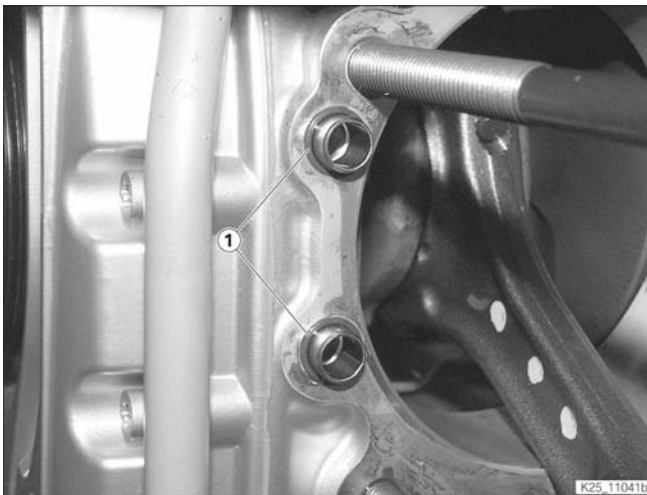
(-) Installing right cylinder

Precondition

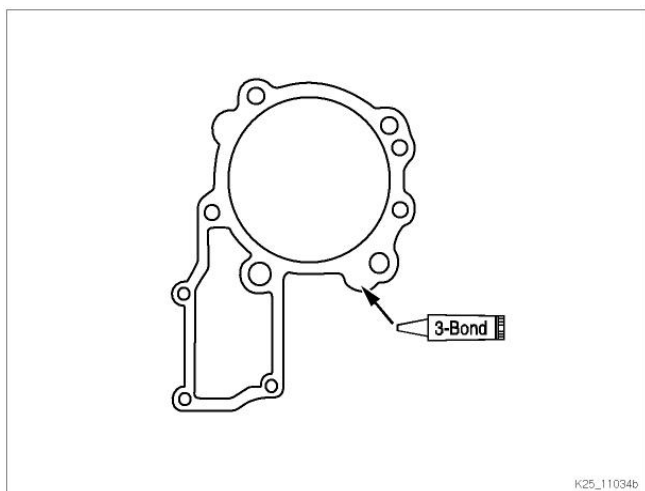
- Crankshaft is locked at TDC.



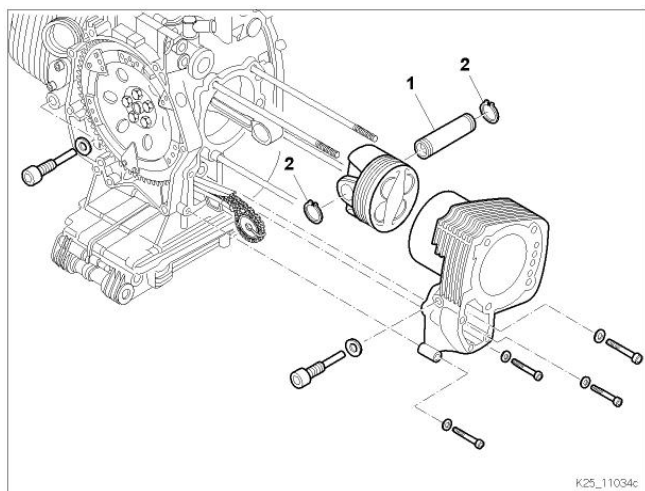
- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



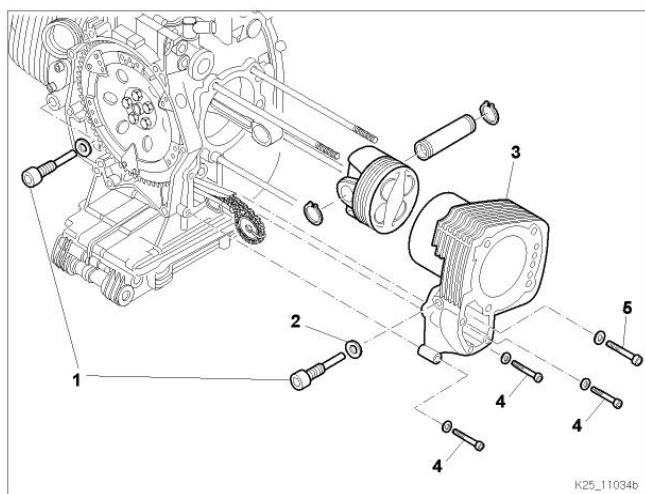
- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.



K25_11034b



K25_11034c



K25_11034b



Consumables/lubricants

3 - Bond 1209	Surface sealant	07 58 9 062 376
---------------	-----------------	--------------------

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Tightening torques

right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

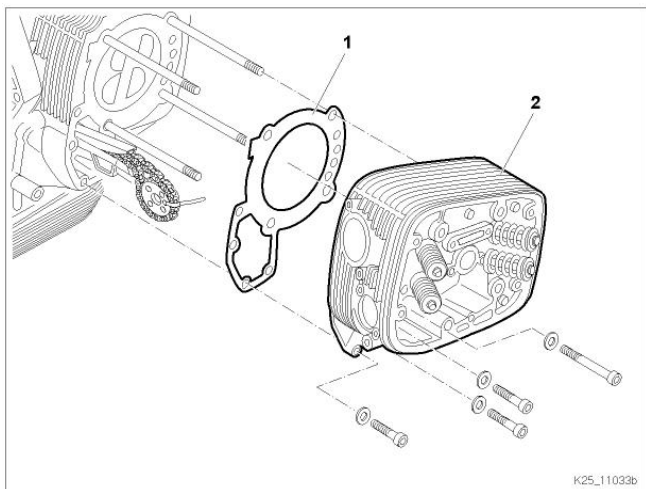
- Install pivot screw for timing-chain slide rail (1) with new seal (2).



Tightening torques

Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed	18 Nm	
--	-------	--

with sealing washer
A12x15.5-AL



(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.

! Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

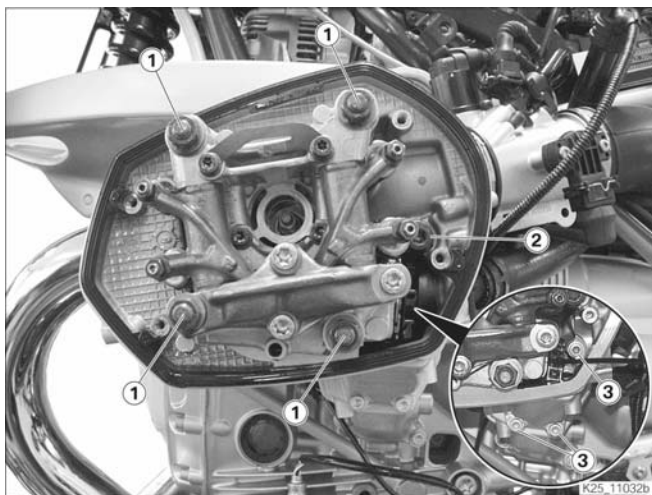
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.


! Attention

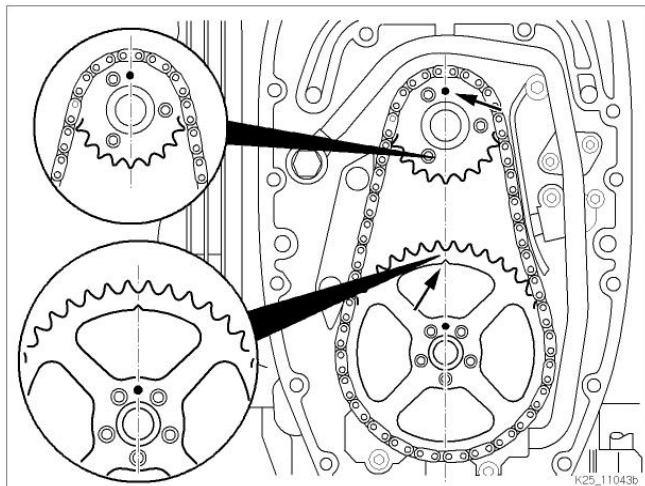
Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



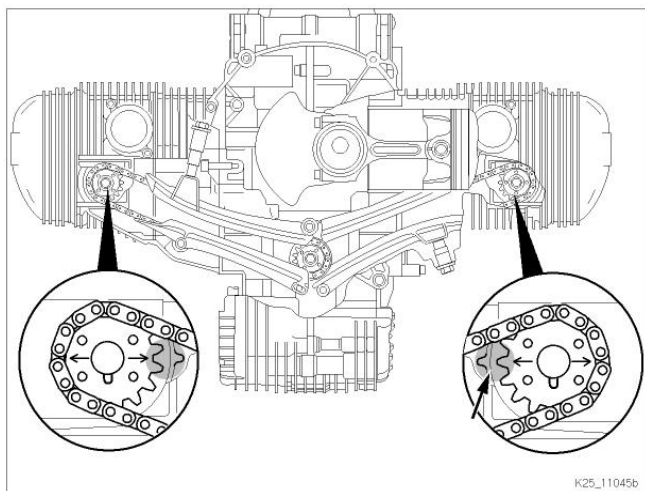
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	



(-) Adjusting timing, right (cylinder No. 1)

- Make sure that the crankshaft and countershaft are in the "**firing TDC, right cylinder**" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

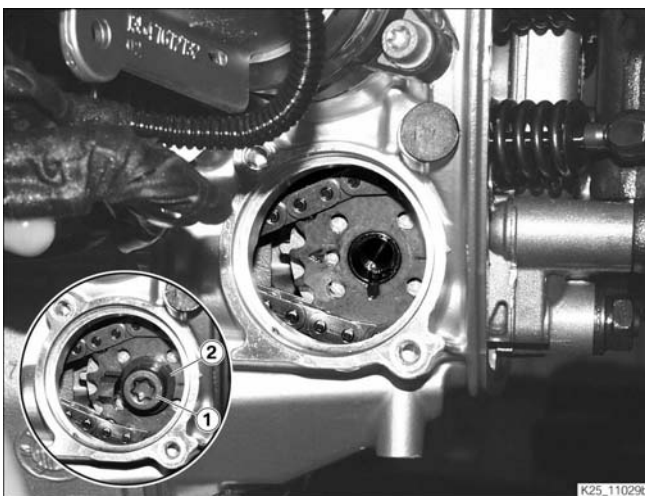


- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



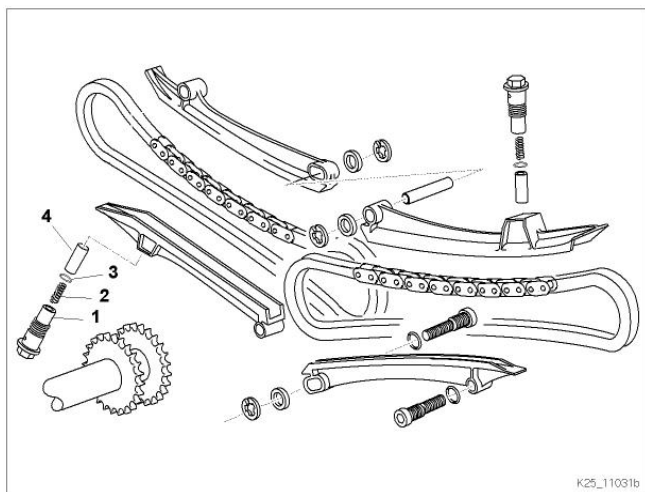
▶ Installing right timing chain tensioner

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.

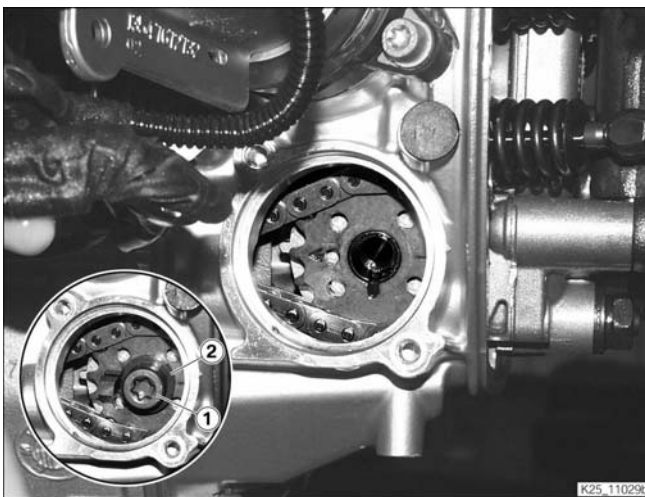


K25_11031b

Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).



K25_11029b

Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

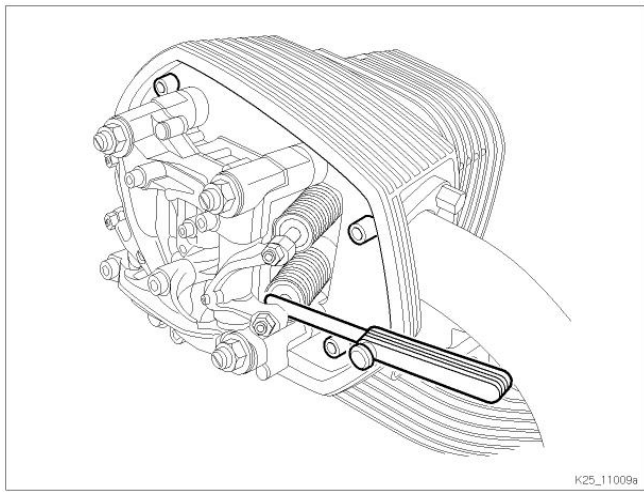
Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.



Technical data

Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.



Tightening torques

Locknut, valve adjusting screw, M6 x 0.5	8 Nm	
--	------	--

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

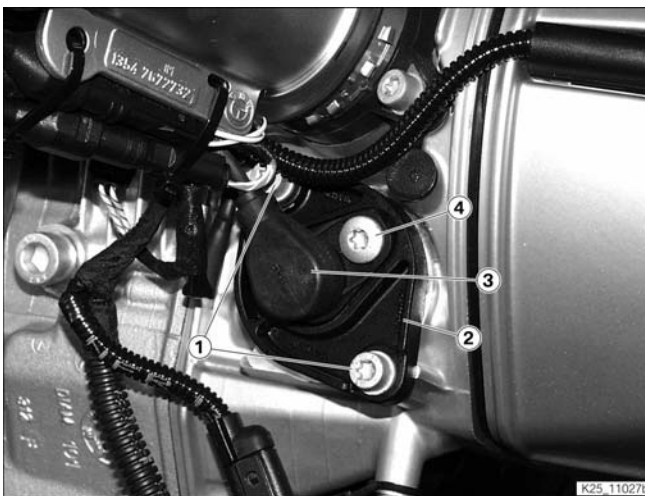
(-) Installing right camshaft cover



Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

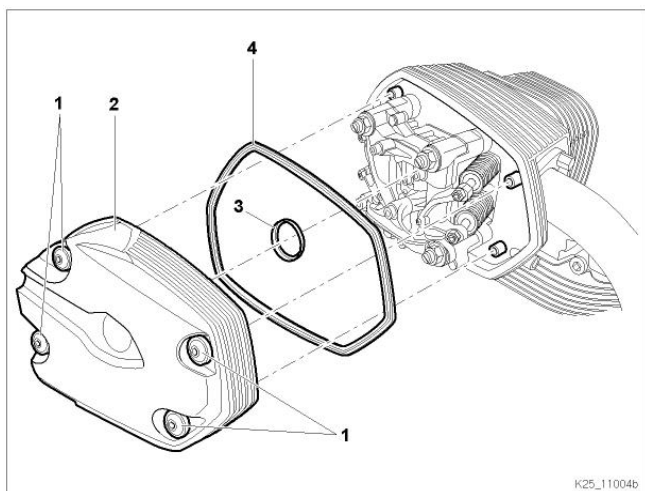
Avoidance: Deburr sharp edges of the housing.




- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

(-) Installing cylinder head cover

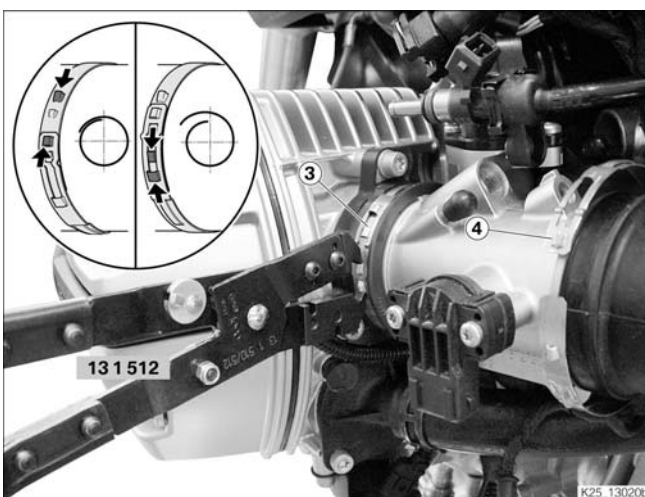
- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.



- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing right throttle-valve stub



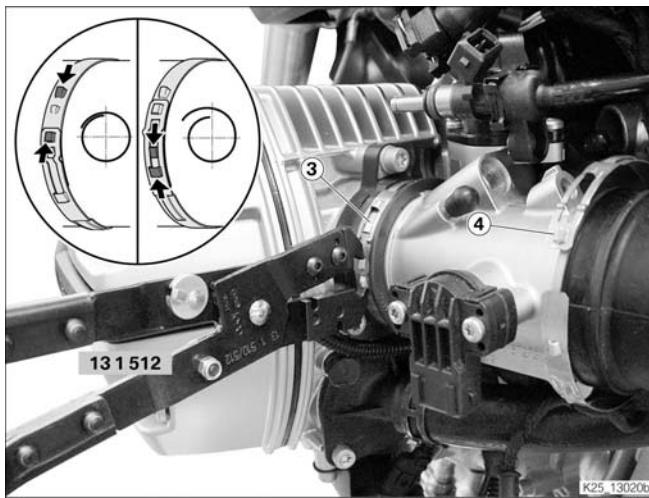
- Remove the cover from the intake.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamp (3) and close it with pliers (No. 13 1 512) .



- Connect plug of right idle actuator (1).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stub on right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing air intake pipe


- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512) .



(-) Connecting plugs of engine sensors, right

- Secure earth lead (1) to the cylinder head.

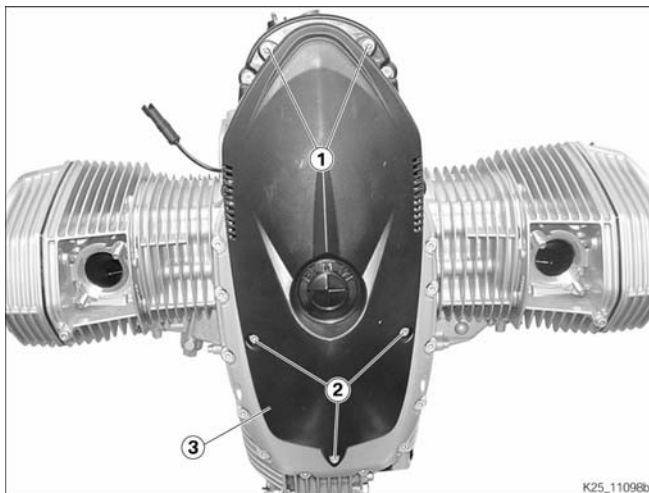



 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

(-) Installing belt guard


- Install belt guard (3) and secure with screws (1) and (2).

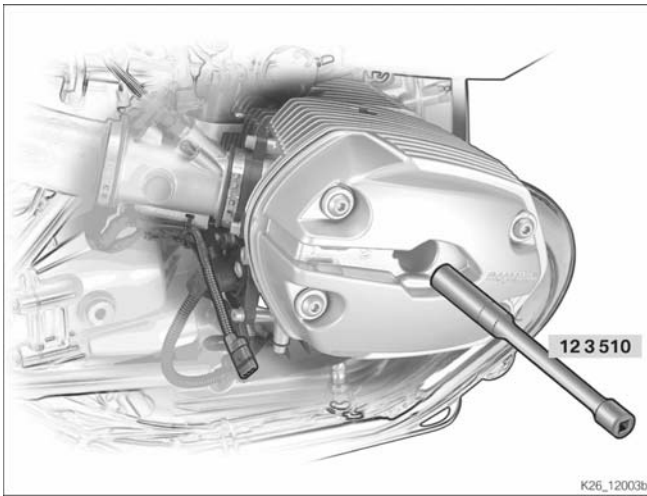


 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing primary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

 Tightening torques		



Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--

 Technical data		
---	--	--

Spark plug, manufacturer and designation		Bosch YR 5 LDE
--	--	----------------

(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510), install and tighten the secondary spark plug.



 Tightening torques		
---	--	--

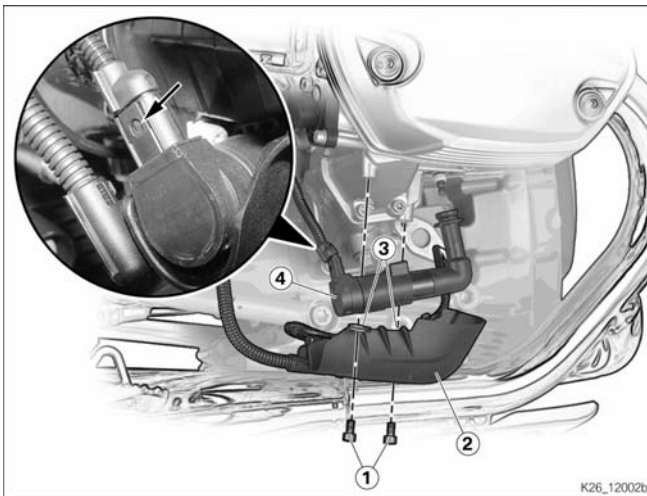
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--


 Technical data		
---	--	--

Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE
--	--	----------------

(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.



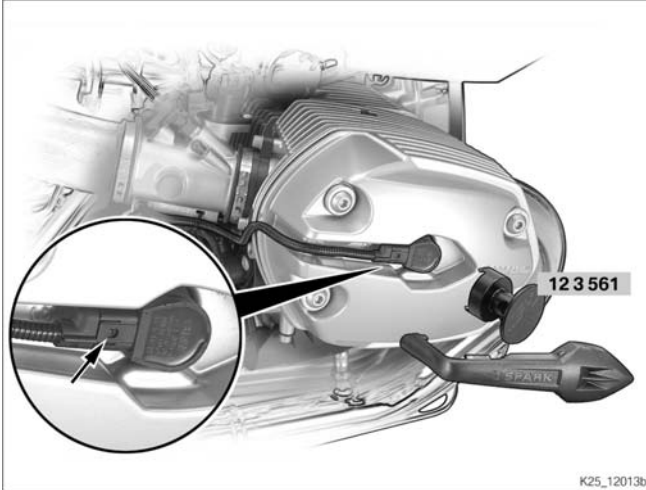
 Consumables/lubricants		
---	--	--

Talcum powder	Assembly aid	
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- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

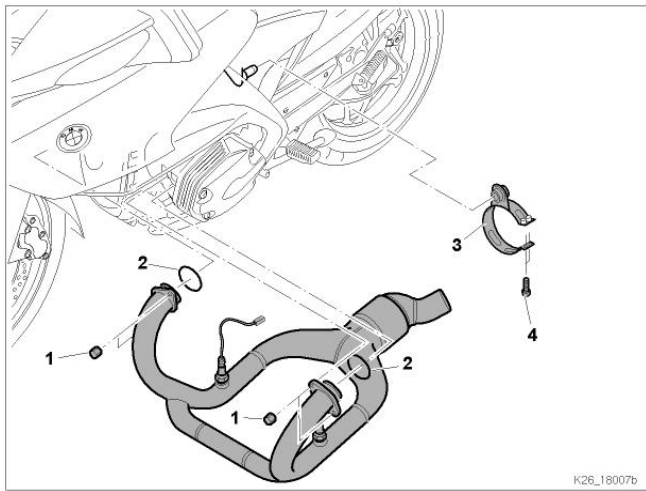
 Tightening torques		
---	--	--

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
--	------	--




(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.




(-) Installing exhaust elbow


- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

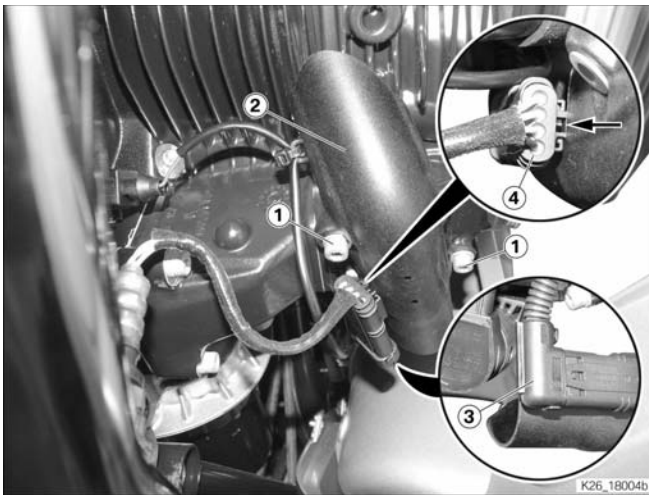
 <p>Tightening torques</p>		
Manifold to cylinder head, Acorn nut M8	21 Nm	

- Align the clamp (arrow) on the manifold and tighten screws (1).

 <p>Tightening torques</p>		




Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	
--	------	--



► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	

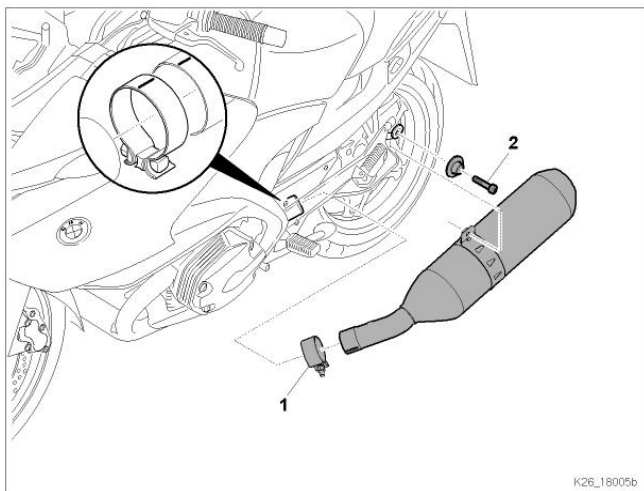


- Install front screw (1) in both bottom sections of the fairing.

◄ **(-) Installing silencer**

- Grease the inner face of Torca clamp (1).

 Consumables/lubricants		
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K26_18005b



K28_18007d

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

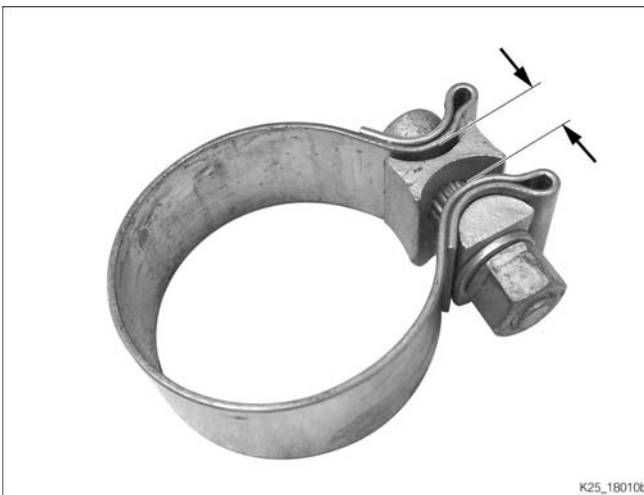
 Tightening torques		
---	--	--

End silencer to footrest support, M8	19 Nm	
--------------------------------------	-------	--

- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--



K25_18010b

► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

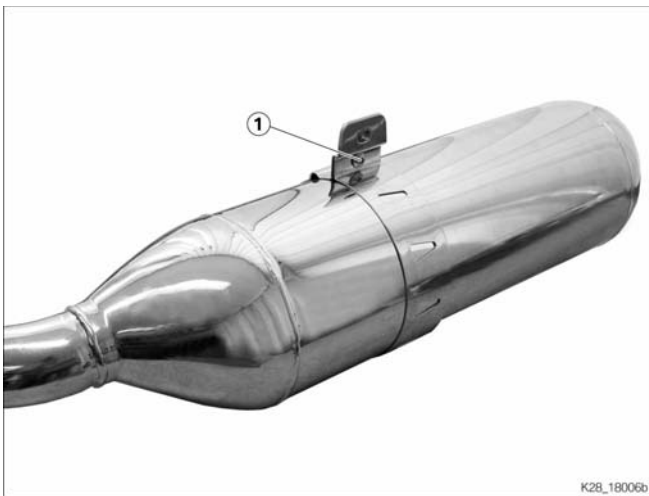
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




 **Attention**


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.


- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




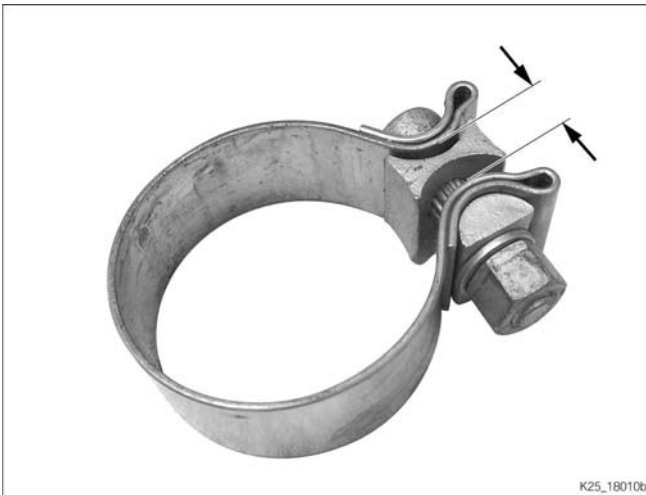
▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	



K25_18010b


Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



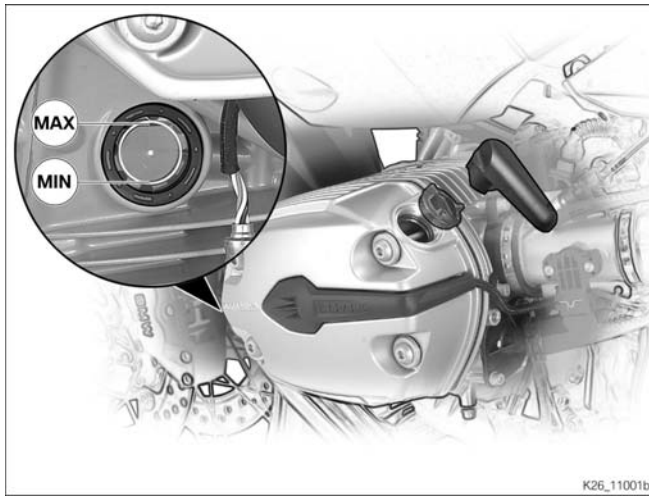
K26_18001b




(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.





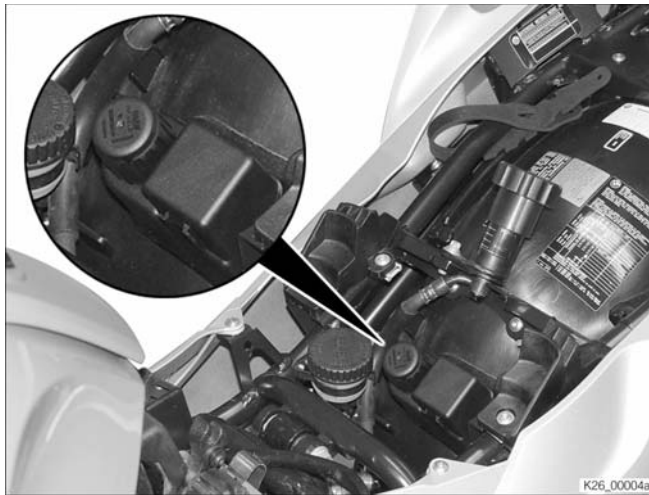
 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.

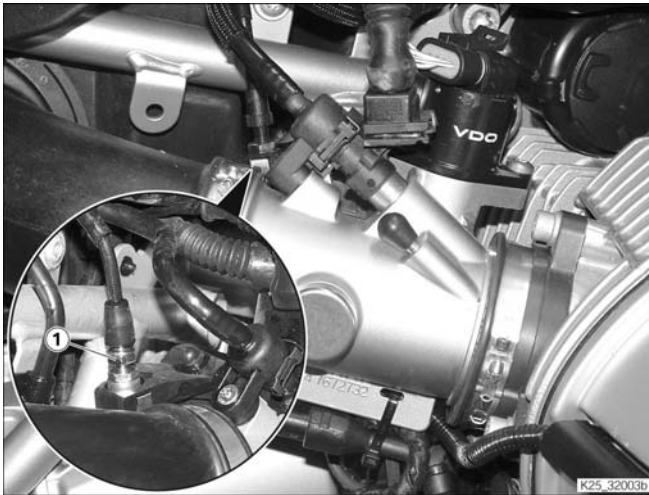


Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

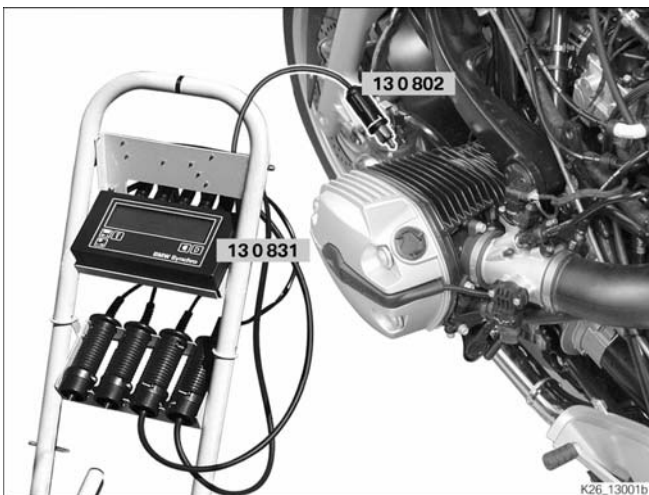
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

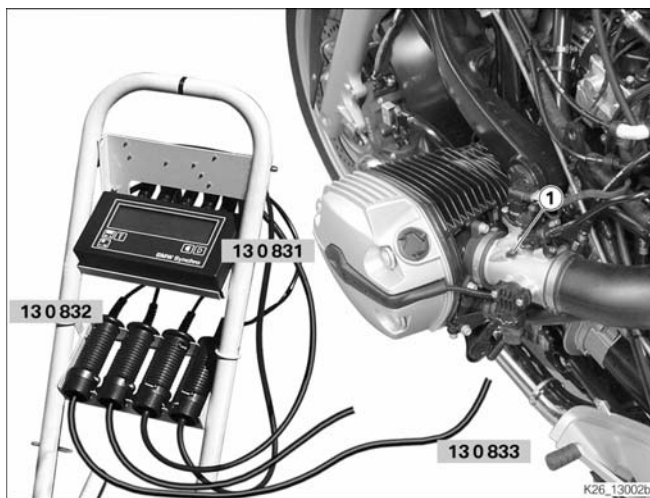


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- » The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



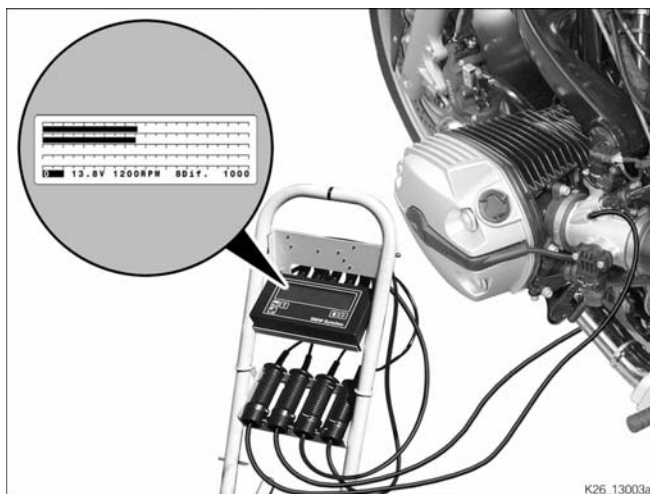
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

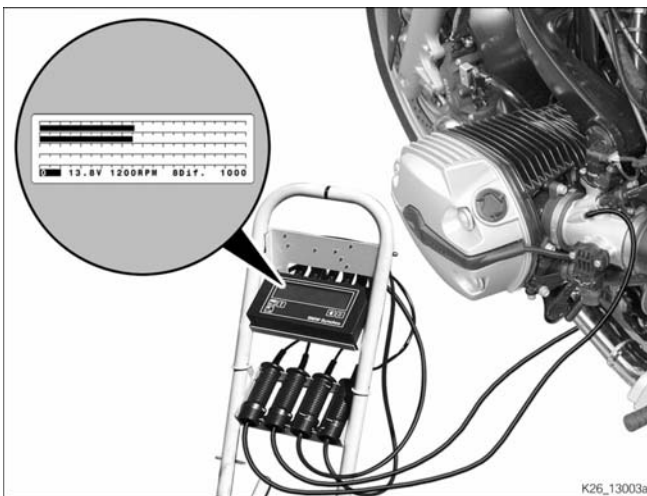
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

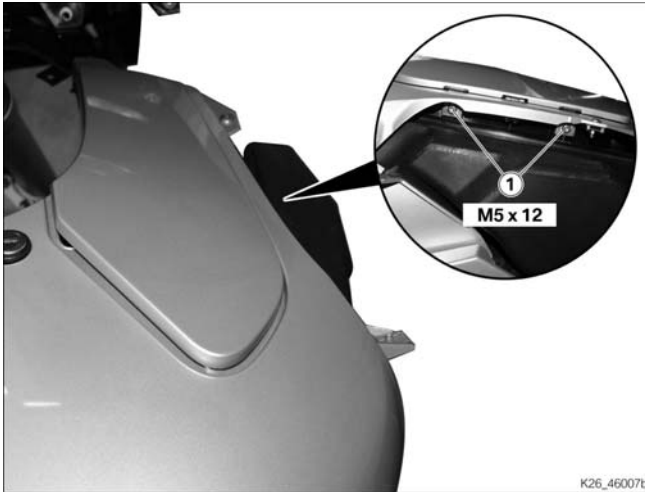
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).





(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

11 11 120 Removing and installing or replacing all cylinders



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

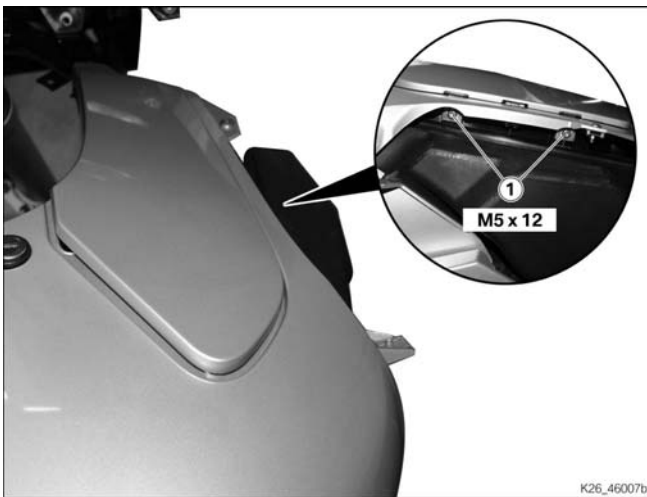
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



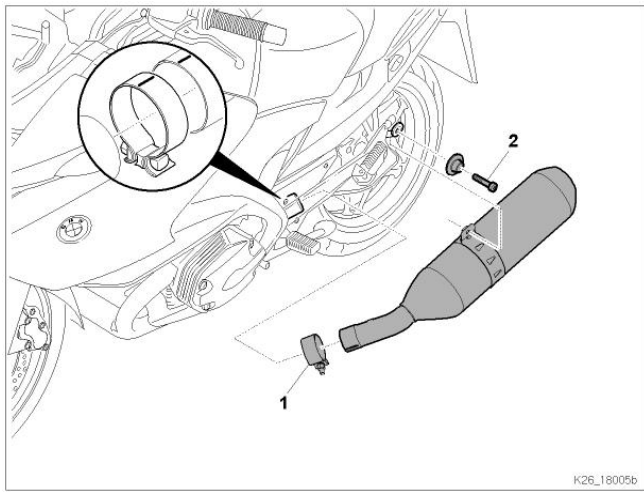
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



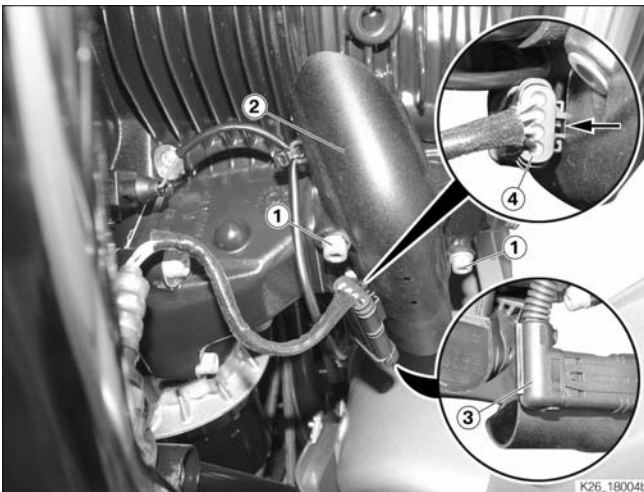
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

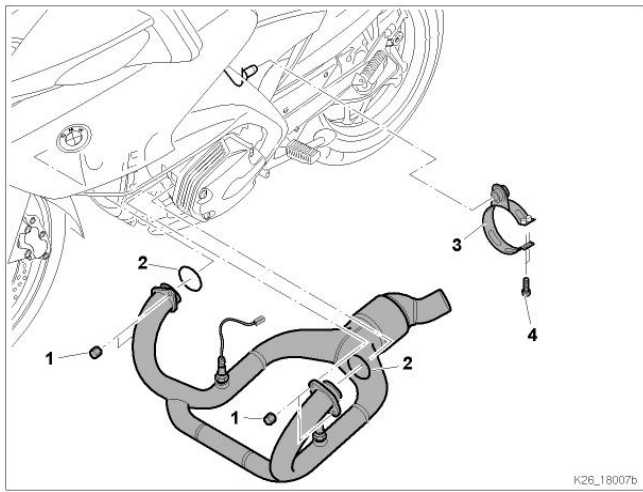
- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- ◄
- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.



(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



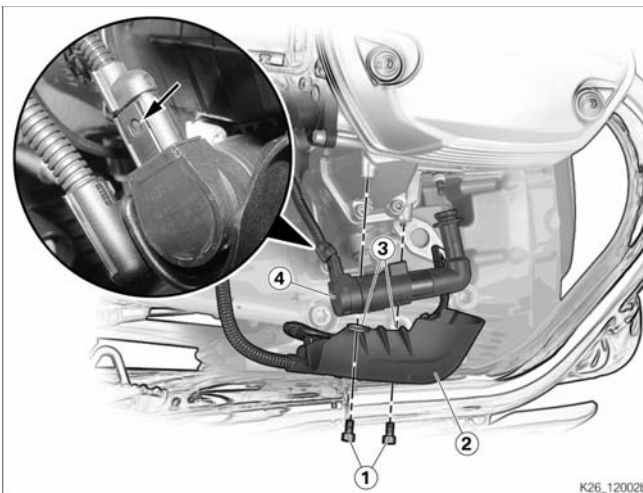
- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

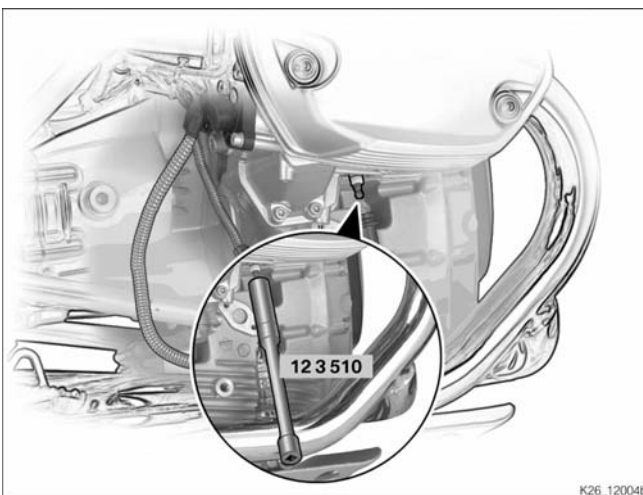
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

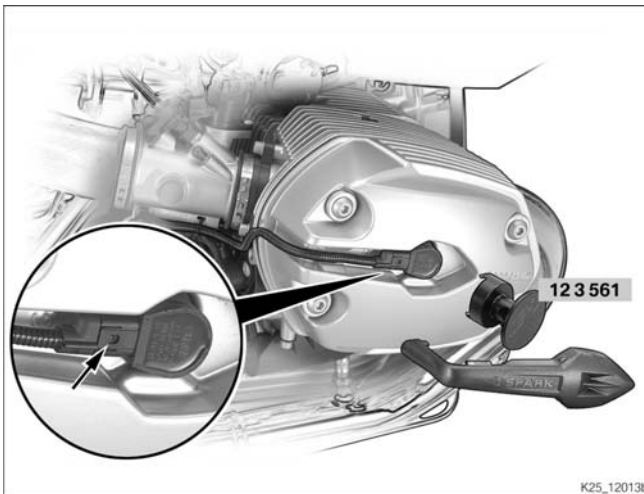


- Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

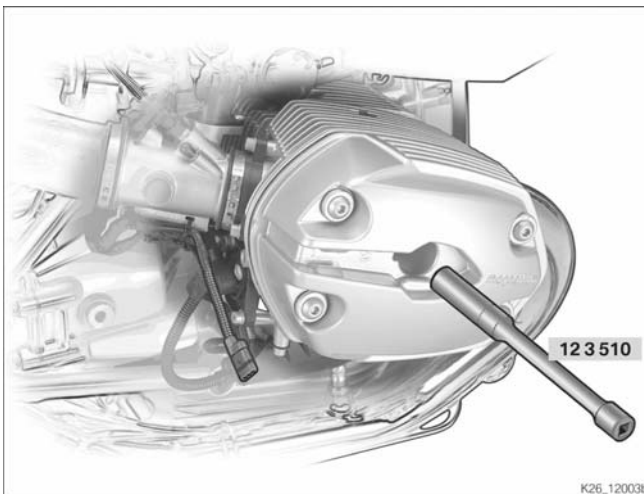
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

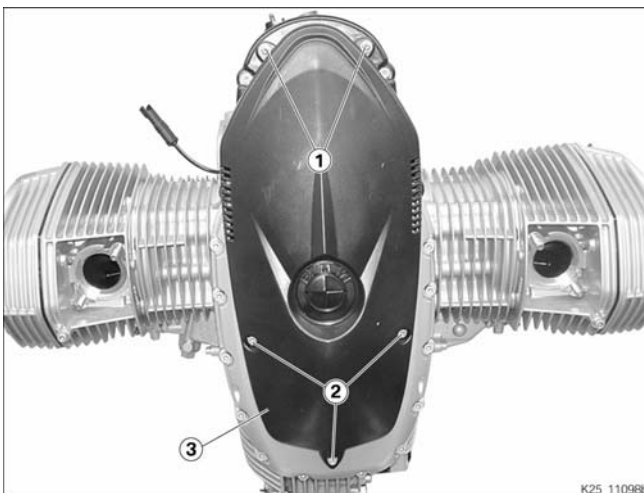
(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the primary spark plug.



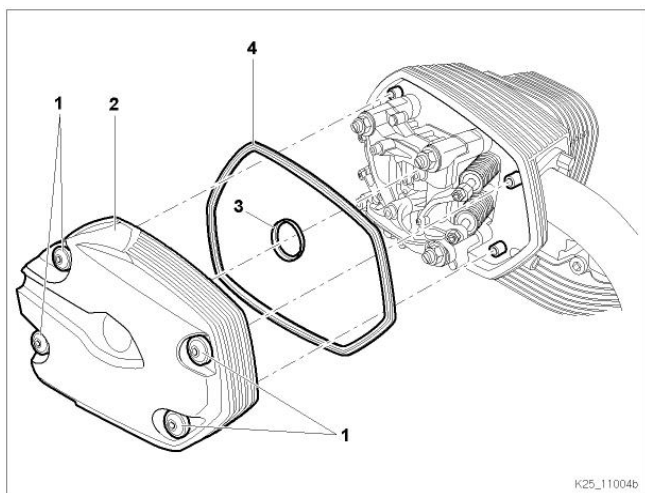
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

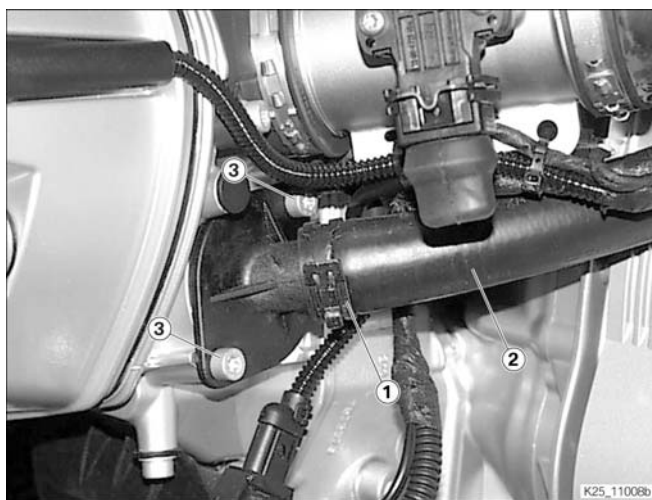
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

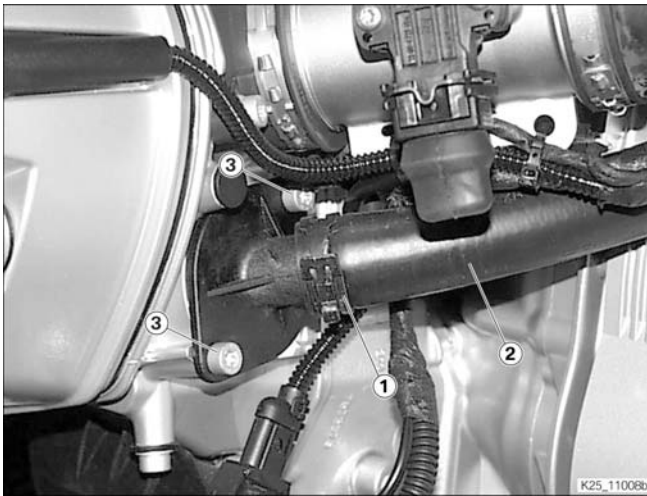
(-) Removing left camshaft cover

► **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.

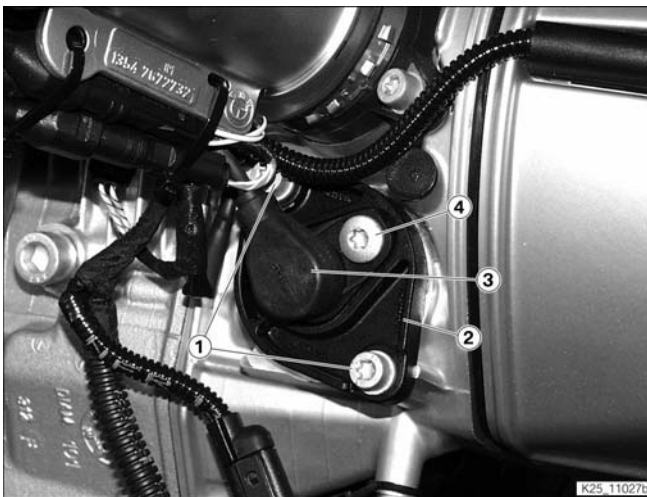


- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).

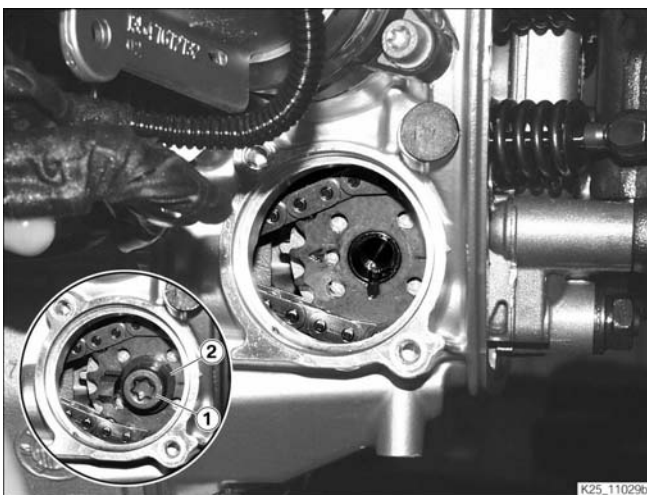


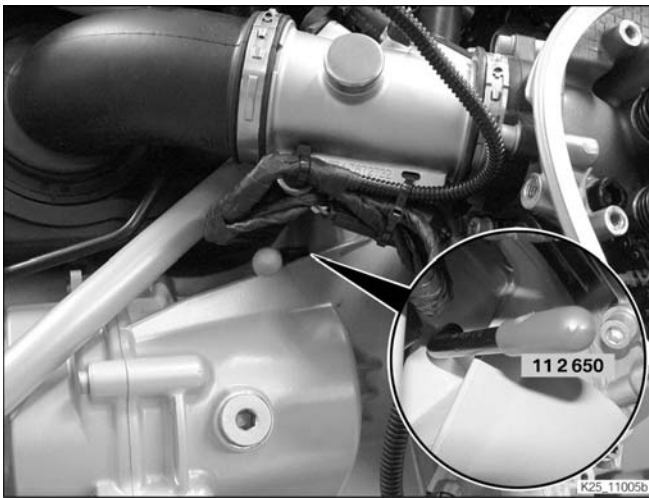
Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.





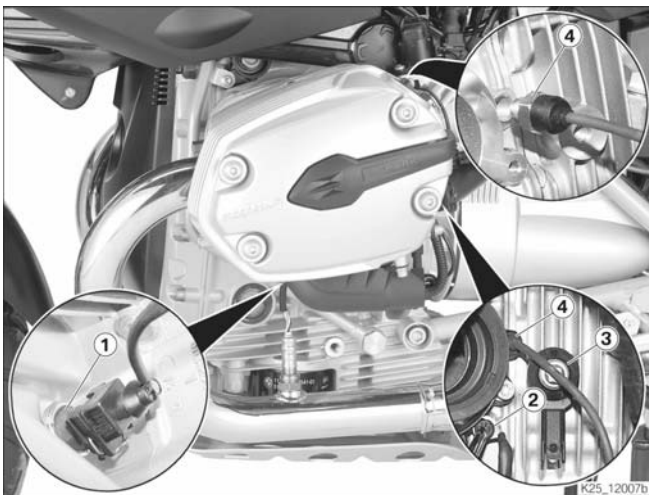
(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).



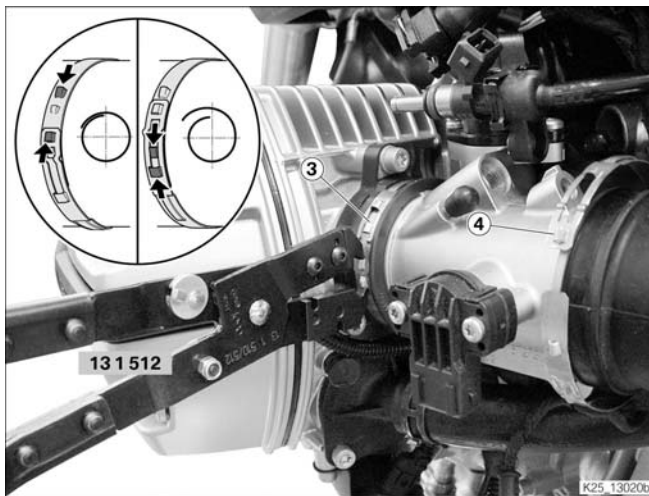
(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).



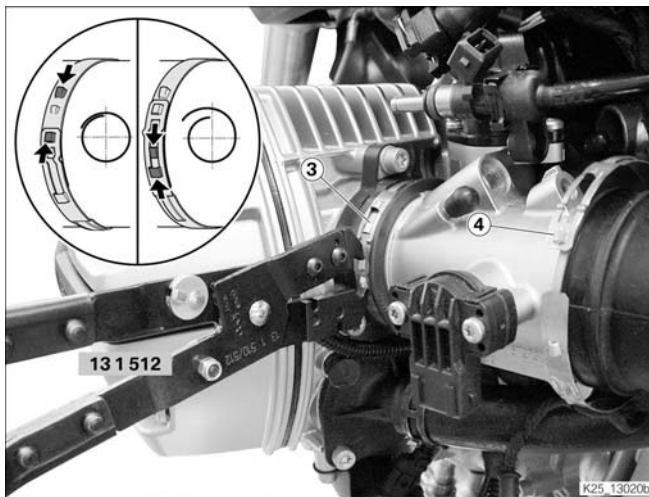
(-) Disconnecting intake air pipes from throttle-valve stubs

- Open clips (4) on left and right with pliers (No. 13 1 512).

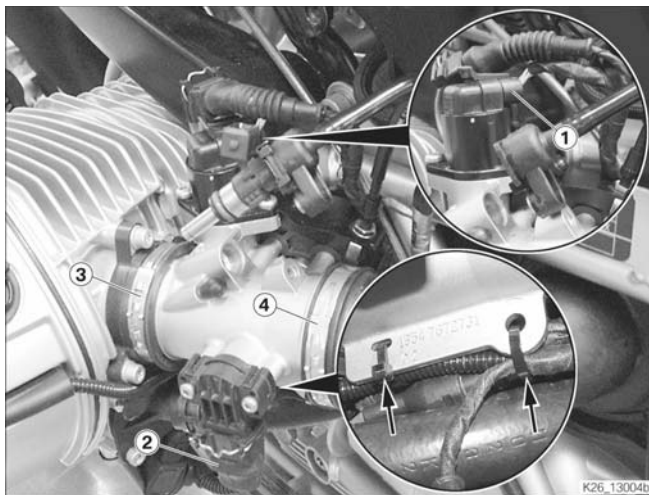


(-) Disconnecting both throttle-valve stubs

- Open hose clips (3) at right and left throttle valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrow) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Pull off the throttle-valve stub on the right and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the throttle-valve stub on the left and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.



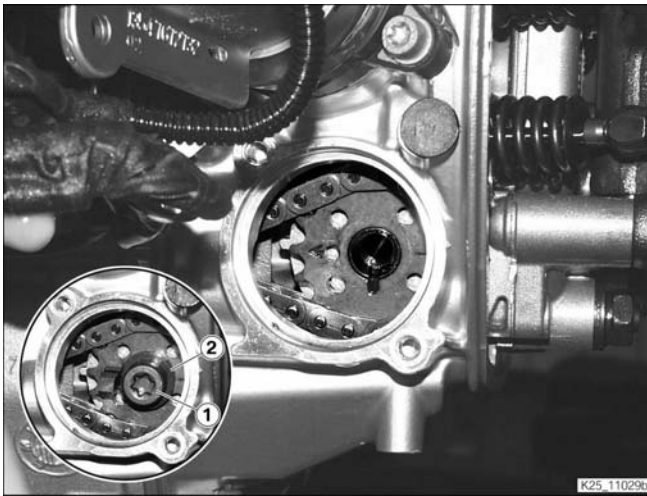
(-) Removing trigger for camshaft sensor

- Slacken screw (1).



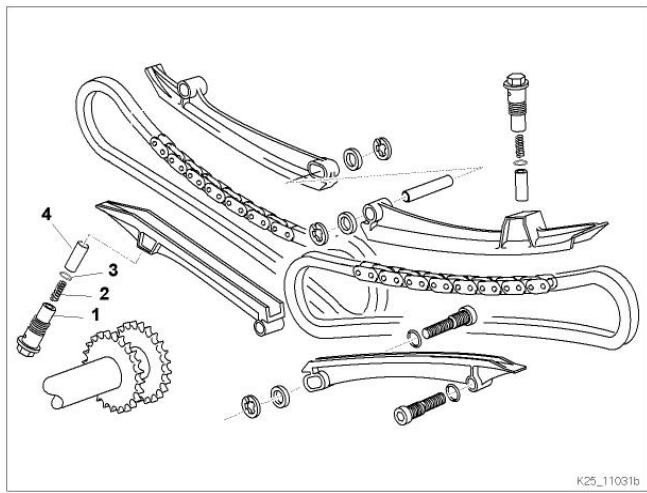
Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



- Remove screw (1) with trigger for camshaft sensor (2).

(-) Removing right chain tensioner



- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

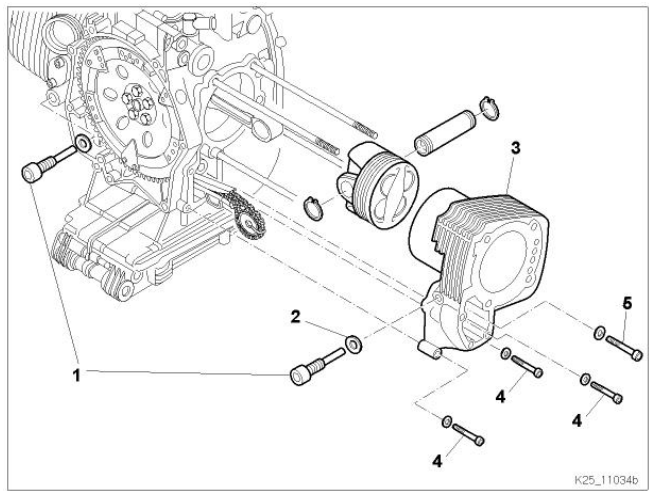
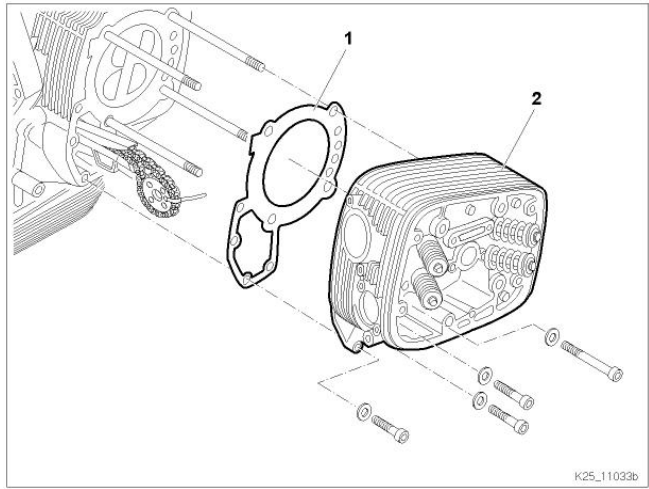
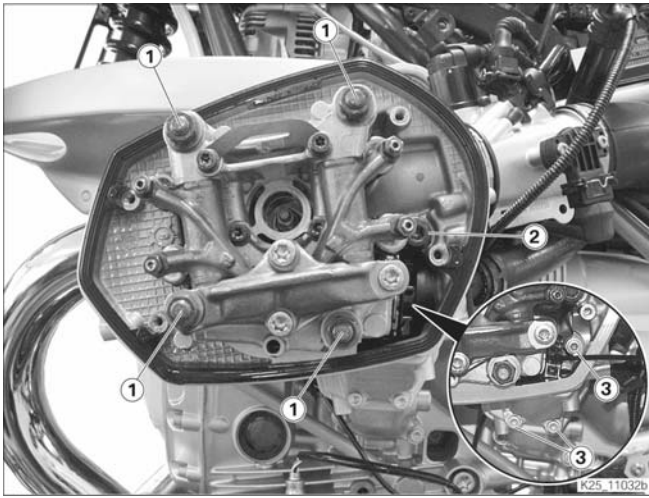
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with



washers.

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.

(-) Removing right cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

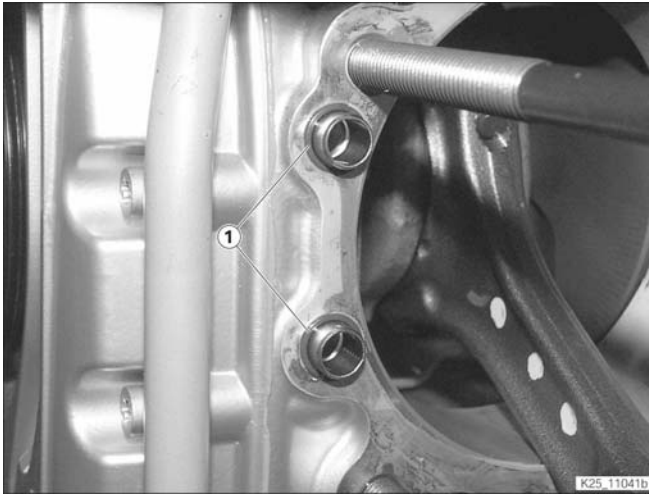
Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.



- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.

(-) Removing breather plate

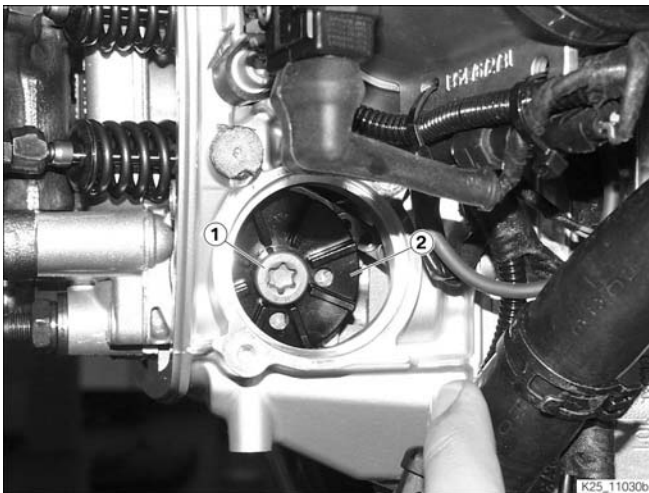
- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).



(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



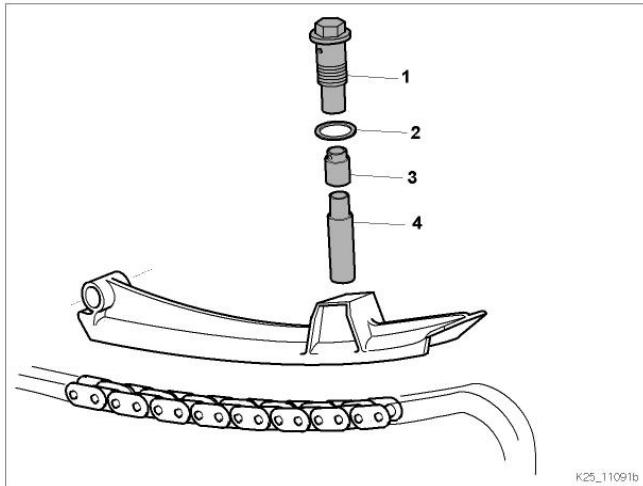
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



(-) Removing left cylinder head

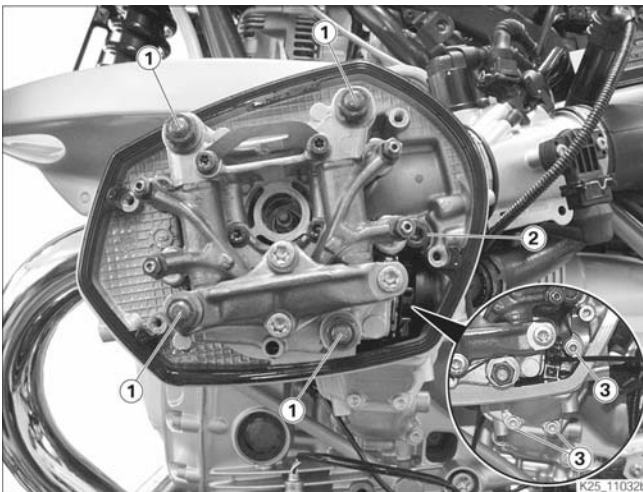
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



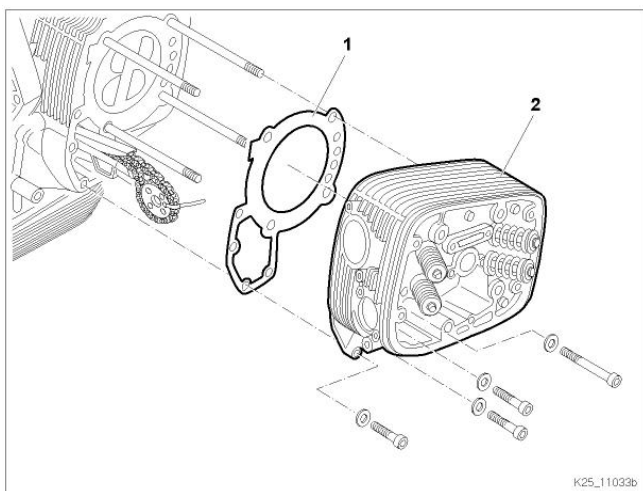
Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

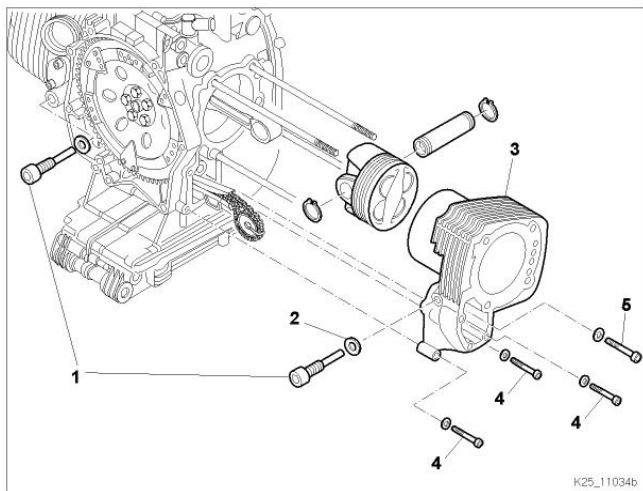
- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing left cylinder



- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

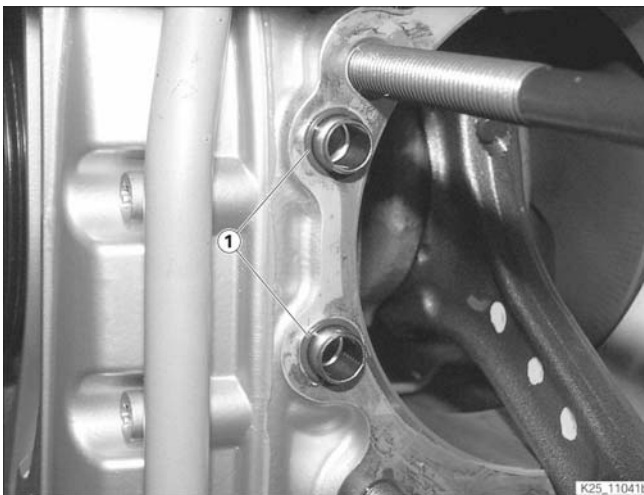
Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.



- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.

(-) Checking cylinders for wear

Test

- Visually inspect the friction faces for:
 - » flaking of the coating
 - » scores and wear marks

Result: Flaking or deep grooves are visible in the friction faces of the cylinder.

Measure:

- Replace cylinder complete with piston.

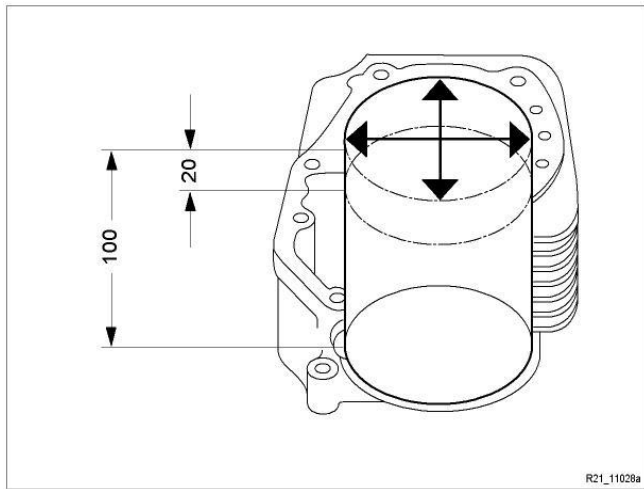
Result: No visual signs of wear or damage to the friction faces of the cylinder.


Measure:

- Measure the cylinder bore.

Test

- Measure the cylinder bore on three planes with internal calipers: measure on the same axis as the piston pin and at a right angle across the bore.



 Technical data			
Cylinder bore, tolerance group A Value definition: When new	from top edge 20 mm from top edge 100 mm	100.992 - 101 mm 100.992 - 101 mm	
Cylinder bore, tolerance group A Value definition: Wear limit	from top edge 20 mm from top edge 100 mm	max. 101.05 mm max. 101.05 mm	
Cylinder bore, tolerance group B Value definition: When new	from top edge 20 mm from top edge 100 mm	101 - 101.008 mm 101 - 101.008 mm	
Cylinder bore, tolerance group B Value definition: Wear limit	from top edge 20 mm from top edge 100 mm	max. 101.058 mm max. 101.058 mm	
Cylinder bore, tolerance group A/B Value definition: When new	from top edge 20 mm from top edge 100 mm	100.992 - 101.008 mm 100.992 - 101.008 mm	
Cylinder bore, tolerance group A/B Value definition: Wear limit	from top edge 20 mm from top edge 100 mm	max. 101.058 mm max. 101.058 mm	
Permitted out-of-roundness	from top edge 20	max. 0.01 mm max. 0.015	

of cylinder bore	mm from top edge 100 mm	mm	
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Result: Measured values are in excess of the wear limit or the cylinder evinces excessive out-of-round.

Measure:

- Replace cylinder complete with piston.

(-) Removing piston

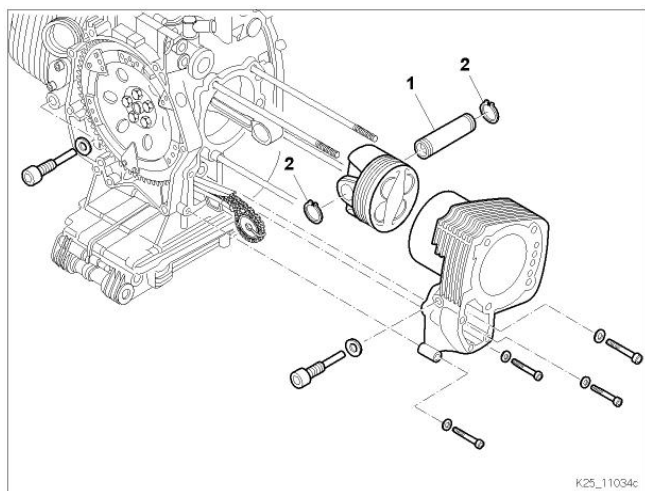
- Remove both circlips (2) from the piston pin.



Note

Remember to mark the exhaust side on the piston crown if you are going to reinstall the same pistons.

- Pull out piston pin (1) in the forward direction of travel until the piston can be separated from the conrod.
- Remove the piston.



(-) Checking pistons for wear

Test

- Visually inspect the friction faces for:
 - » scores and wear marks

Result: Deep scores visible in the piston.

Measure:

- Replace piston and cylinder.

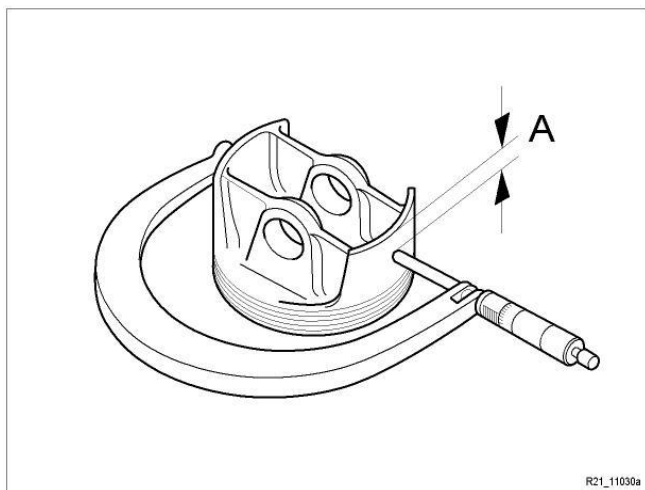
Result: No visual signs of wear or damage to the piston.


Measure:

- Measure the piston diameter.

Test

- Measure the piston diameter on the measuring plane with a caliper gauge: measure at a right angle to the axis of the piston pin.



 Technical data			
Piston diameter, tolerance group A Value definition: When new	At right angles to piston-pin axis, across bottom edge of piston 6	100.977 - 100.989 mm	

	mm		
Piston diameter, tolerance group A Value definition: Wear limit	At right angles to piston-pin axis, across bottom edge of piston 6 mm	min. 100.9 mm	
Piston diameter, tolerance group B Value definition: When new	At right angles to piston-pin axis, across bottom edge of piston 6 mm	100.965 - 100.977 mm	
Piston diameter, tolerance group B Value definition: Wear limit	At right angles to piston-pin axis, across bottom edge of piston 6 mm	min. 100.89 mm	
Piston diameter, tolerance group AB Value definition: When new	At right angles to piston-pin axis, across bottom edge of piston 6 mm	100.973 - 100.981 mm	
Piston diameter, tolerance group AB Value definition: Wear limit	At right angles to piston-pin axis, across bottom edge of piston 6 mm	min. 100.895 mm	

Result: Measured values are lower than the wear limit.

Measure:

- Replace piston and cylinder.

Test

- Use the measured values for the cylinder and the piston to calculate the installed play of the piston.



Technical data

Piston installation clearance Value definition: When new		0.011 - 0.035 mm	
Piston installation clearance Value definition: Wear limit		max. 0.12 mm	

Result: Installed play of piston is greater than the wear limit.

Measure:

- Replace piston and cylinder.

(-) Checking piston rings for wear

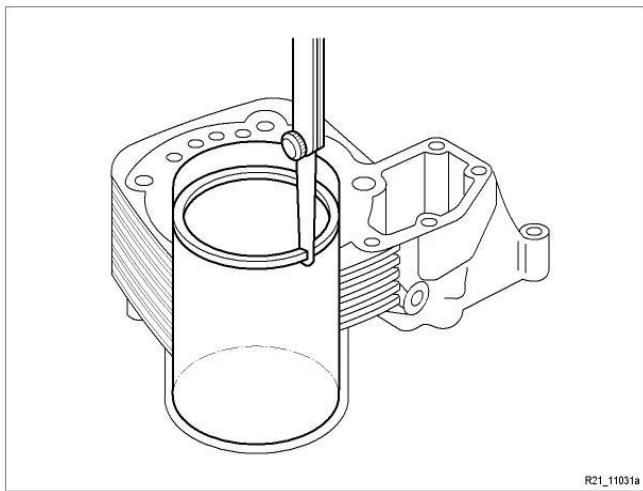
Precondition

- The cylinder bore must be in as-new condition or compliant with the dimensional specifications.



Test

- Insert the piston rings one at a time into the cylinder and use the piston to straighten the ring.



Technical data

Installed direction of piston rings		"Top" marking uppermost	
-------------------------------------	--	-------------------------	--

- » The piston ring is in the installed position in the cylinder.
- Use a feeler gauge to measure the piston-ring end gap.



Technical data

Piston ring 1st groove, end gap Value definition: When new		0.1 - 0.3 mm	
Piston ring 1st groove, end gap		max. 0.8 mm	

Value definition: Wear limit			
Piston ring 2nd groove, end gap Value definition: When new		0.1 - 0.3 mm	
Piston ring 2nd groove, end gap Value definition: Wear limit		max. 0.8 mm	
Piston ring 3rd groove, end gap Value definition: When new		0.3 - 0.6 mm	
Piston ring 3rd groove, end gap Value definition: Wear limit		max. 1.2 mm	


Result: Piston-ring end gap is greater than the wear limit.

Measure:

- Replace the piston rings.

(-) Cleaning sealing faces, cylinder base

- Remove all traces of old sealant from the cylinder base and the crankcase, paying particular attention to the grooves in the crankcase.
- Clean and degrease the sealing faces of the cylinder base and the crankcase.

 Consumables/lubricants		
Brake cleaner	Cleaners	83 11 9 407 848

(-) Installing piston in cylinder



Attention

Nature: There is only one tolerance group (A/B) for replacement pistons and cylinders. There are two other tolerance groups (A



and B) for components installed ex-works. Piston and cylinder must belong to the same tolerance group.

Avoidance: Always replace piston and cylinder as a paired set.

 **Attention**

Nature: In order to ensure low-vibration, smooth engine operation, all the pistons must belong to the same weight class.


Avoidance: Always use pistons of the same weight class in any one engine.

- Determine the correct weight class (1) of the piston and use a piston of the appropriate weight class.

 **Note**


The weight class is stamped on the piston crown and is legible only if the piston is new.

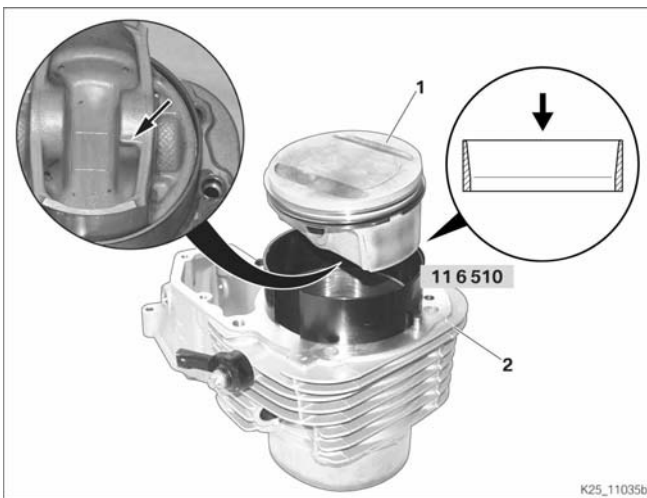
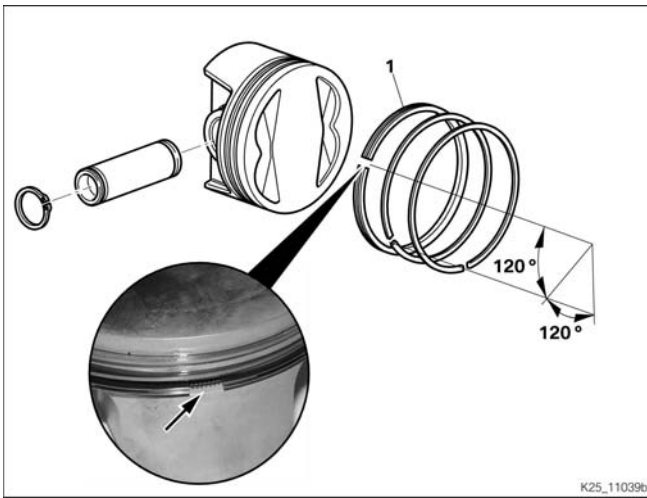
If the symptoms are such that only one replacement cylinder with piston has to be installed, the weight of the other piston has to be ascertained by weighing.

 Technical data			
Difference in weight within a weight class (weight classes + and -)		max. 10 g	
Value definition:			
Complete with piston pin and piston rings			

► **Positioning piston rings**

- Position oil wiper ring (1) with the end faces (arrow) up in the installed position.
- Position the other rings with the end gaps offset by the specified angle.


 Technical data			
Installed direction of piston rings		"Top" marking uppermost	
Offset of piston-ring		120 °	




gaps			
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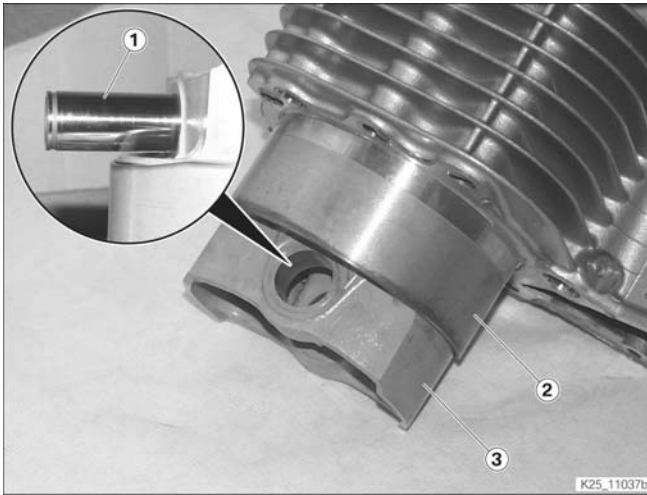
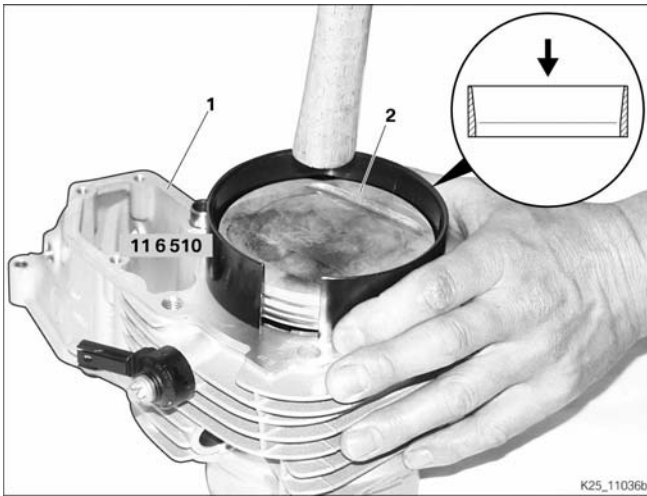
- Coat the friction face of the cylinder and the friction face of the piston skirt with oil.

 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

- Place the cylinder, base down, on a smooth, level and firm working surface.
- Set sliding sleeve for piston rings (No. 11 6 510) with the tapered end up on the cylinder.
- Insert the piston with the cast nose (arrow) pointing toward the exhaust side into sliding sleeve (No. 11 6 510) and carefully press it through the taper and into the cylinder.

 Technical data			
Installation direction of piston		Arrow on piston crown and/or cast lug pointing to exhaust side	

- » The piston rings are preloaded.
- » The piston skirt is held in position by the cylinder.
- Press sliding sleeve (No. 11 6 510) against the cylinder and carefully tap the piston into the cylinder.
- » The piston is full inserted into the cylinder.
- Remove sliding sleeve for piston rings (No. 11 6 510) .



- Push piston (3) through cylinder (2) just far enough to allow piston pin (1) to be inserted. Make sure that the piston rings do not project past the end of the cylinder liner.

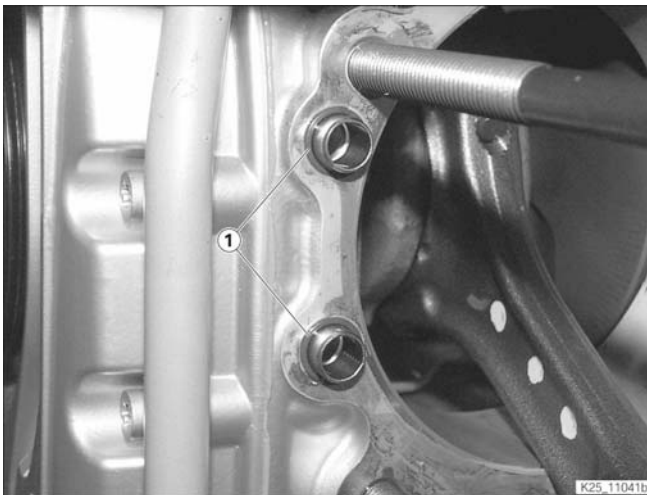
(-) Installing right cylinder

Precondition

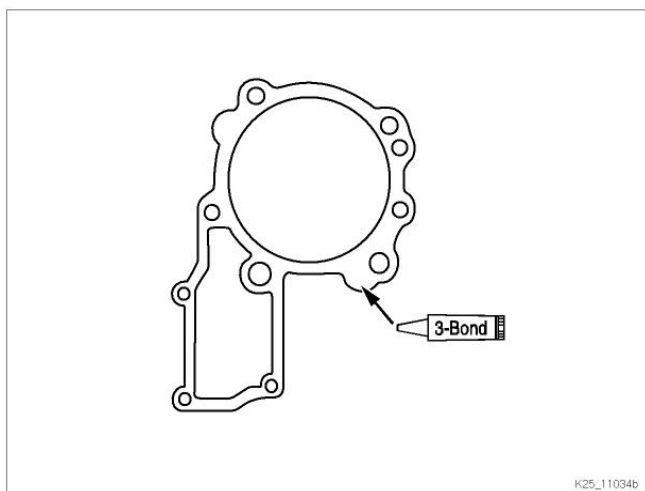
- Crankshaft is locked at TDC.



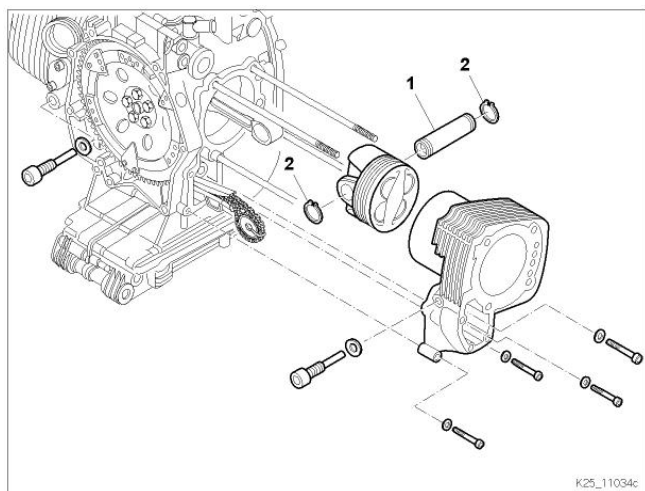
- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



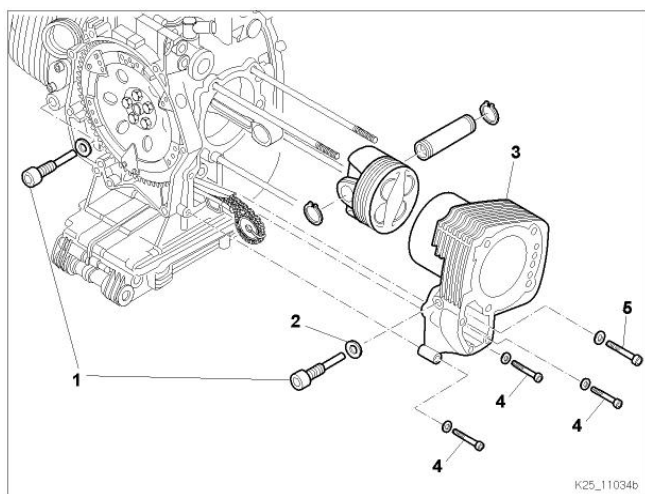
- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.



K25_11034b



K25_11034c



K25_11034b



Consumables/lubricants

3 - Bond 1209	Surface sealant	07 58 9 062 376
---------------	-----------------	--------------------

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

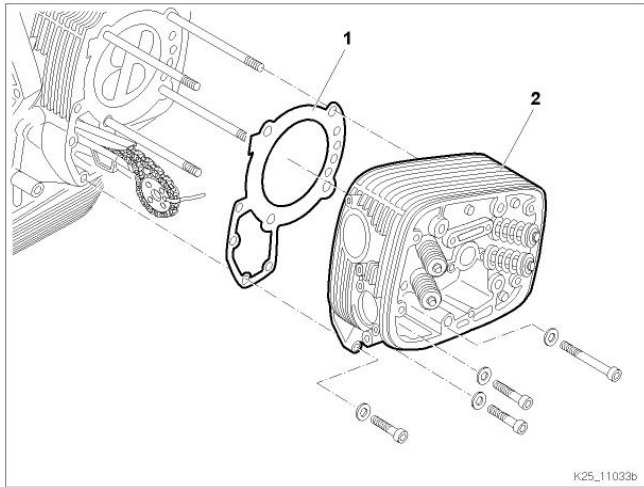
When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed	18 Nm	

with sealing washer
A12x15.5-AL



(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.

! Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

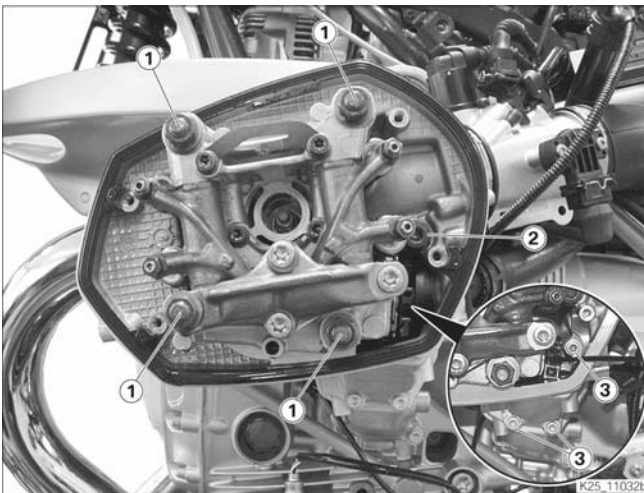
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.


! Attention

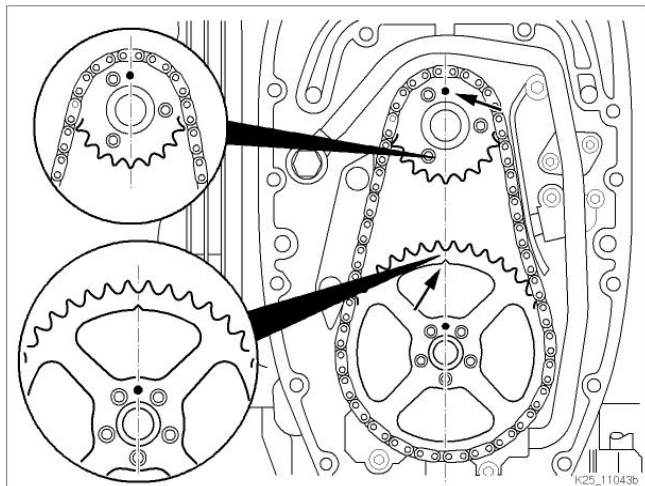
Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



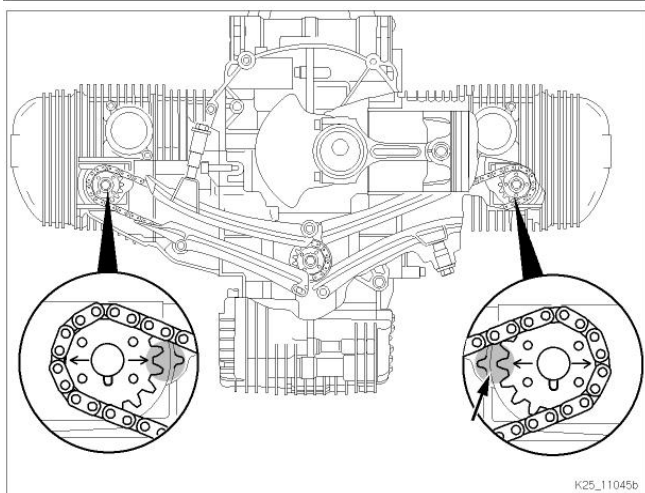
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	



(-) Adjusting timing, right (cylinder No. 1)

- Make sure that the crankshaft and countershaft are in the **"firing TDC, right cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

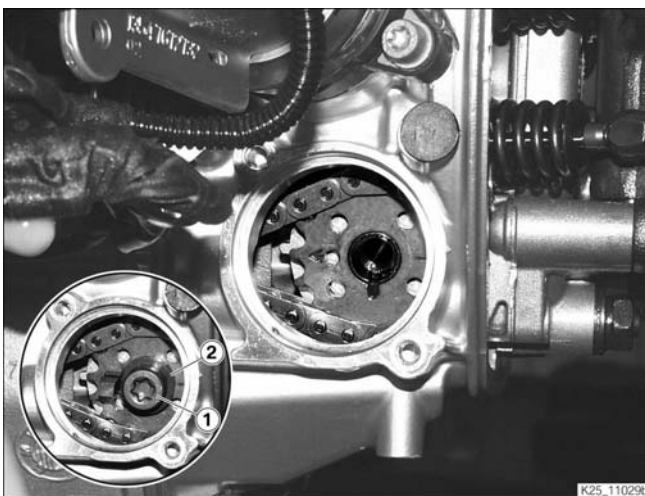


- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



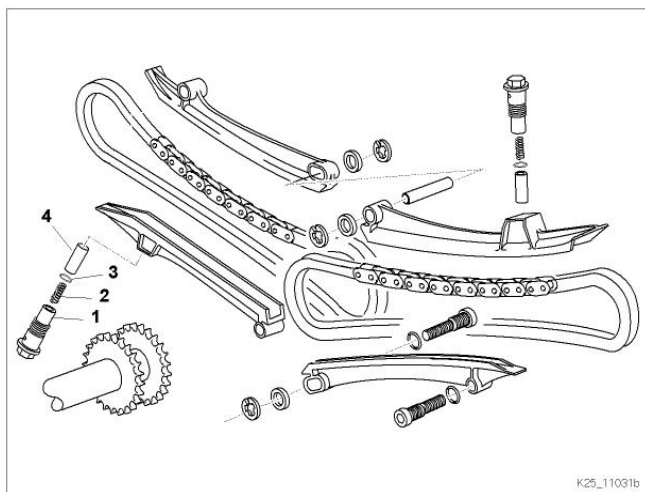
▶ Installing right timing chain tensioner

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

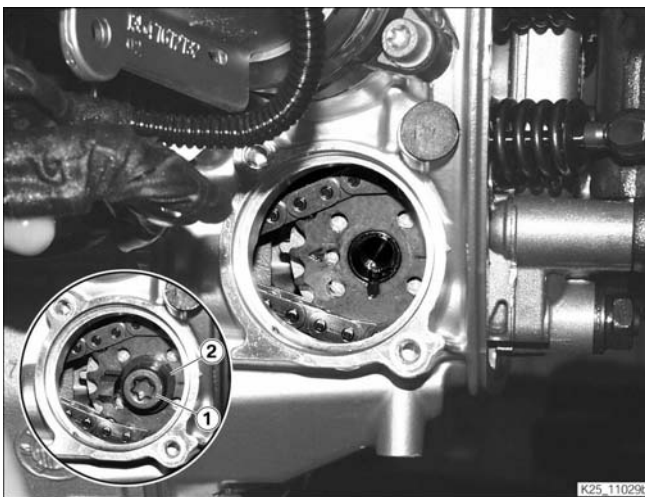


- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.



K25_11031b

Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



K25_11029b

- Tighten screw (1).

Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

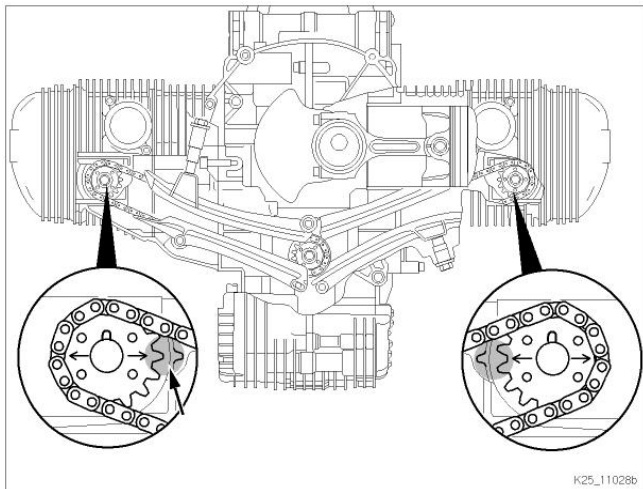
(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.



- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.



- Insert locating pin (No. 11 2 650) to lock the engine in position.

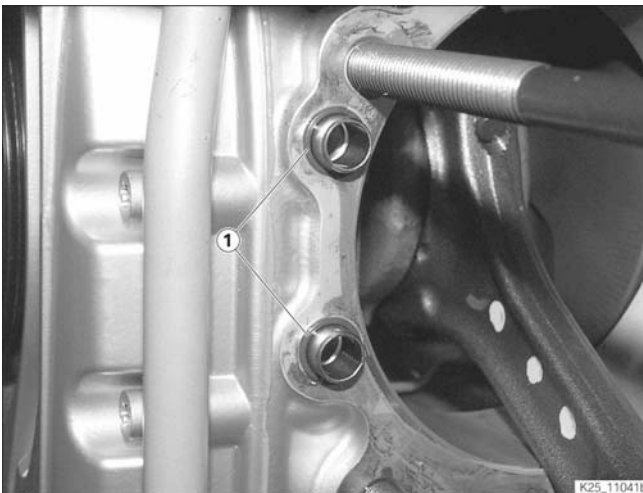
(-) Installing left cylinder

Precondition

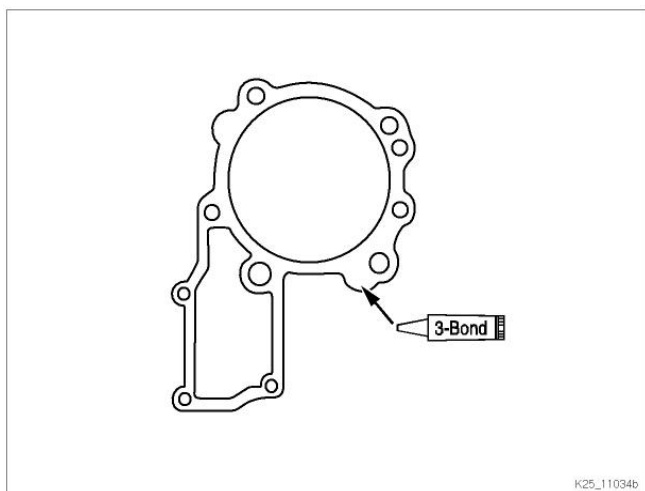
- Crankshaft is locked at TDC.



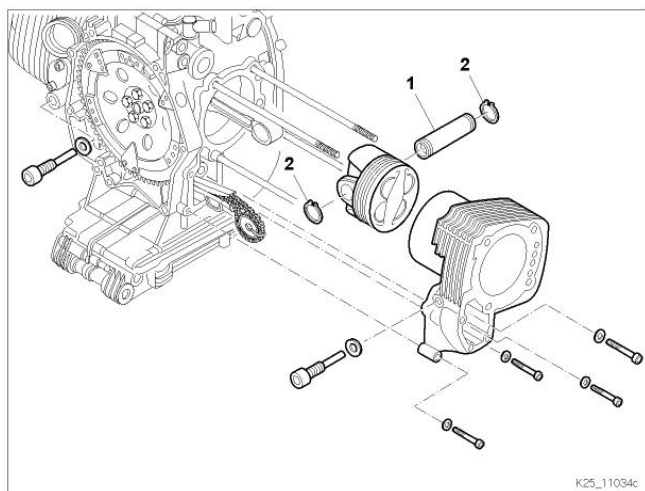
- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



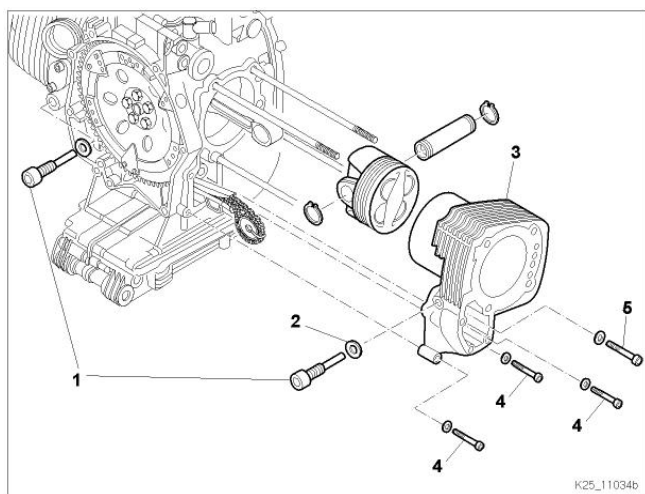
- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.



K25_11034b



K25_11034c



K25_11034b



Consumables/lubricants

3 - Bond 1209	Surface sealant	07 58 9 062 376
---------------	-----------------	--------------------

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Tightening torques

right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

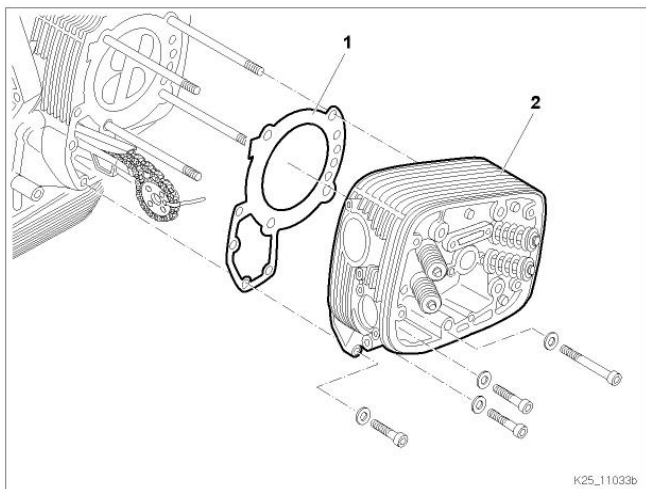
- Install pivot screw for timing-chain slide rail (1) with new seal (2).



Tightening torques

Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed	18 Nm	
--	-------	--

with sealing washer
A12x15.5-AL



(-) Installing left cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.

! Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

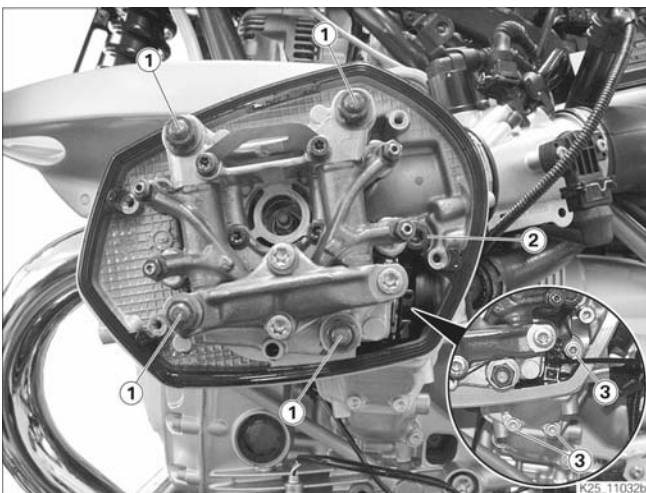
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.


! Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

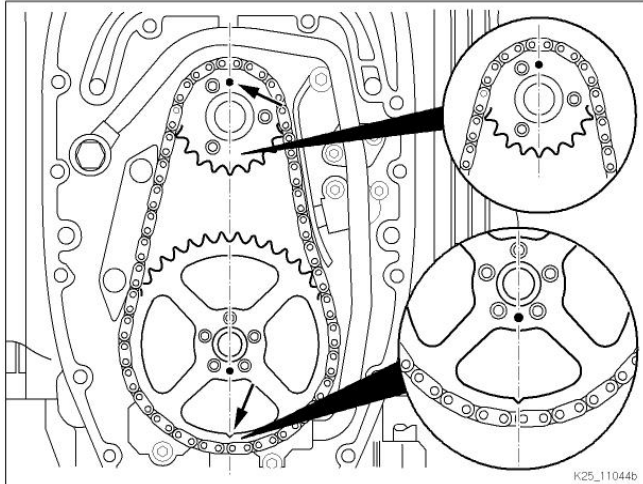
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



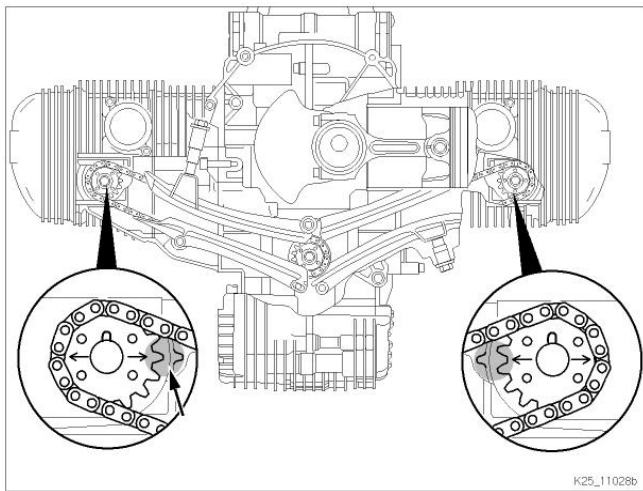
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, left (cylinder No. 2)



- Make sure that the crankshaft and countershaft are in the **"firing TDC, left cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the sprocket for the timing chain of the countershaft is **down** and at the top the split line between the two halves of the crankcase is between two teeth.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **up**.
- » The valves in the left-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

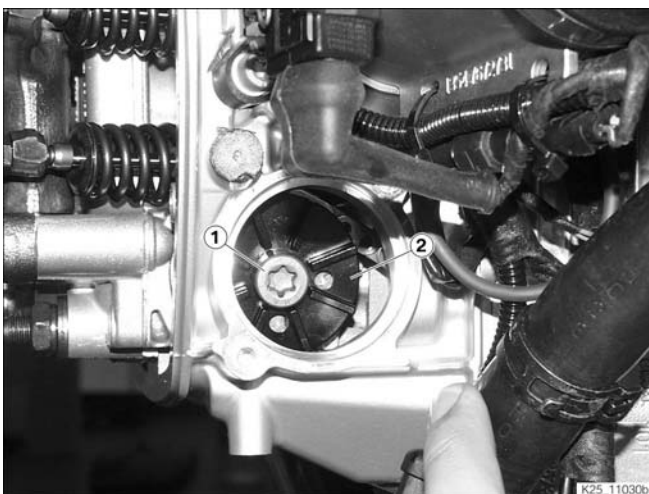


- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.



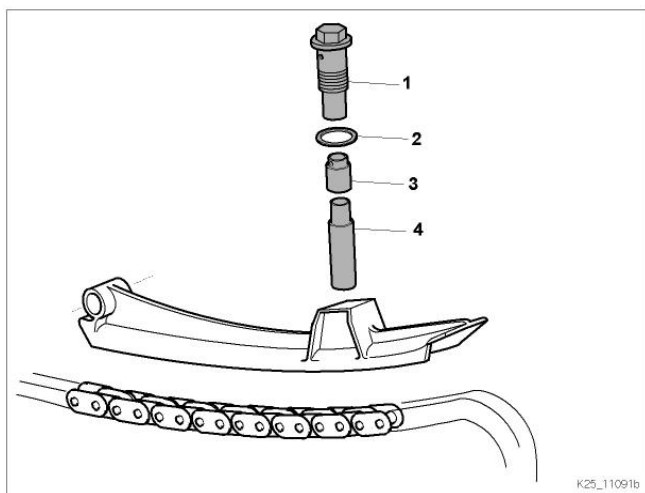
Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.




(-) Installing left timing chain tensioner

-



- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore up in the chain tensioner.
- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.
- >> The chain tensioner must slide onto the piston without tilting.
- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	


(-) Securing left camshaft sprocket

Precondition

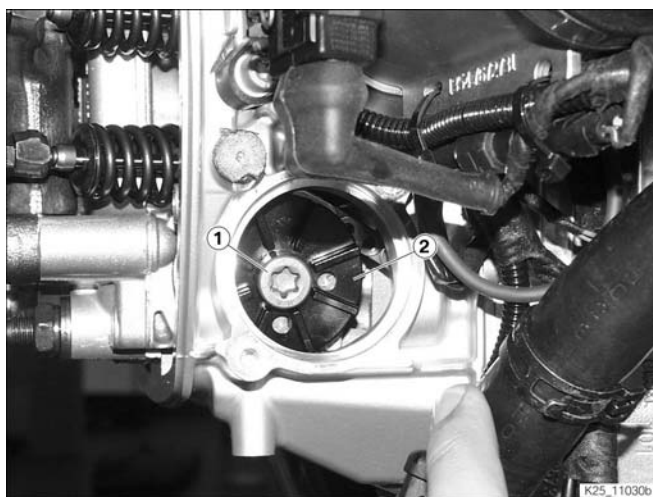
- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance


Test

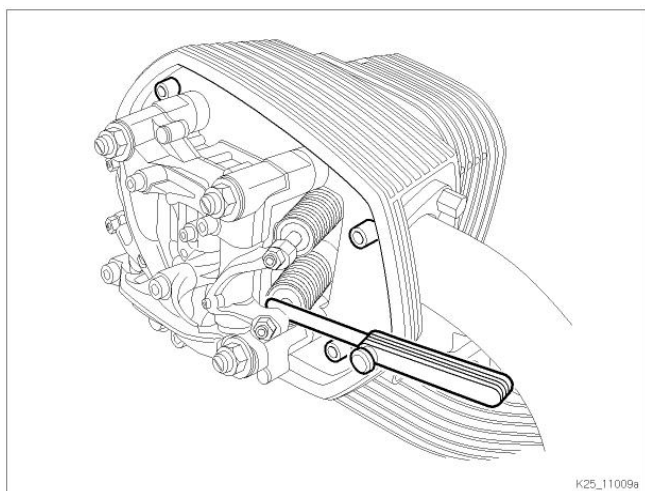
- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.

 Technical data			
Valve clearance, inlet	engine cold max.	0.15 mm	




valve	35 °C		
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

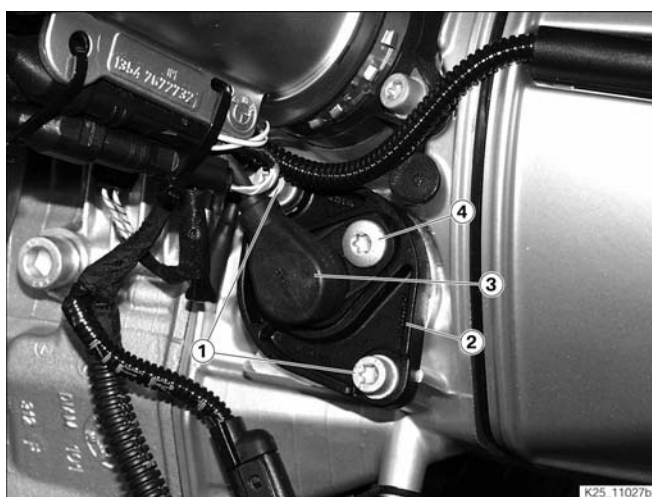
(-) Installing right camshaft cover

! Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

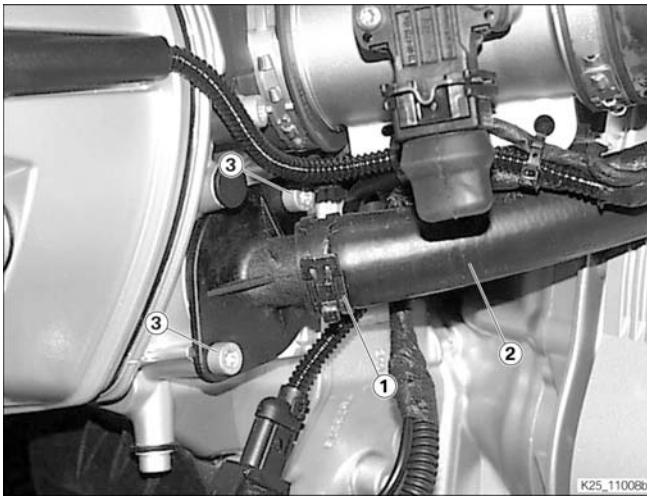


(-) Installing left camshaft cover

! Attention

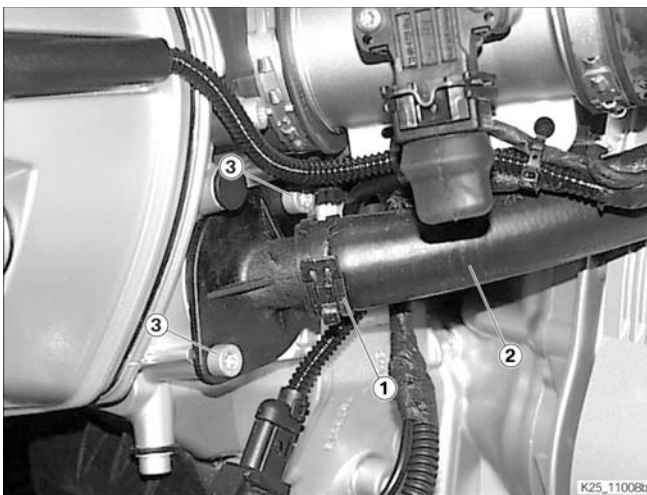
Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.



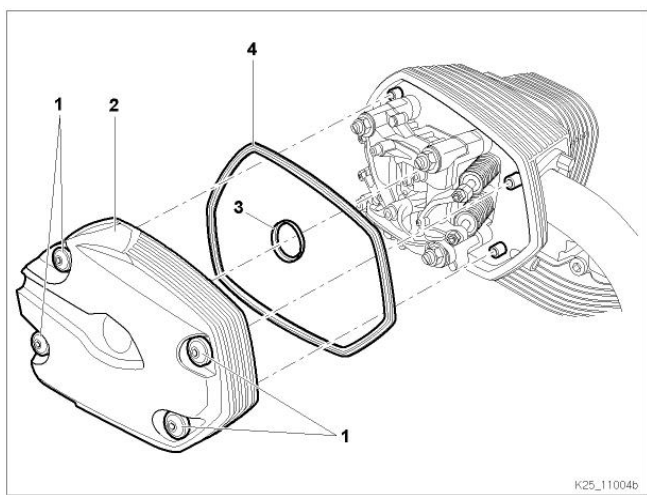
- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

► **Connecting hose for crankcase breather**




- Connect hose (2) to the camshaft cover.
 - Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.

◄ **(-) Installing cylinder head cover**

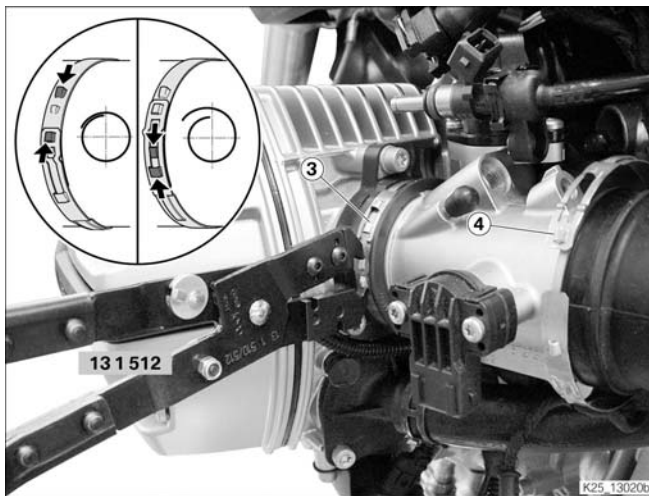


- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

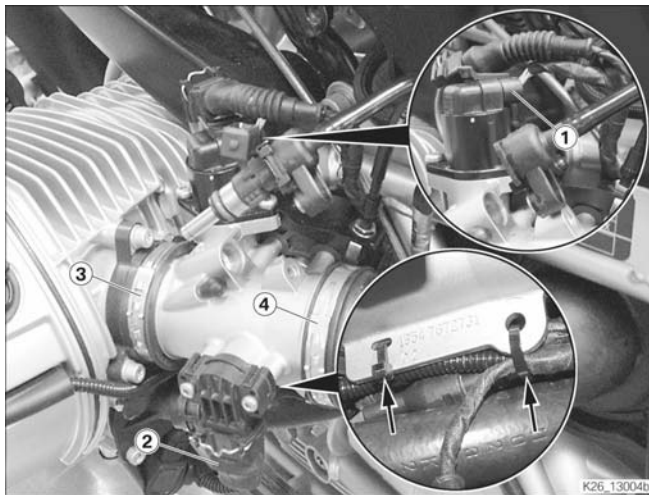
 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing both throttle-valve stubs

- Remove the covers from the intakes.
- Introduce the throttle-valve stub into the air intake and position it correctly.

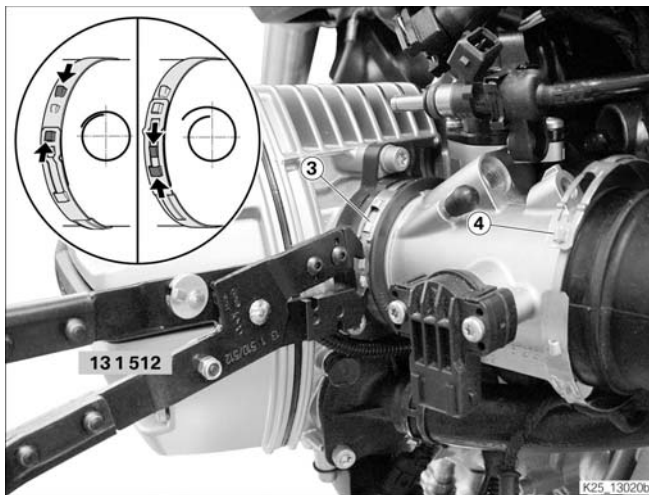


- Align hose clamps (3) and close them with pliers (No. 13 1 512).



- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.


(-) Installing air intake pipe

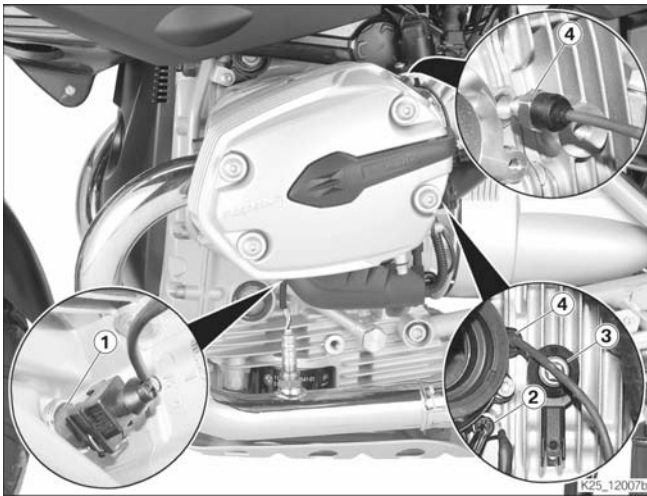


- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512).

(-) Connecting plugs of engine sensors and switches, left

- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.

 Tightening torques		




left and right, M6 x 10	8 Nm	
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- Connect knock sensor (3).
- Connect temperature sensor (4).

(-) Connecting plugs of engine sensors, right

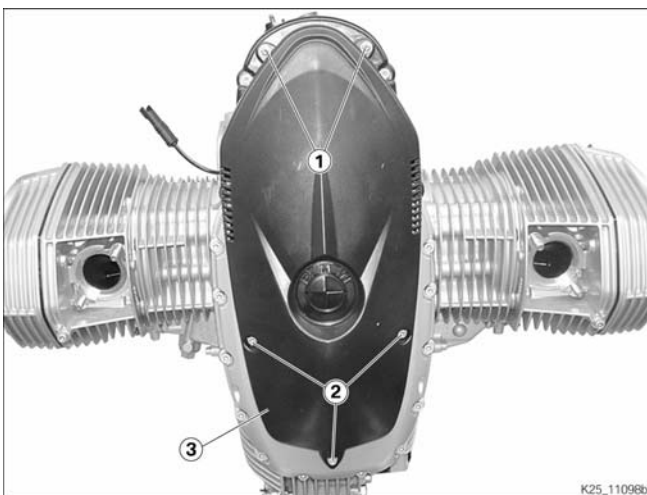


- Secure earth lead (1) to the cylinder head.


 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

(-) Installing belt guard




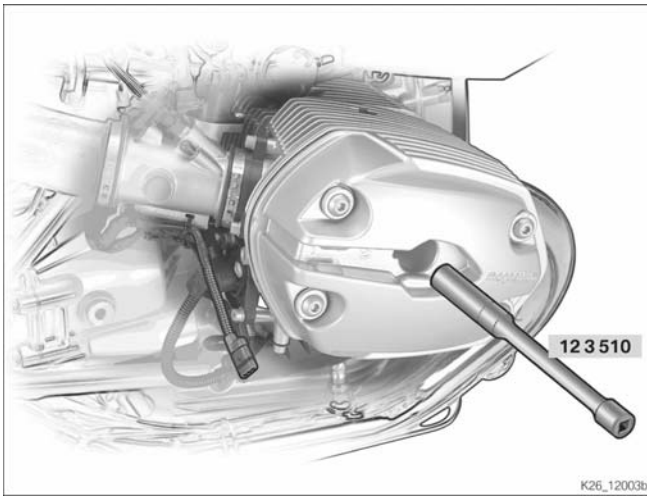
- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing primary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

 Tightening torques		



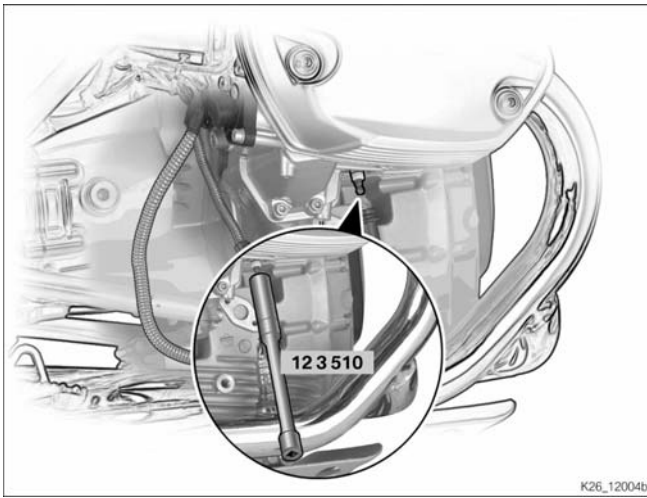
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
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 Technical data		
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Spark plug, manufacturer and designation		Bosch YR 5 LDE
--	--	----------------

(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.



 Tightening torques		
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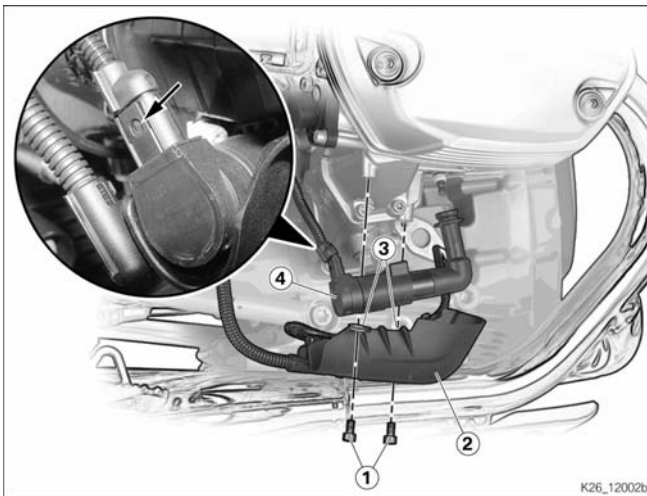
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--

 Technical data		
---	--	--

Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE
--	--	----------------

(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.



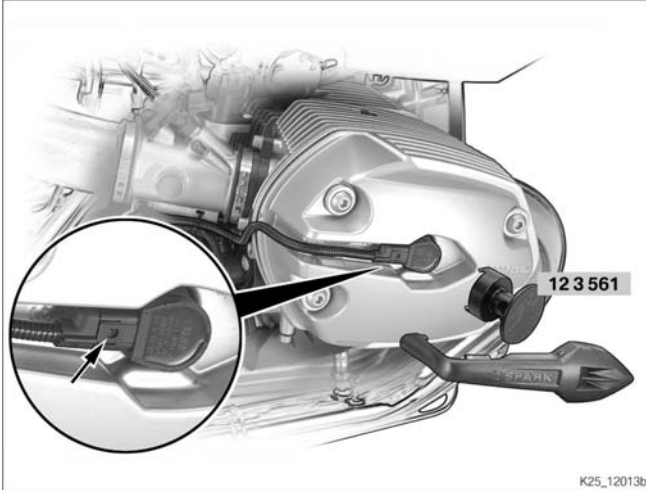
 Consumables/lubricants		
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Talcum powder	Assembly aid	
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- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

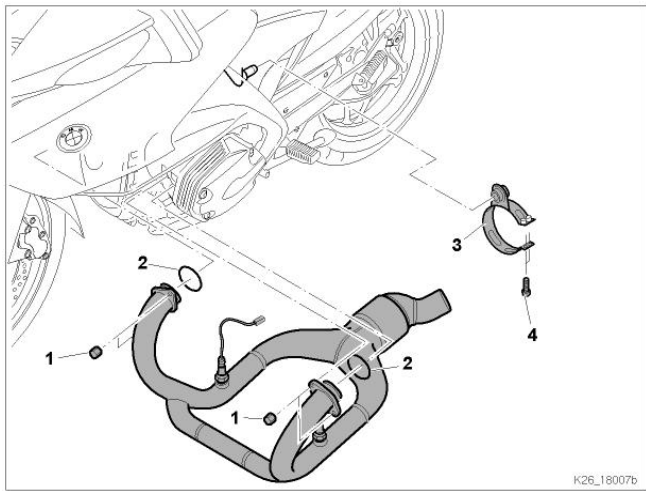
 Tightening torques		
---	--	--

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
--	------	--




(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.




(-) Installing exhaust elbow


- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

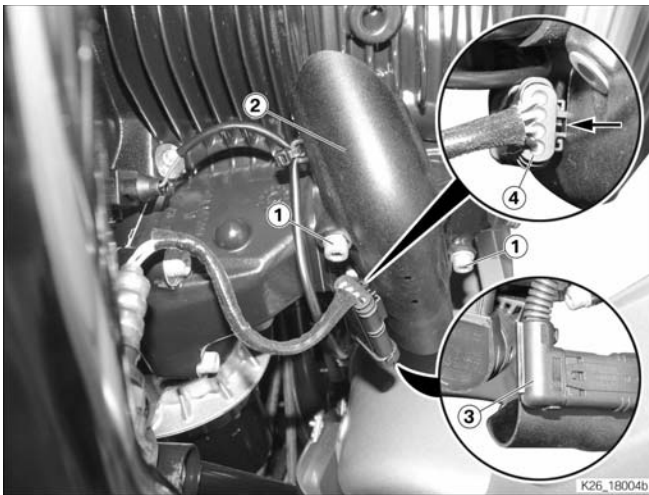
 <p>Tightening torques</p>		
Manifold to cylinder head, Acorn nut M8	21 Nm	

- Align the clamp (arrow) on the manifold and tighten screws (1).

 <p>Tightening torques</p>		




Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	
--	------	--



► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).


 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	

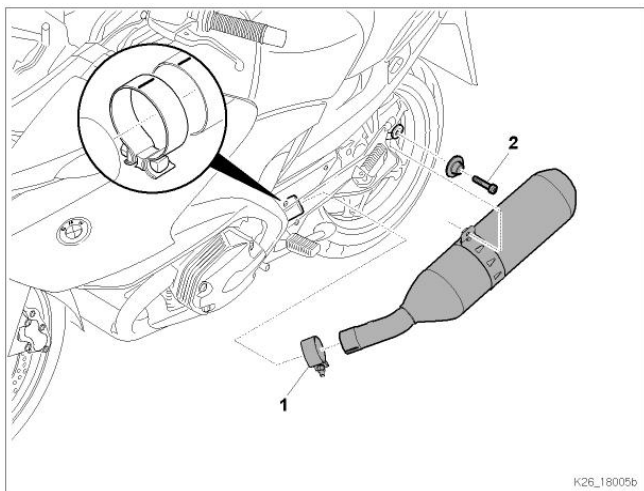


- Install front screw (1) in both bottom sections of the fairing.

◄ **(-) Installing silencer**

- Grease the inner face of Torca clamp (1).

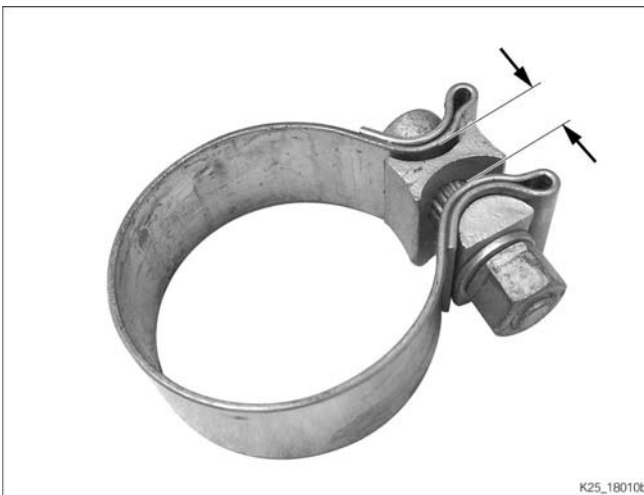
 Consumables/lubricants		
---	--	--



K26_18005b



K28_18007d



K25_18010b

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	--------------------

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
---	--	--

End silencer to footrest support, M8	19 Nm	
--------------------------------------	-------	--

- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--

► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

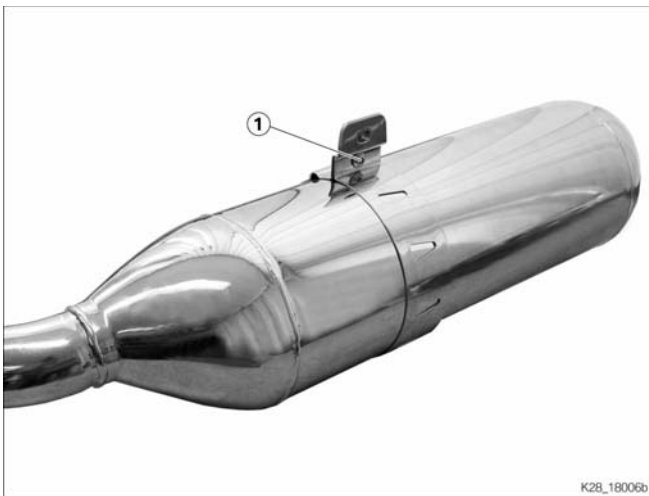
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




 **Attention**


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.


- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




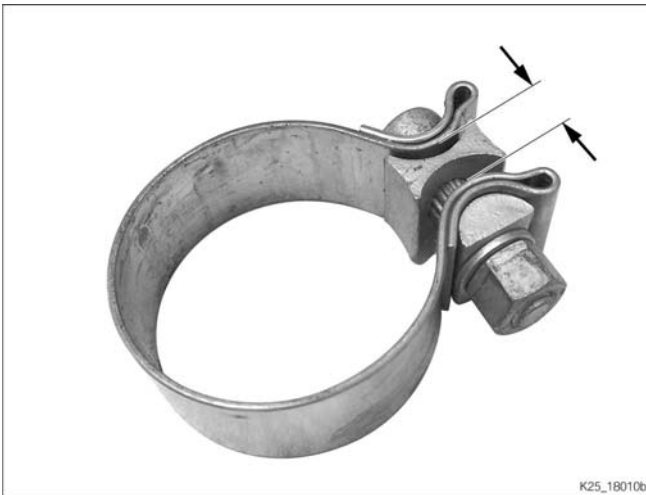
Checking Torca clamp on silencer

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	



K25_18010b


Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



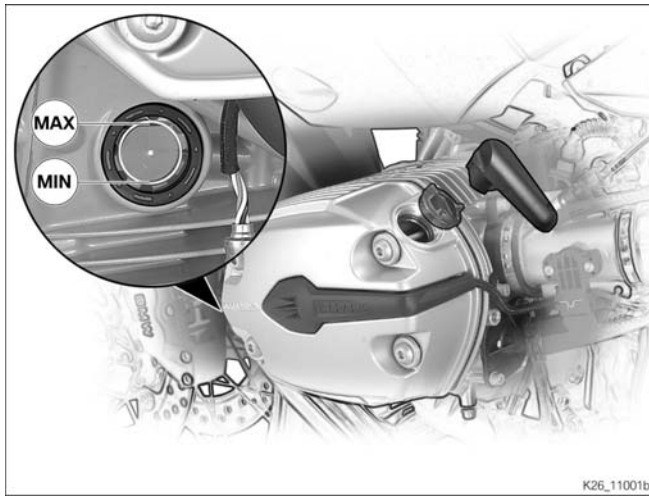
K26_18001b




(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.





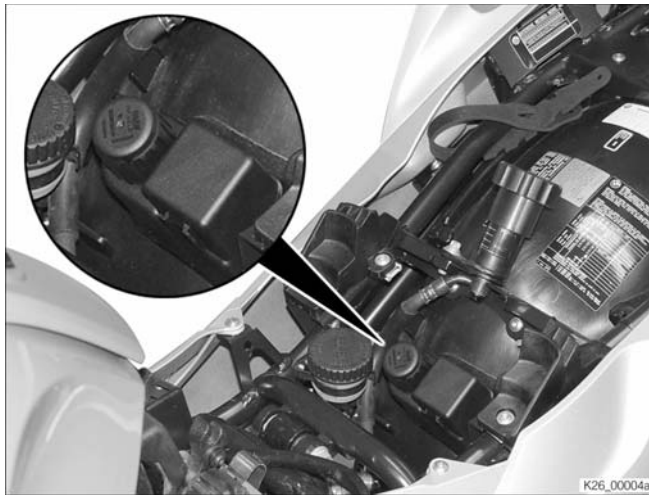
 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.

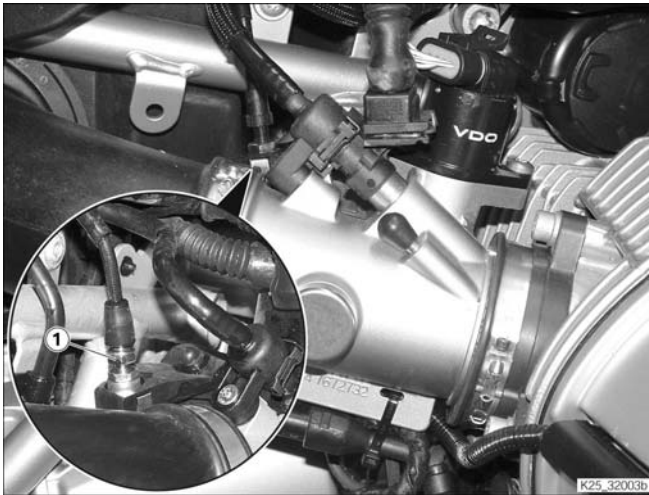


Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

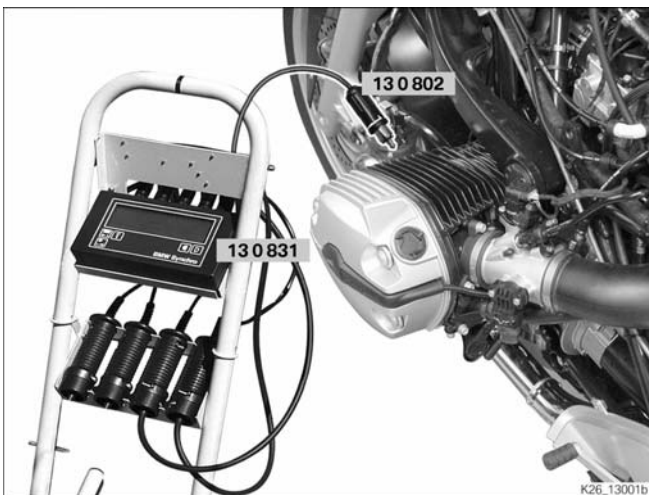
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

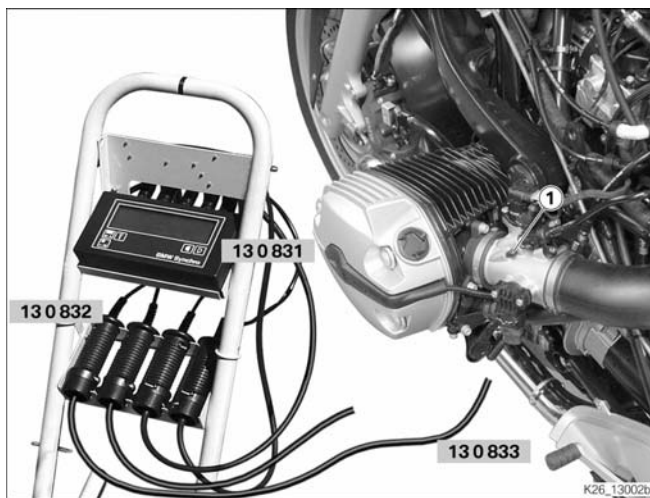


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- » The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



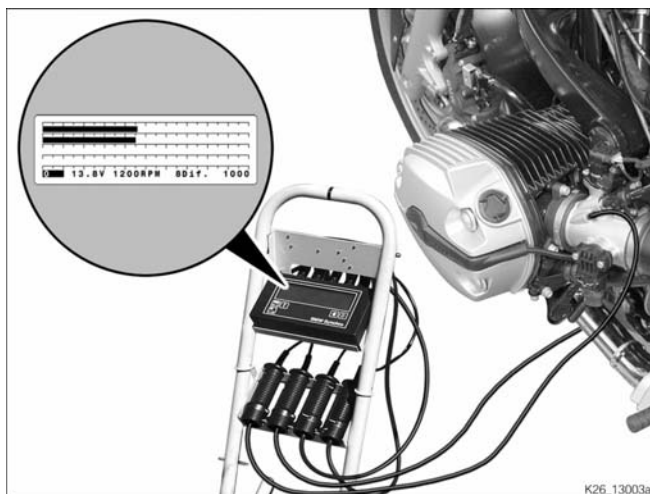
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

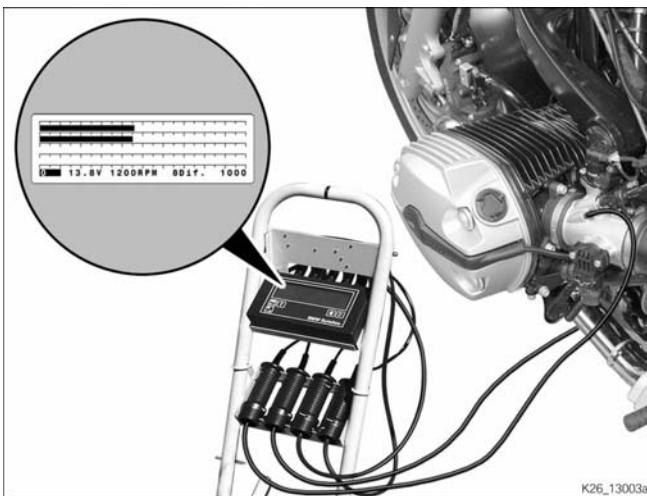
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

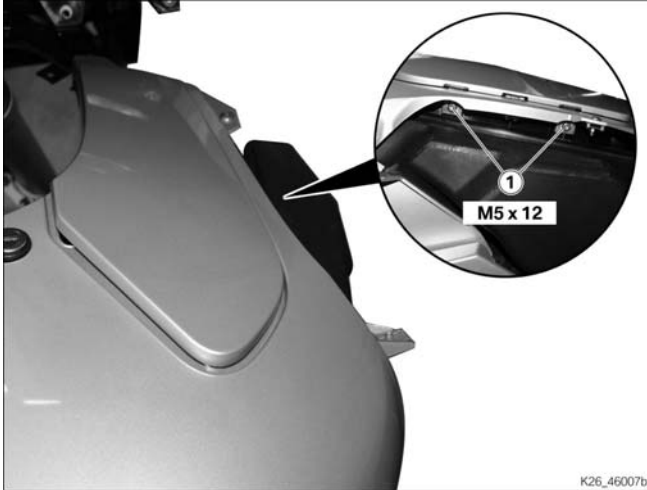
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).





(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



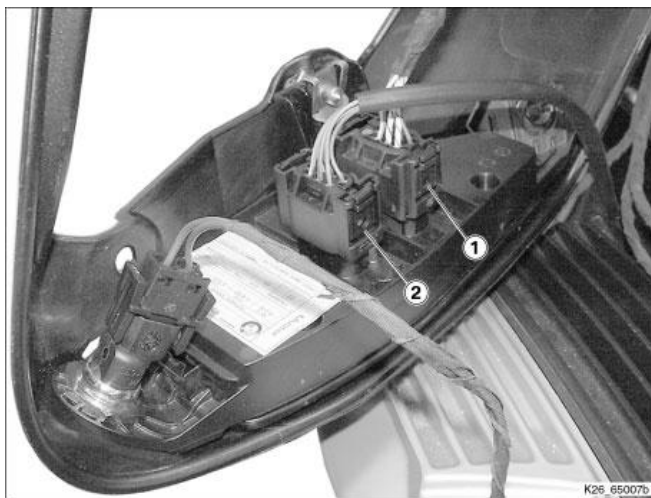
(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



11 11 131 Sealing all cylinders



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

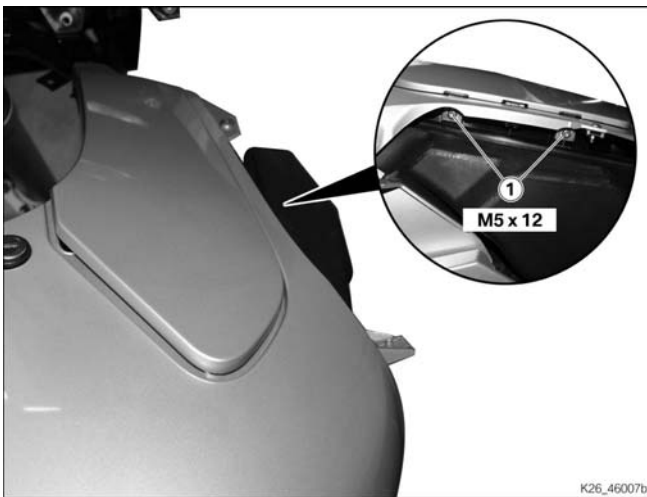
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



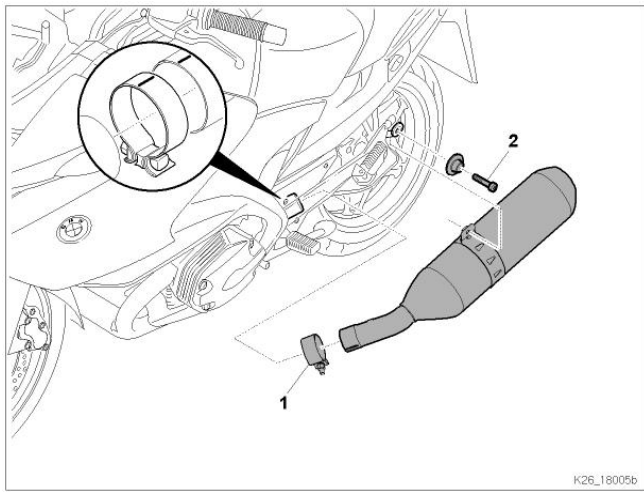
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



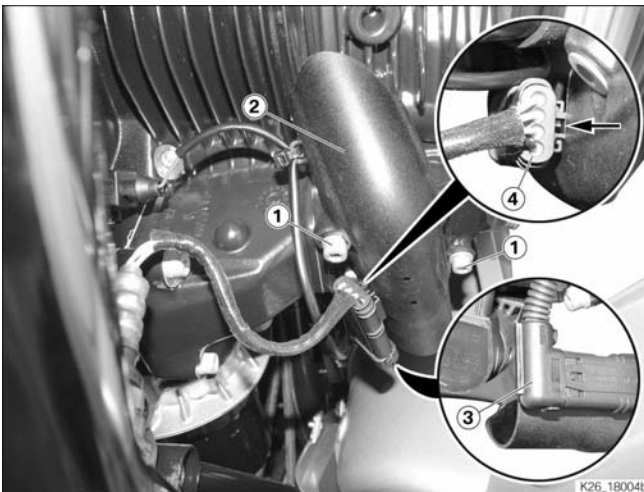
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

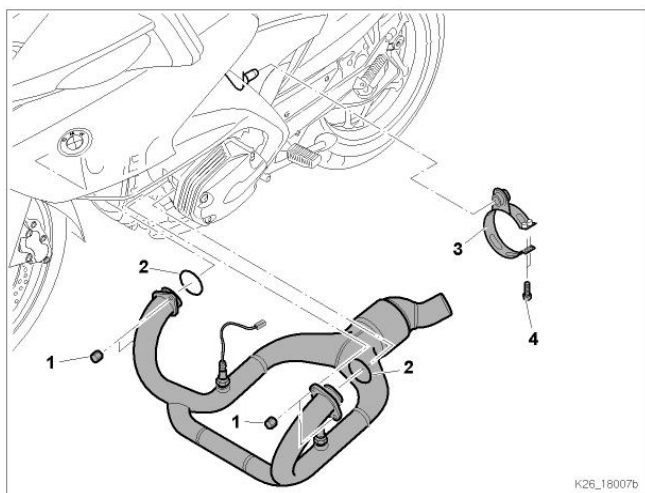
- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.



(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



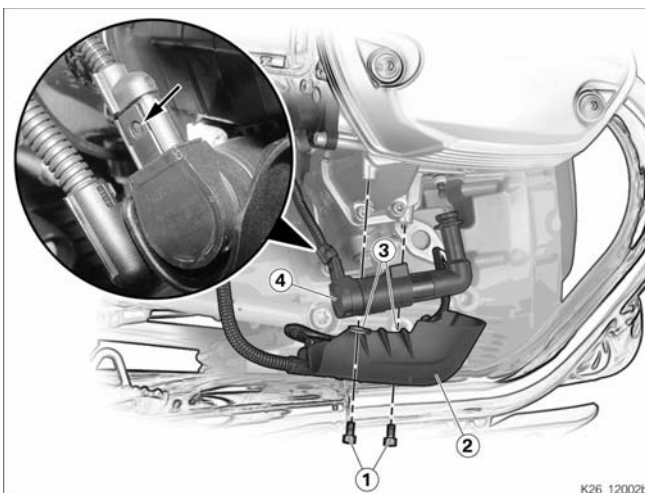
- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

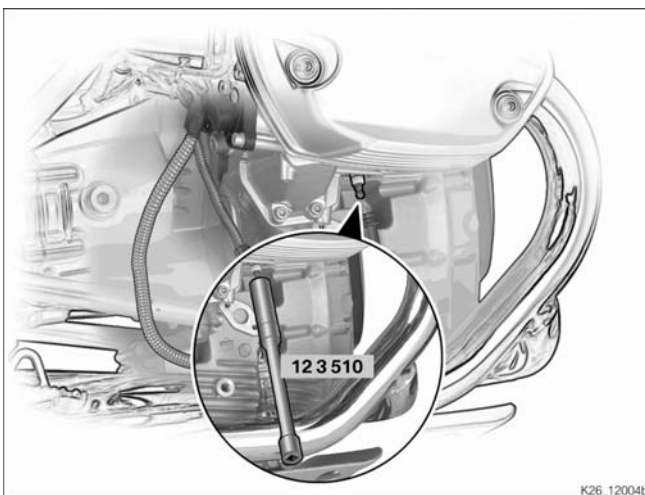
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



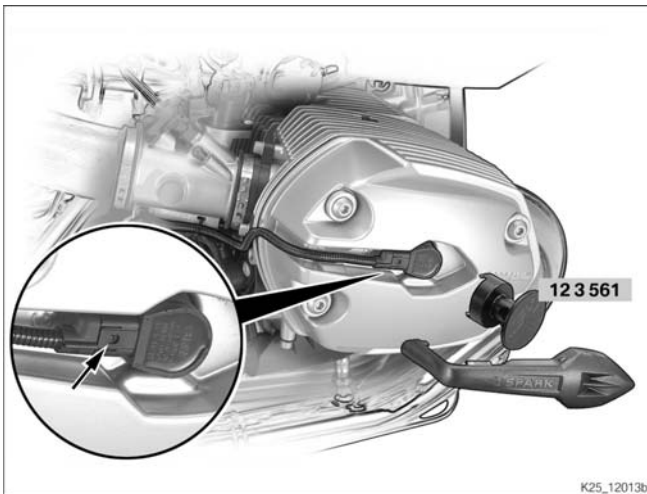
- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



(-) Removing direct ignition coil



Precondition

- Ignition is switched OFF



- Remove the primary spark plug cover.



Attention

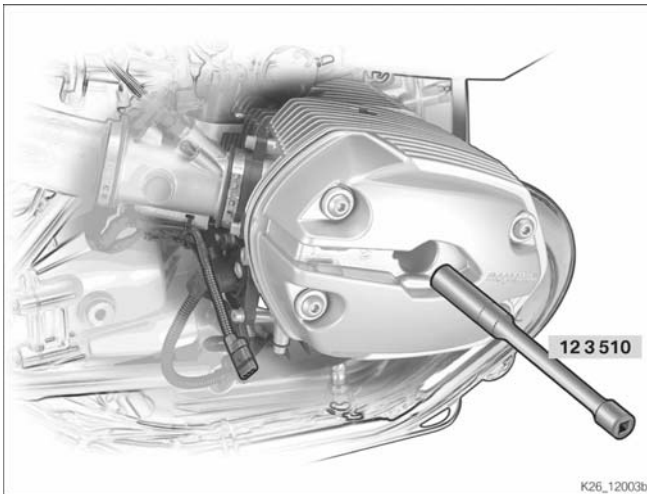
Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

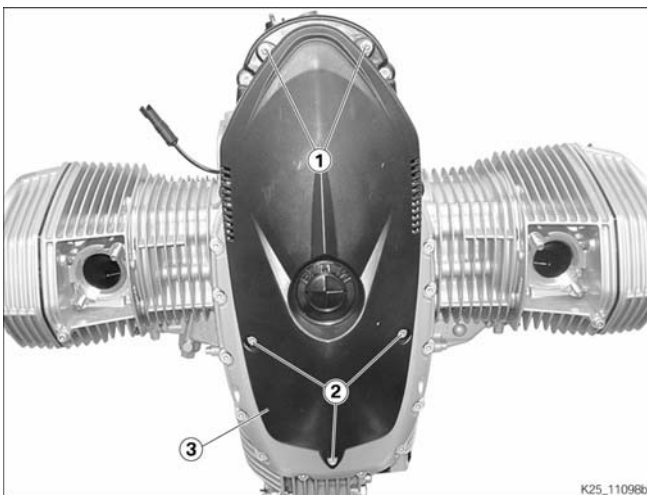
(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the primary spark plug.



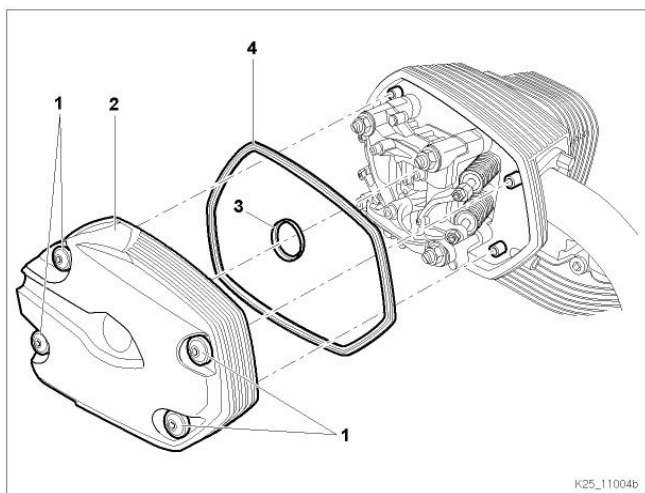
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

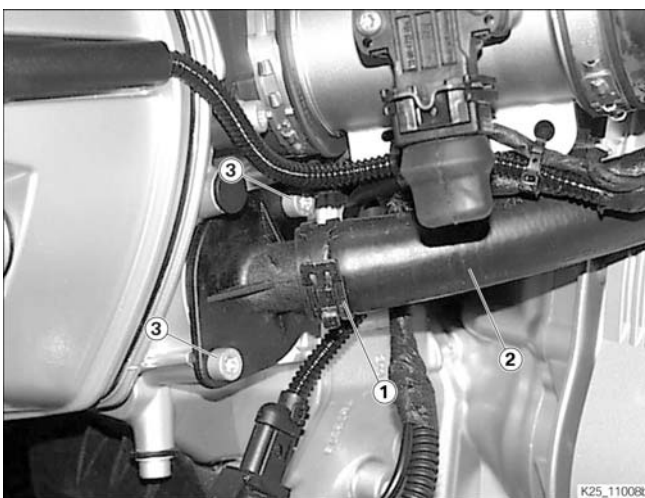


Technical data

Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

(-) Removing left camshaft cover

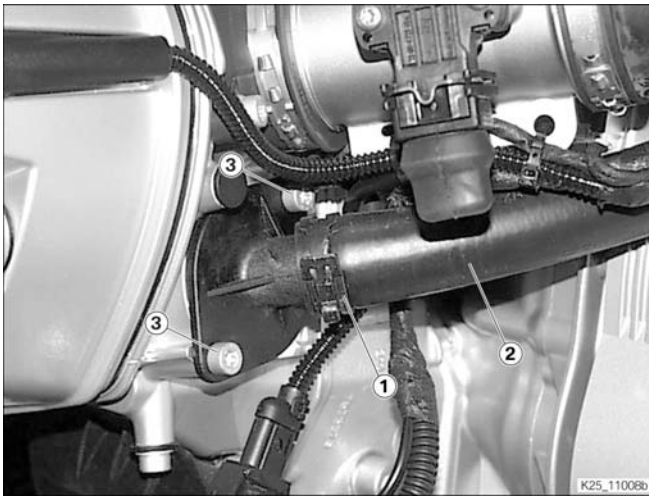


▶ **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.

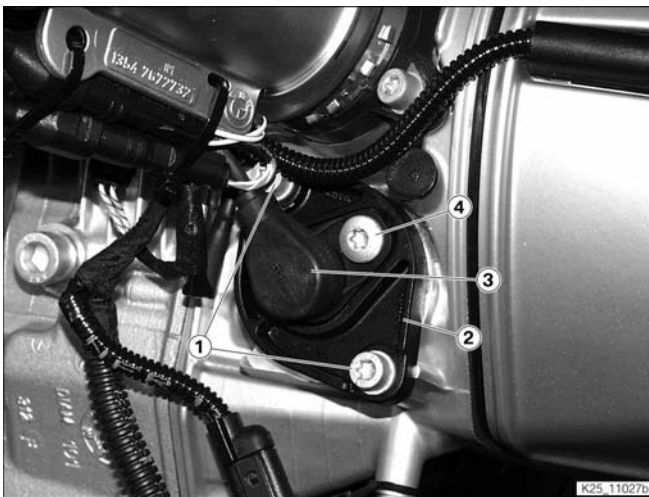


- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).

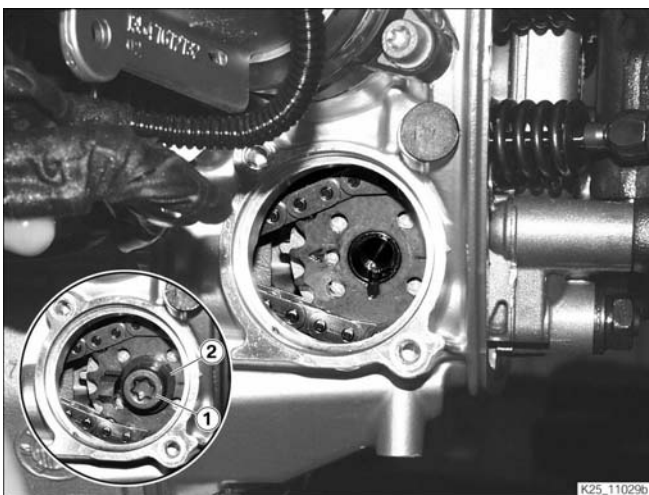


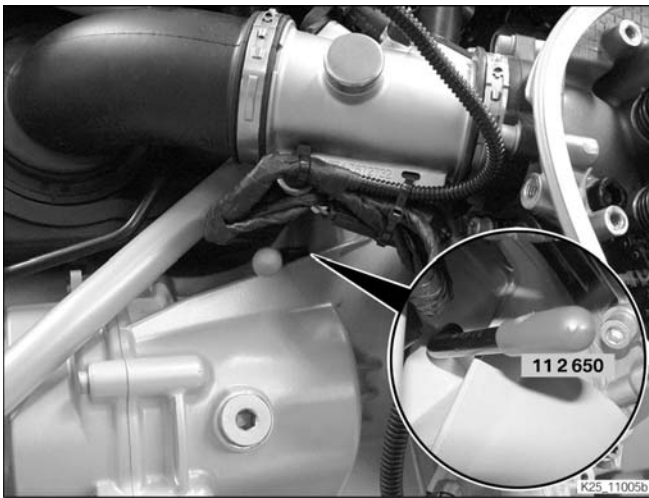
Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.





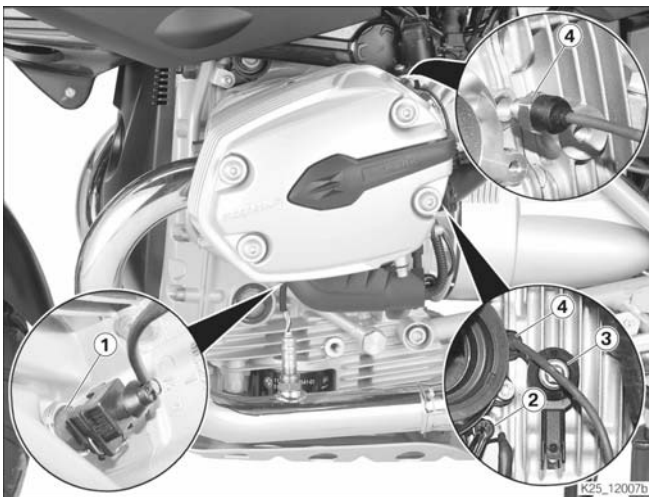
(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).



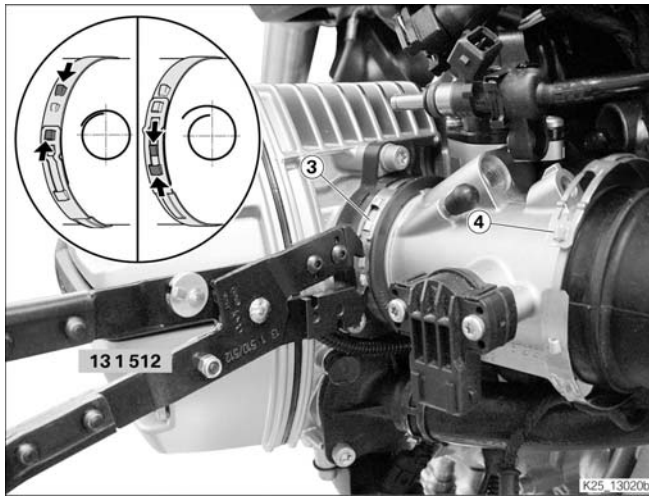
(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).



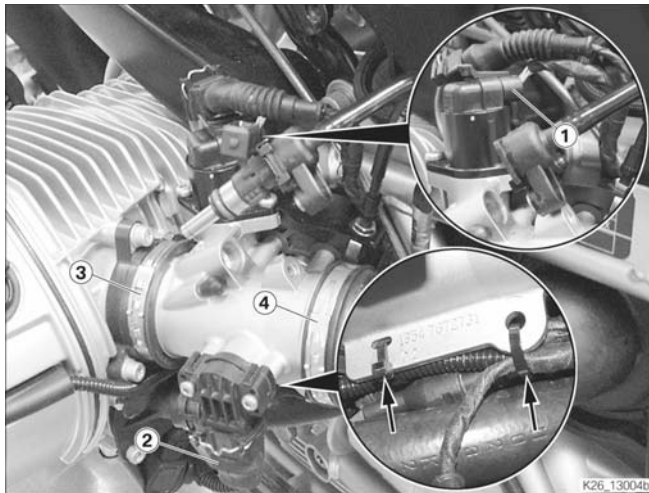
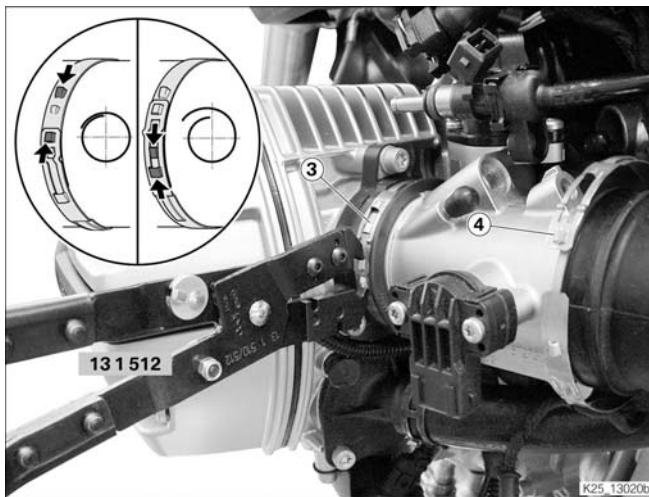
(-) Disconnecting intake air pipes from throttle-valve stubs

- Open clips (4) on left and right with pliers (No. 13 1 512).



(-) Disconnecting both throttle-valve stubs

- Open hose clips (3) at right and left throttle valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrow) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Pull off the throttle-valve stub on the right and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the throttle-valve stub on the left and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

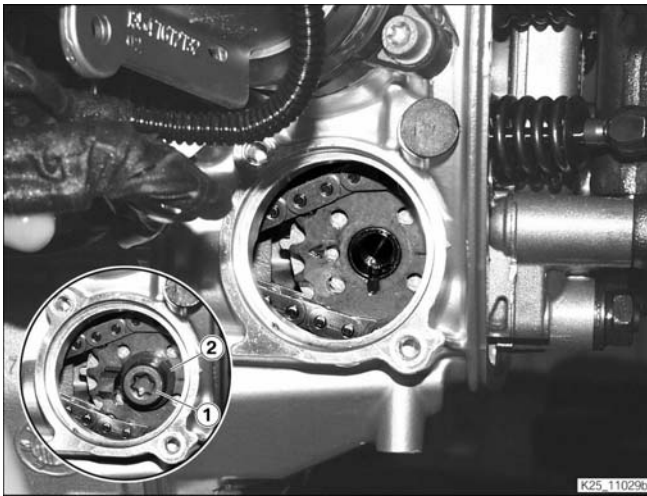
(-) Removing trigger for camshaft sensor

- Slacken screw (1).



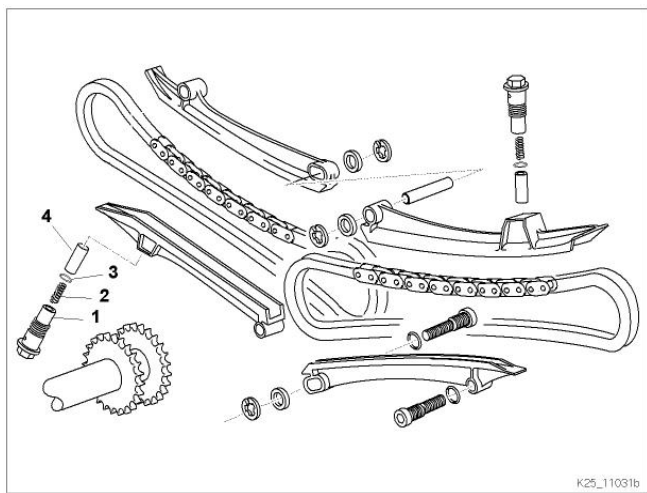
Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



- Remove screw (1) with trigger for camshaft sensor (2).

(-) Removing right chain tensioner



- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

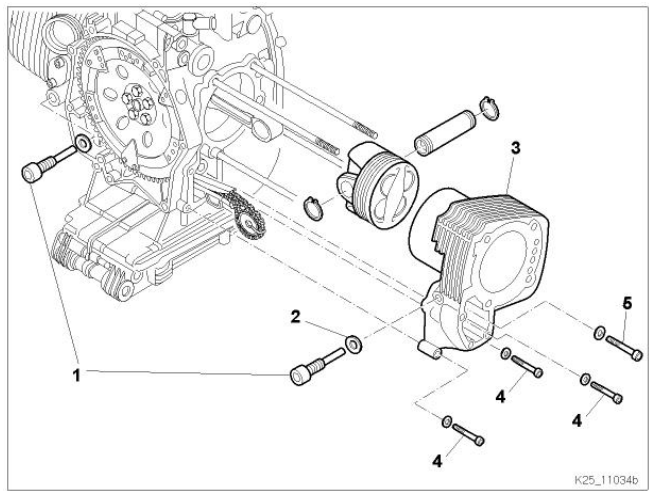
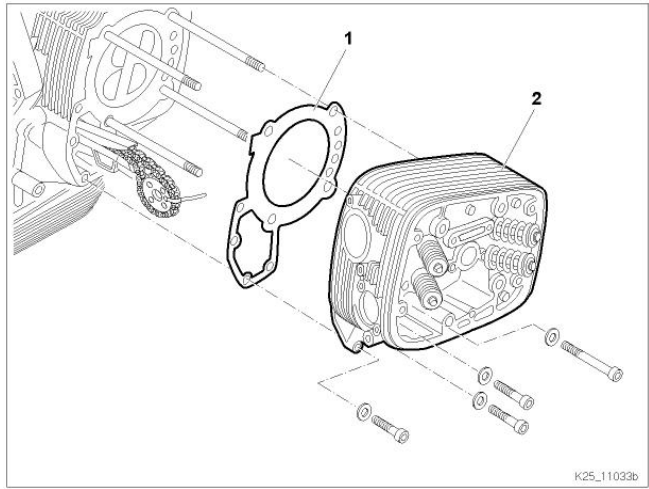
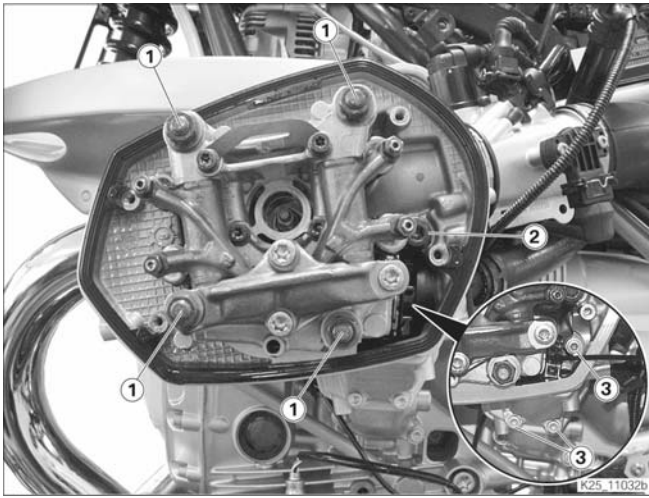
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with



washers.

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.

(-) Removing right cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

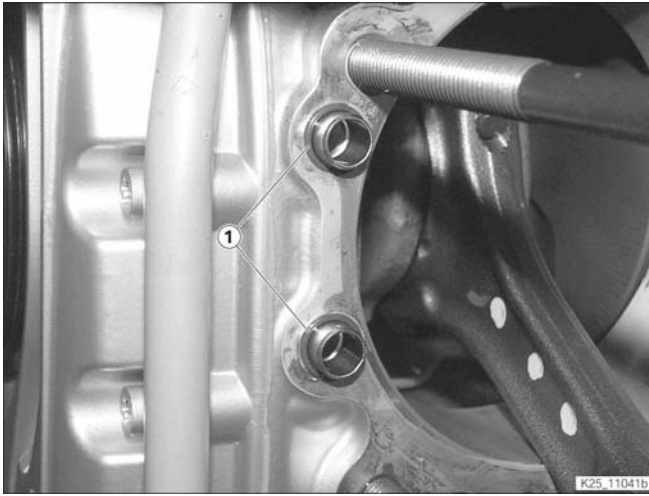
Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.



- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.

(-) Removing breather plate

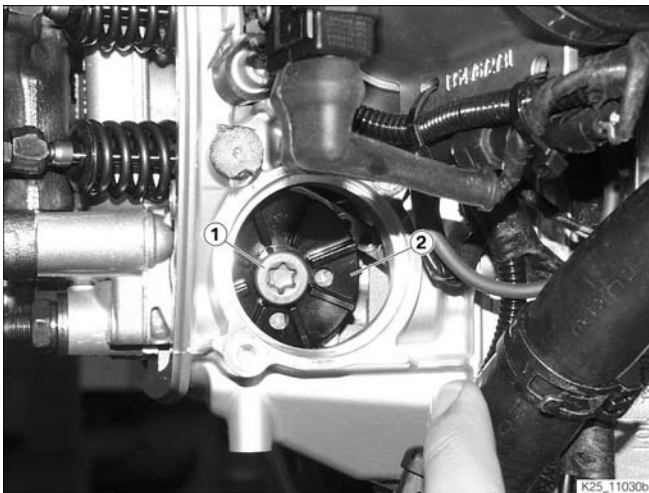
- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).



(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



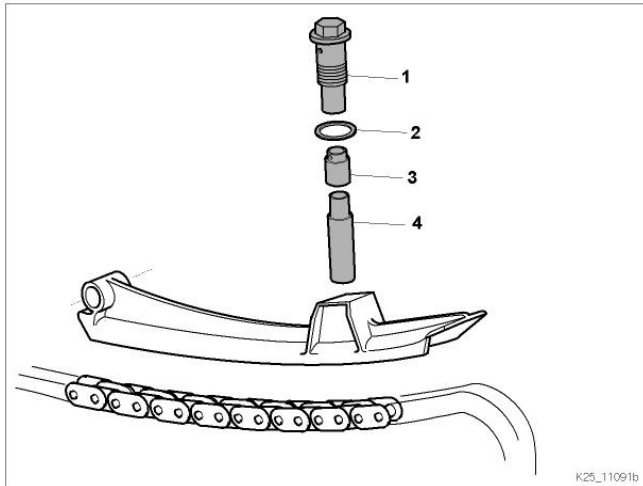
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



(-) Removing left cylinder head

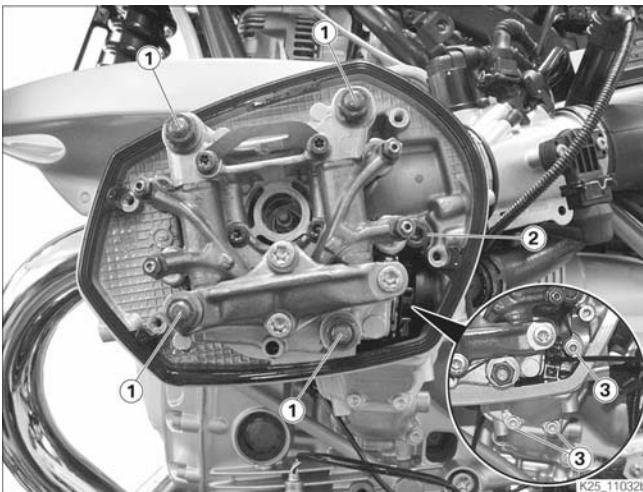
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



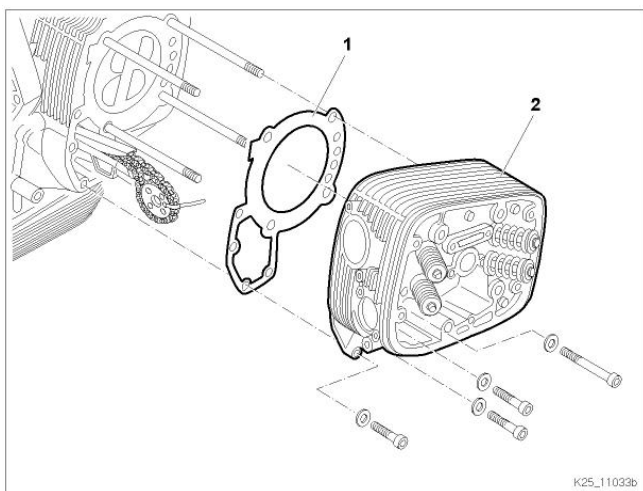
Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

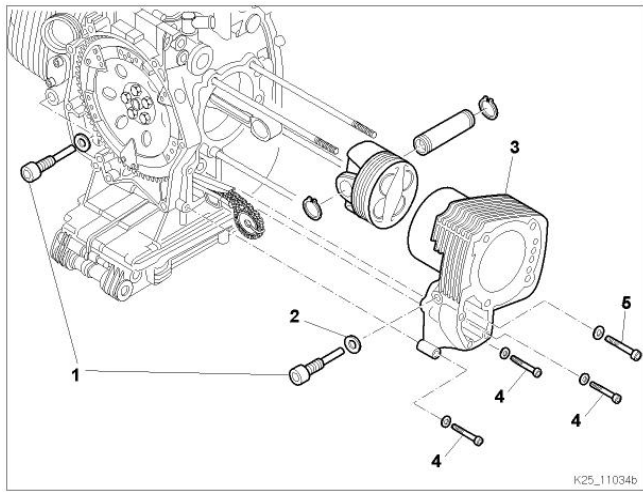
- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing left cylinder



- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

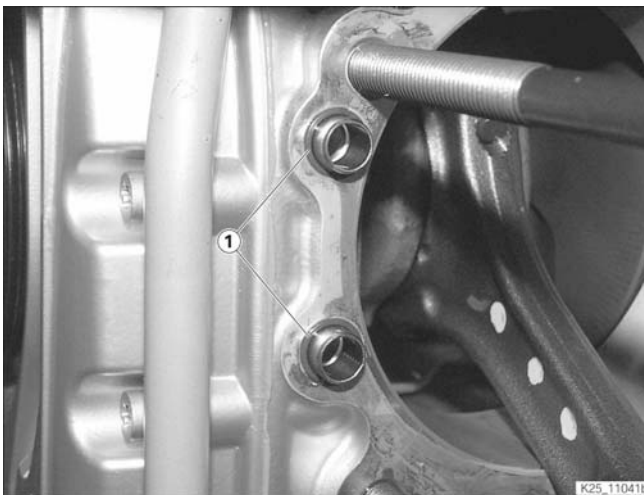
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Removing piston

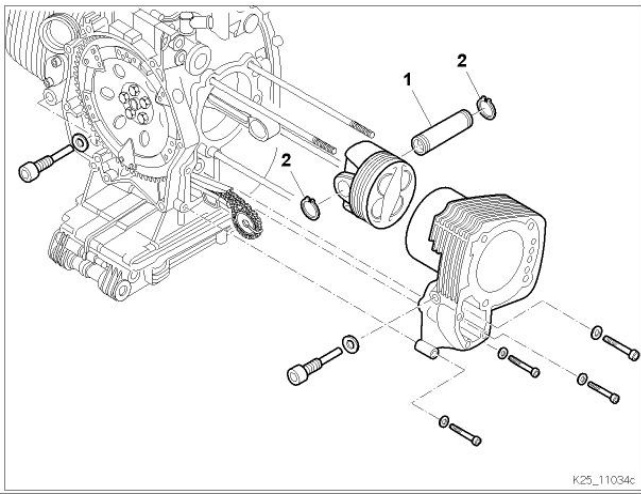
- Remove both circlips (2) from the piston pin.



Note

Remember to mark the exhaust side on the piston crown if you are going to reinstall the same pistons.

- Pull out piston pin (1) in the forward direction of travel until the piston can be separated from the conrod.
- Remove the piston.



(-) Cleaning sealing faces, cylinder base

- Remove all traces of old sealant from the cylinder base and the crankcase, paying particular attention to the grooves in the crankcase.
- Clean and degrease the sealing faces of the cylinder base and the crankcase.



Consumables/lubricants

Brake cleaner	Cleaners	83 11 9 407 848
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(-) Installing piston in cylinder



Attention

Nature: There is only one tolerance group (A/B) for replacement pistons and cylinders. There are two other tolerance groups (A and B) for components installed ex-works. Piston and cylinder must belong to the same tolerance group.

Avoidance: Always replace piston and cylinder as a paired set.



Attention

Nature: In order to ensure low-vibration, smooth engine operation, all the pistons must belong to the same weight class.

Avoidance: Always use pistons of the same weight class in any one engine.

- Determine the correct weight class (1) of the piston and use a piston of the appropriate weight class.



Note

The weight class is stamped on the piston crown and is

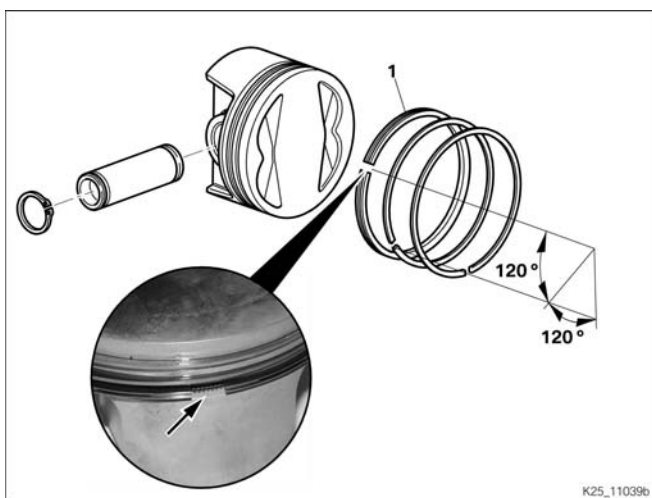
legible only if the piston is new.

If the symptoms are such that only one replacement cylinder with piston has to be installed, the weight of the other piston has to be ascertained by weighing.



Technical data

Difference in weight within a weight class (weight classes + and -)		max. 10 g	
Value definition:			
Complete with piston pin and piston rings			



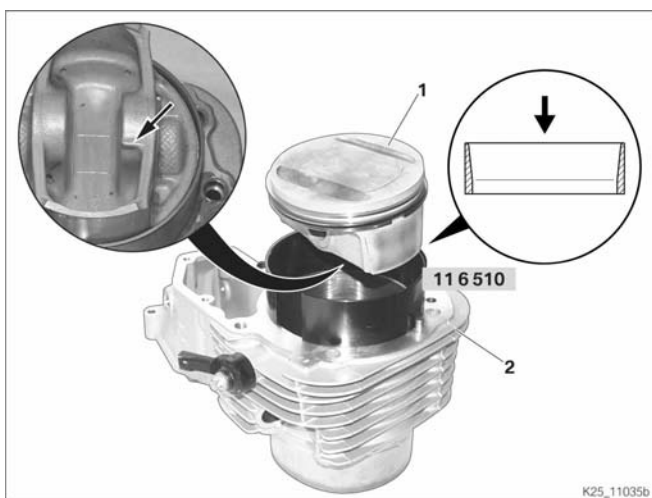
► **Positioning piston rings**

- Position oil wiper ring (1) with the end faces (arrow) up in the installed position.
- Position the other rings with the end gaps offset by the specified angle.



Technical data

Installed direction of piston rings		"Top" marking uppermost	
Offset of piston-ring gaps		120 °	



- Coat the friction face of the cylinder and the friction face of the piston skirt with oil.



Consumables/lubricants

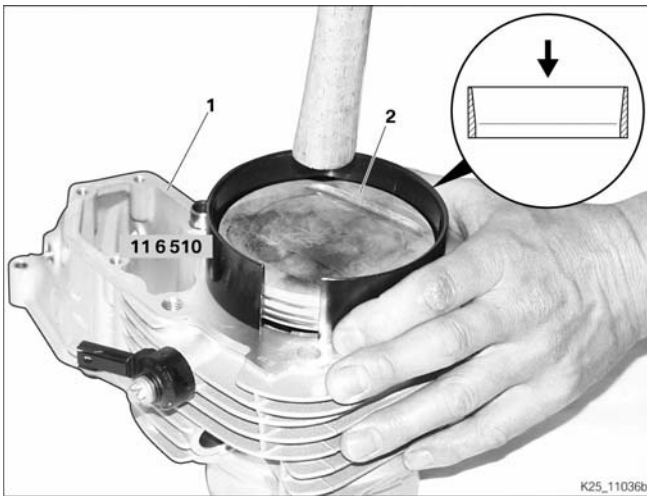
Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Place the cylinder, base down, on a smooth, level and firm working surface.
- Set sliding sleeve for piston rings (No. 11 6 510) with the tapered end up on the cylinder.
- Insert the piston with the cast nose (arrow) pointing toward the exhaust side into sliding sleeve (No. 11 6 510) and carefully press it through the taper and into the cylinder.

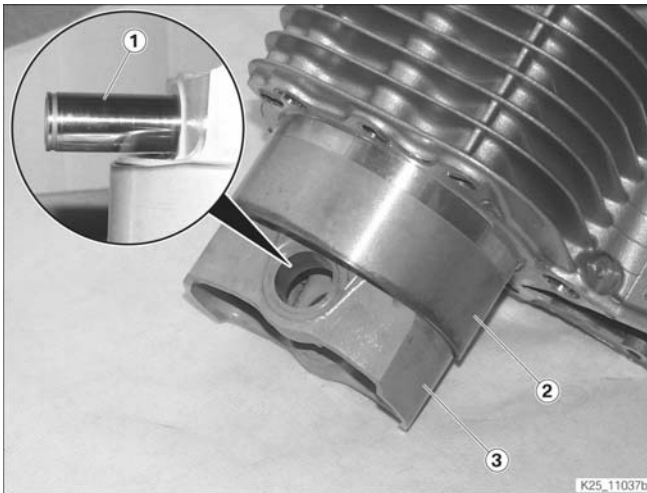


Technical data

Installation direction of piston		Arrow on piston crown and/or cast lug pointing to exhaust side	
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- » The piston rings are preloaded.
- » The piston skirt is held in position by the cylinder.
 - Press sliding sleeve (No. 11 6 510) against the cylinder and carefully tap the piston into the cylinder.
- » The piston is full inserted into the cylinder.
 - Remove sliding sleeve for piston rings (No. 11 6 510) .



- Push piston (3) through cylinder (2) just far enough to allow piston pin (1) to be inserted. Make sure that the piston rings do not project past the end of the cylinder liner.

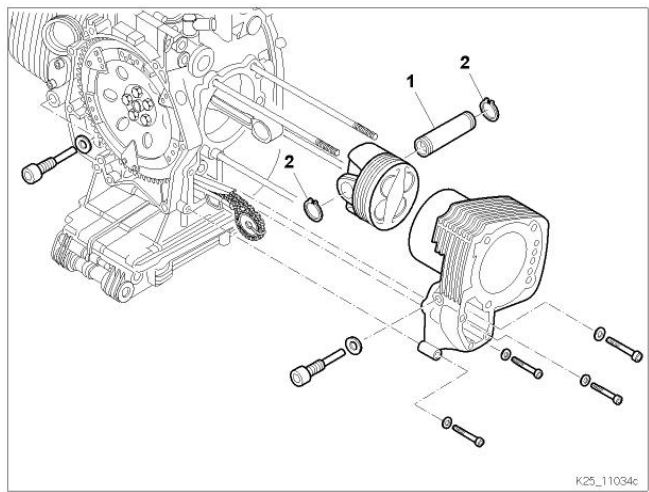
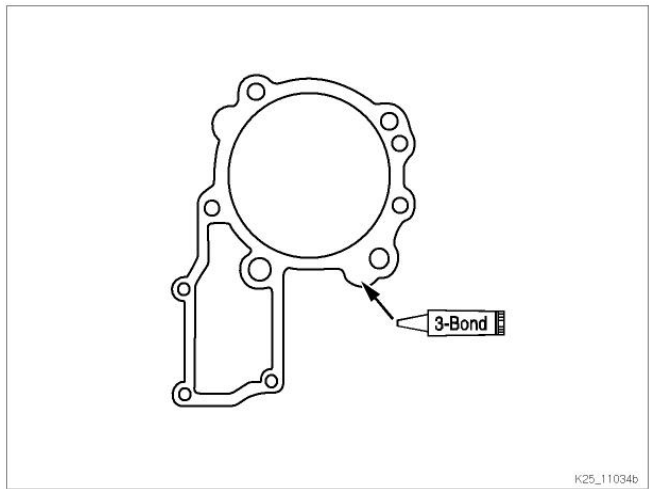
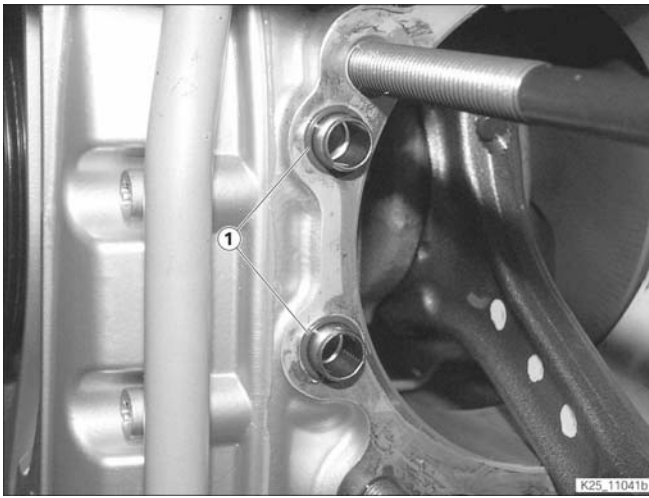
(-) Installing right cylinder

Precondition


- Crankshaft is locked at TDC.




- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.

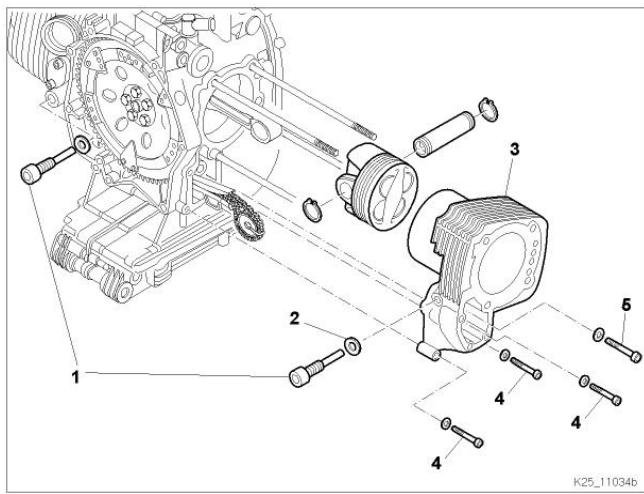
 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



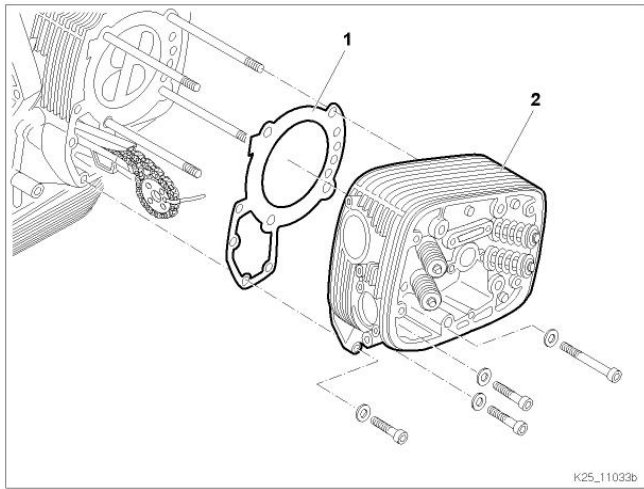
Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain side rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



⚠ Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

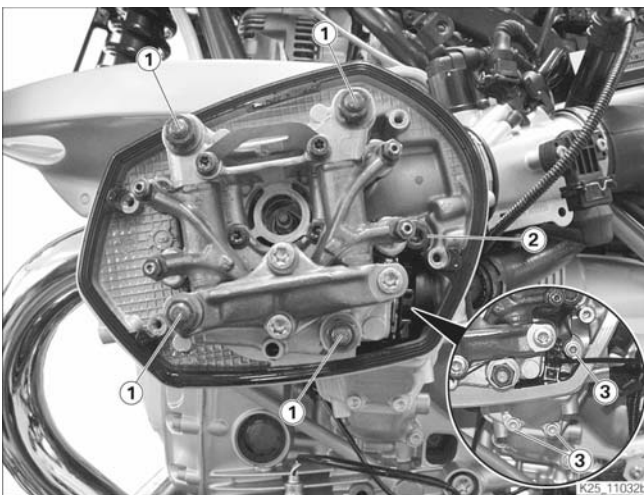
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.


⚠ Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

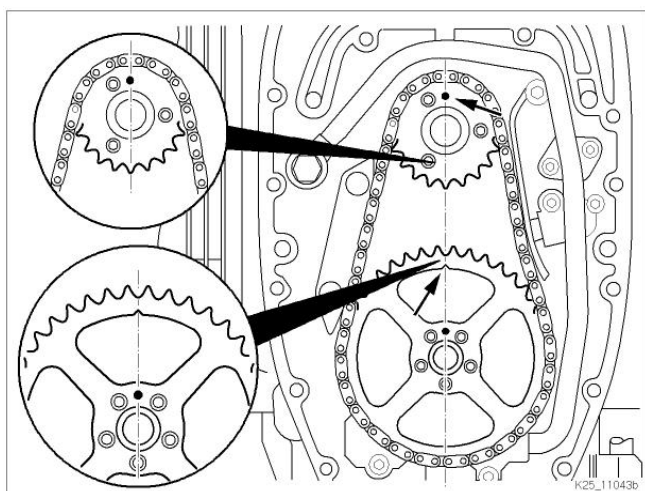
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



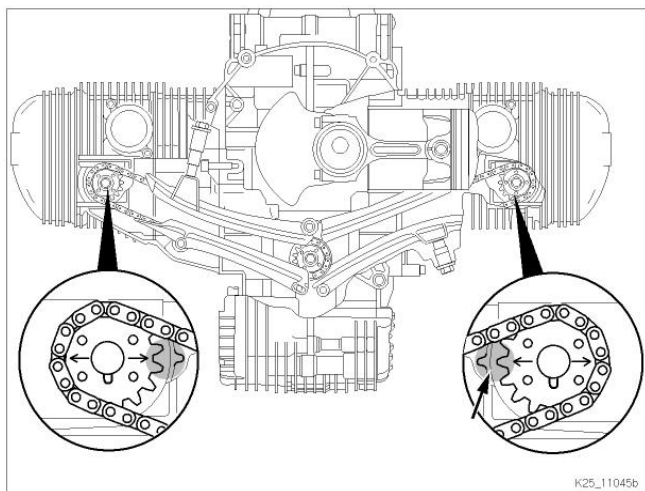
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, right (cylinder No. 1)



- Make sure that the crankshaft and countershaft are in the **"firing TDC, right cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

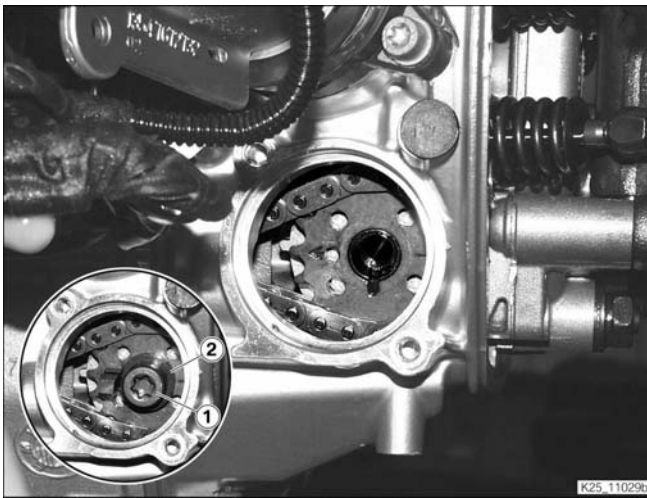
- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.





- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



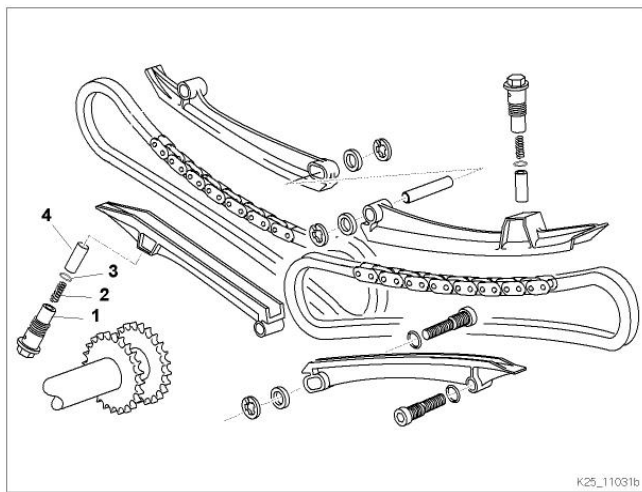
▶ Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.




- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.



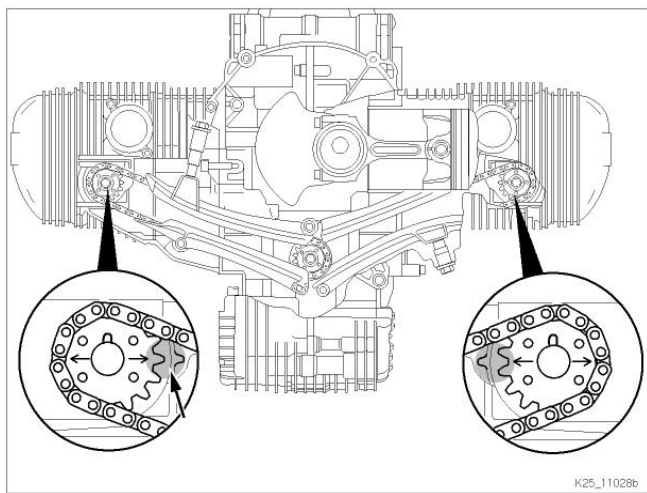
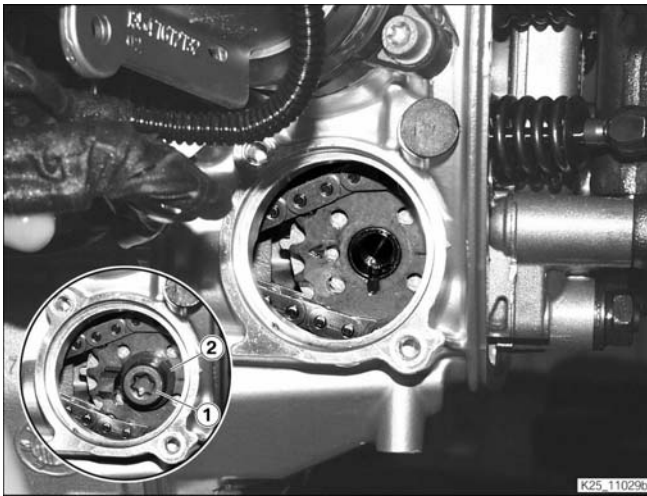
 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.

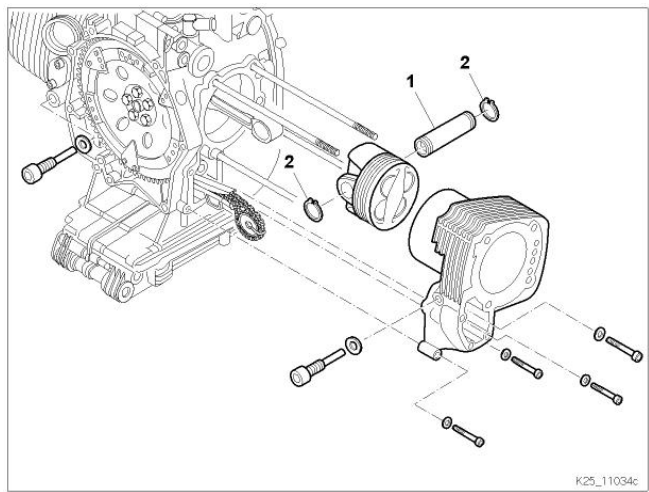
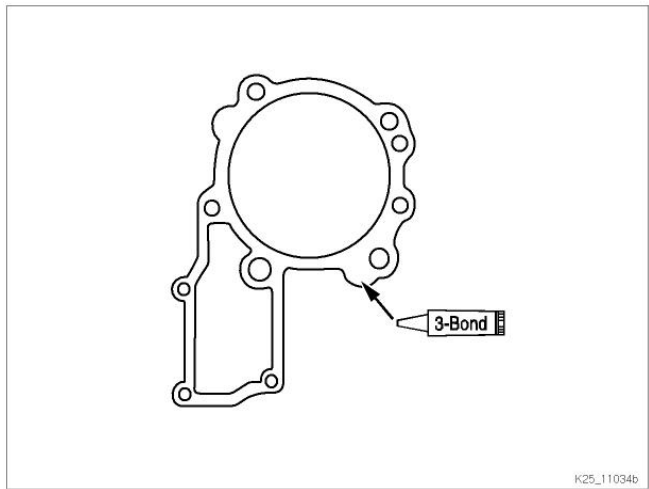
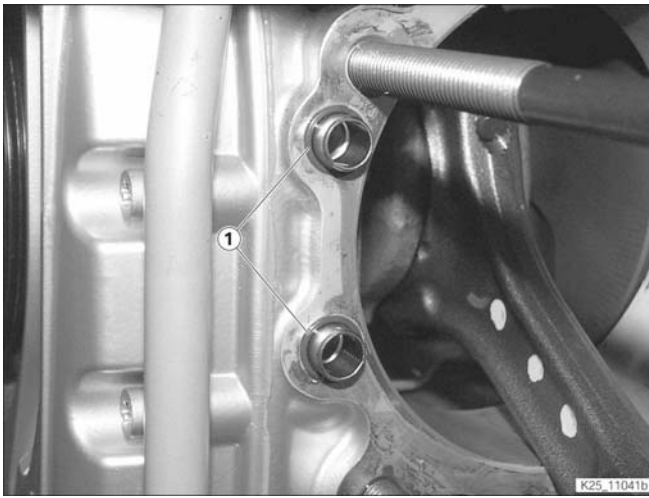
(-) Installing left cylinder

Precondition


- Crankshaft is locked at TDC.




- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.

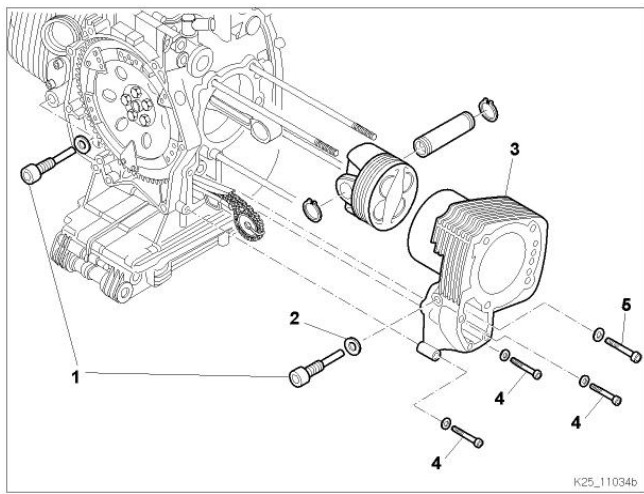
 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685


- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).




Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



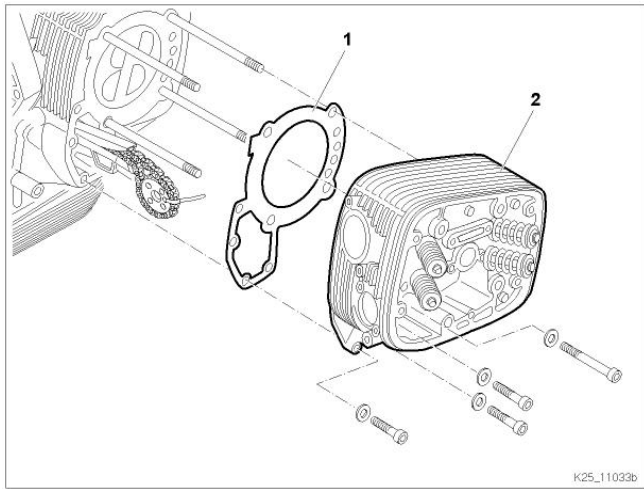
 Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain side rail (1) with new seal (2).

 Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing left cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

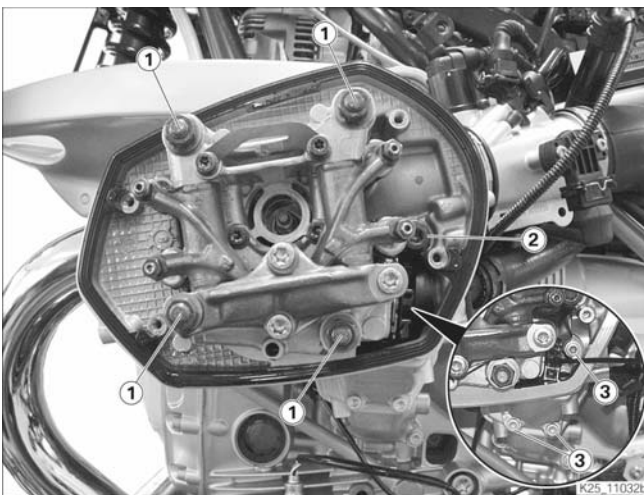
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.


Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

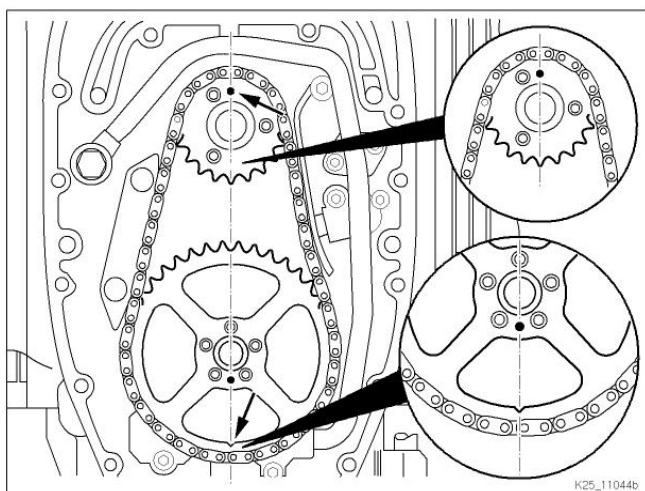
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



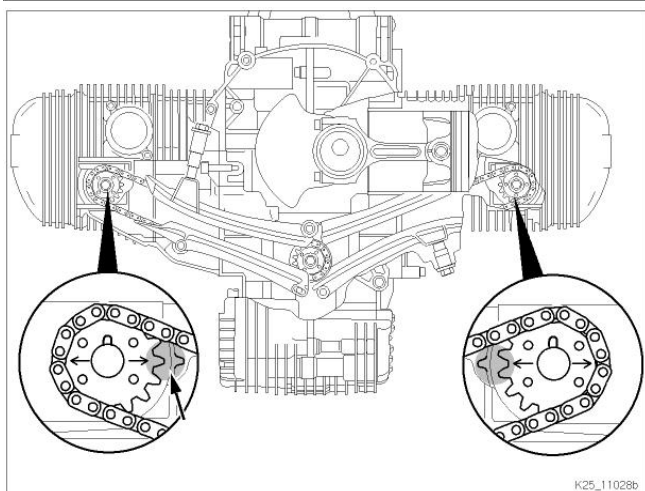
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, left (cylinder No. 2)



- Make sure that the crankshaft and countershaft are in the **"firing TDC, left cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the sprocket for the timing chain of the countershaft is **down** and at the top the split line between the two halves of the crankcase is between two teeth.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **up**.
- » The valves in the left-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

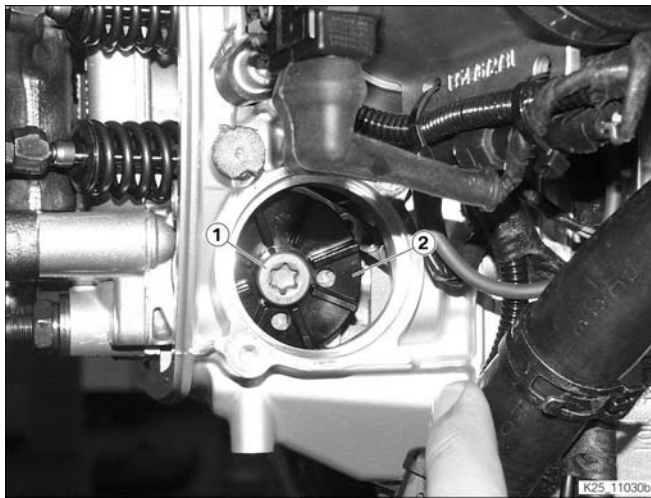
- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.





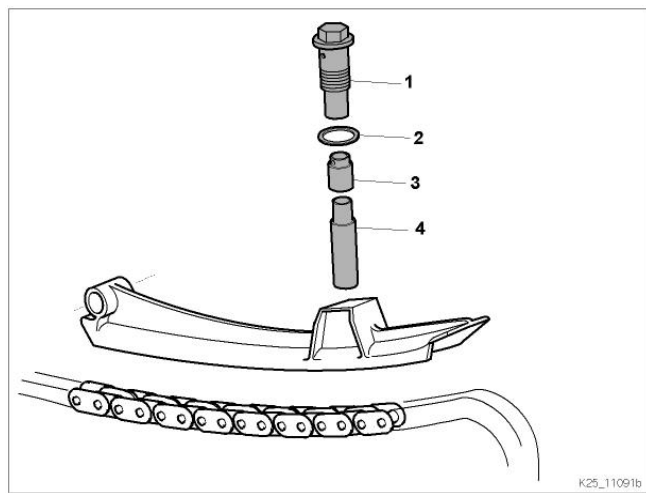
- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.




Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

(-) Installing left timing chain tensioner



- Install piston (4) in the cylinder.
 - Install piston (3) with chamfered side with the oil bore up in the chain tensioner.
 - Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.
- » The chain tensioner must slide onto the piston without tilting.
- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	


(-) Securing left camshaft sprocket

Precondition

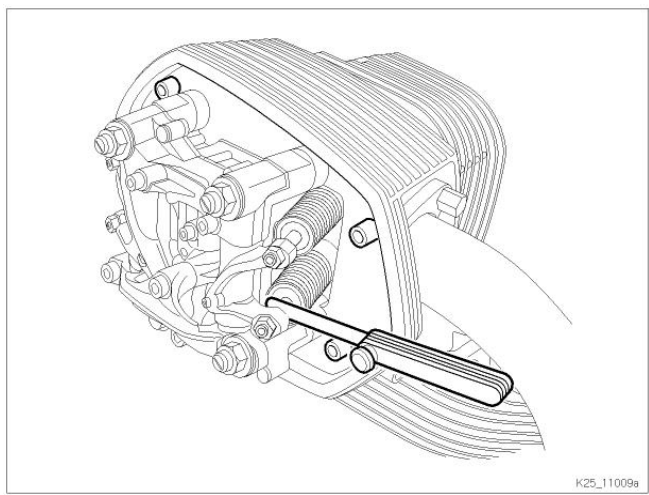
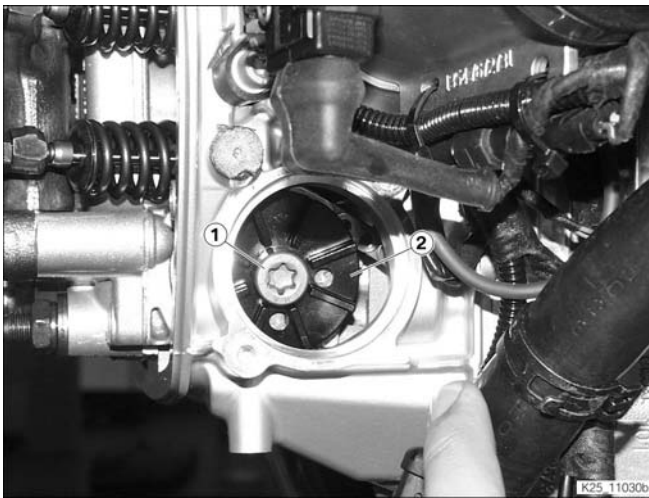
- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance


Test

- Measure valve clearance with feeler gauge.



Note


You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.

 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

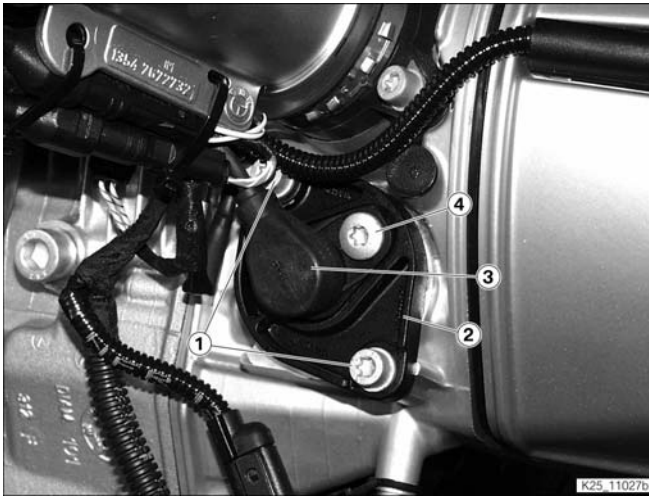
 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



Attention



Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

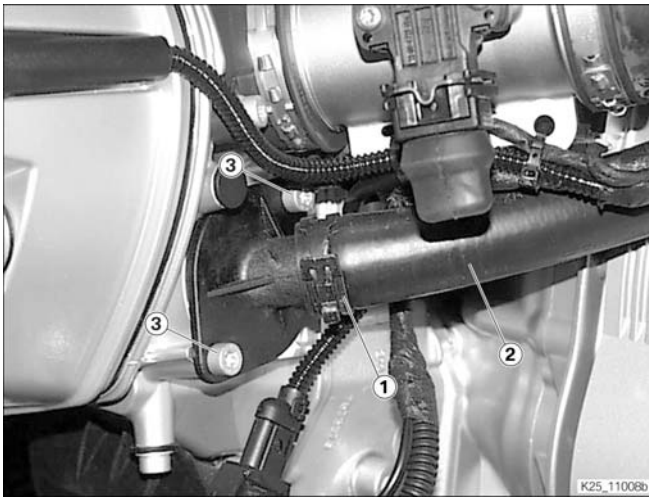
(-) Installing left camshaft cover



Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

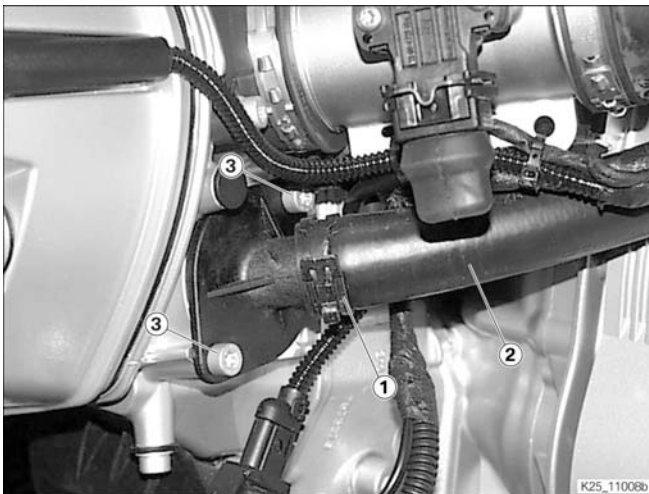
Avoidance: Deburr sharp edges of the housing.



- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

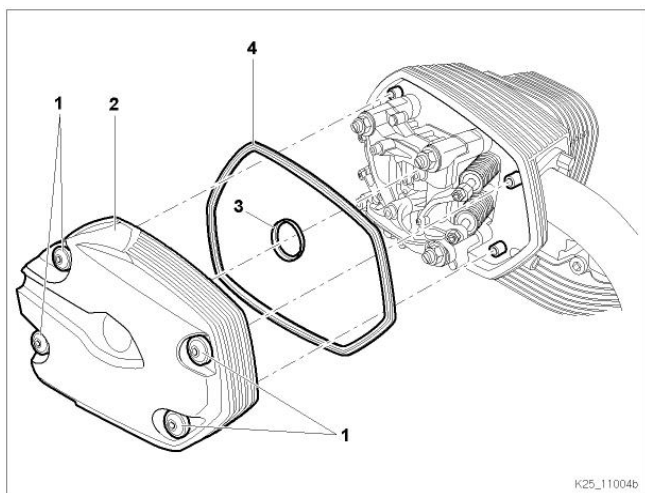
► Connecting hose for crankcase breather

- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.




(-) Installing cylinder head cover

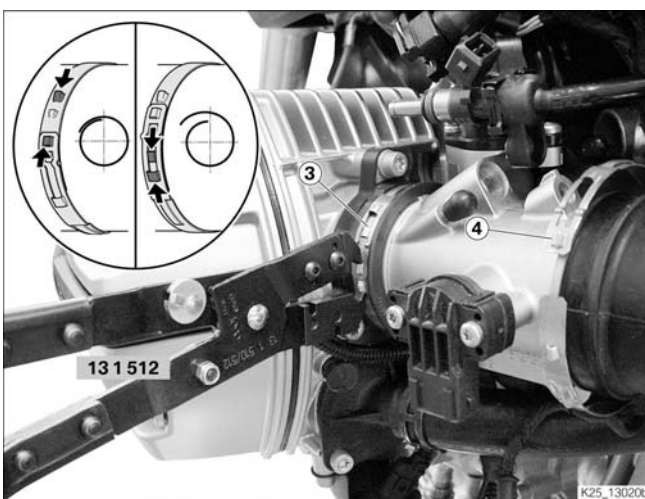
- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.



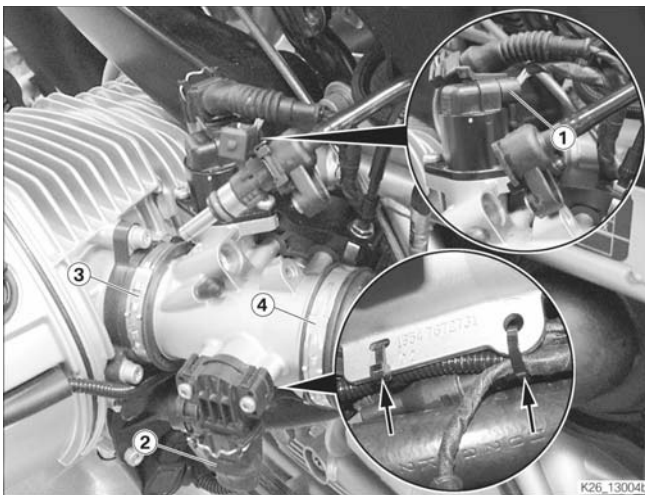
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing both throttle-valve stubs



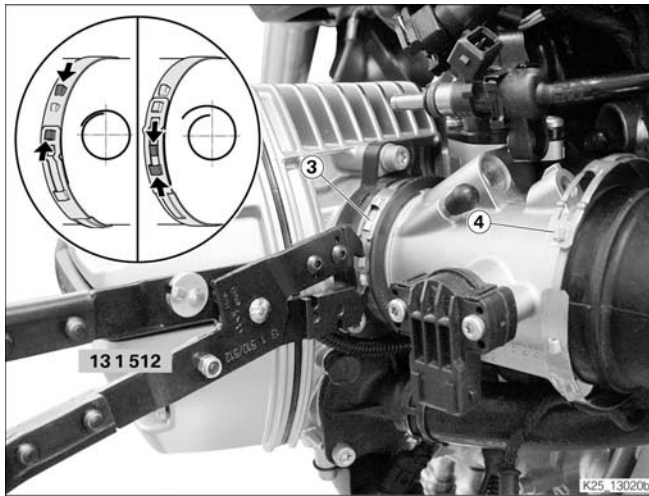
- Remove the covers from the intakes.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamps (3) and close them with pliers (No. 13 1 512) .



- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.


(-) Installing air intake pipe

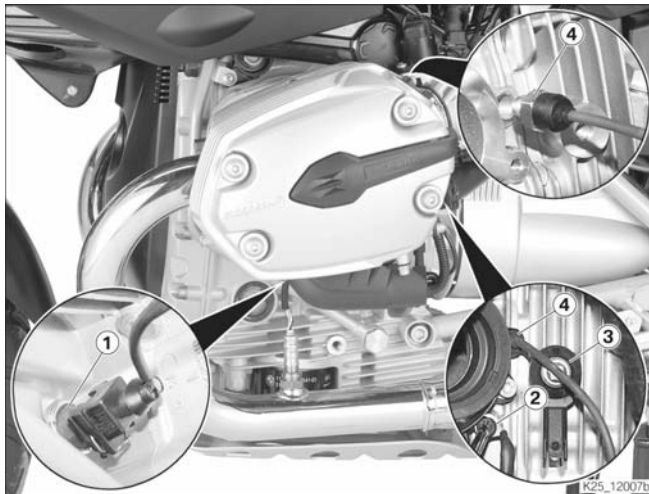
- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512) .



(-) Connecting plugs of engine sensors and switches, left

- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.


 Tightening torques		
left and right, M6 x 10	8 Nm	



- Connect knock sensor (3).
- Connect temperature sensor (4).

(-) Connecting plugs of engine sensors, right

- Secure earth lead (1) to the cylinder head.

 Tightening torques		
left and right, M6 x 10	8 Nm	

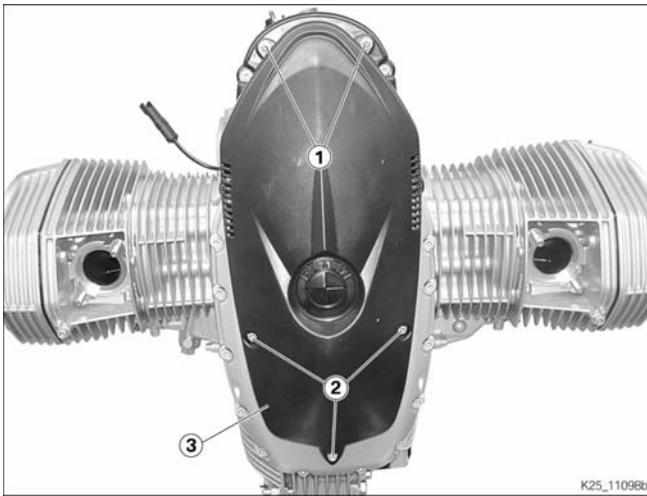



- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).

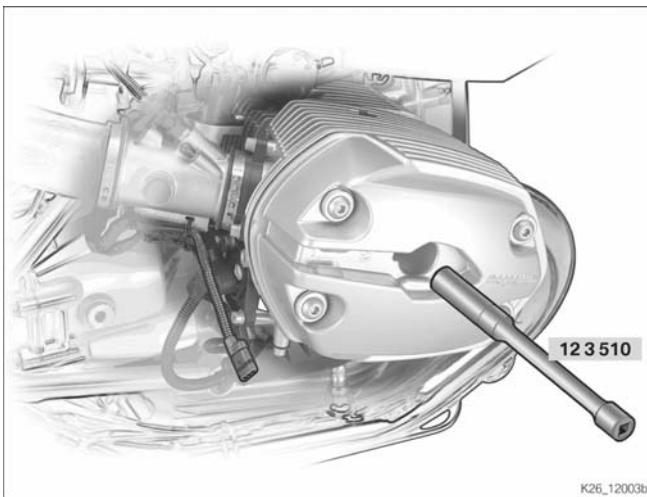
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
 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing primary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

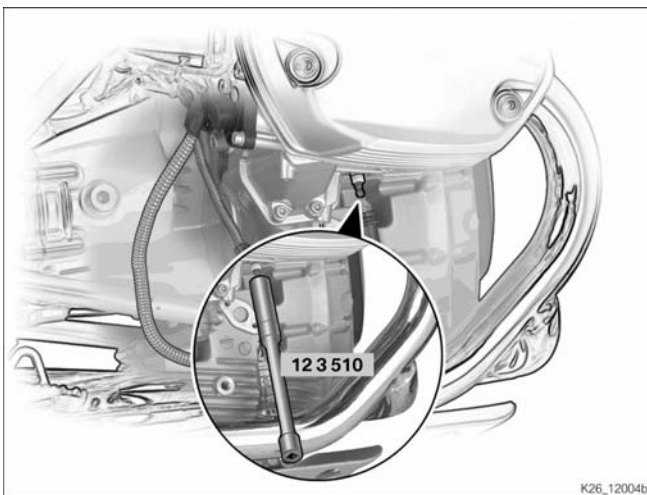



 Tightening torques		
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	


 Technical data			
Spark plug, manufacturer and designation		Bosch YR 5 LDE	

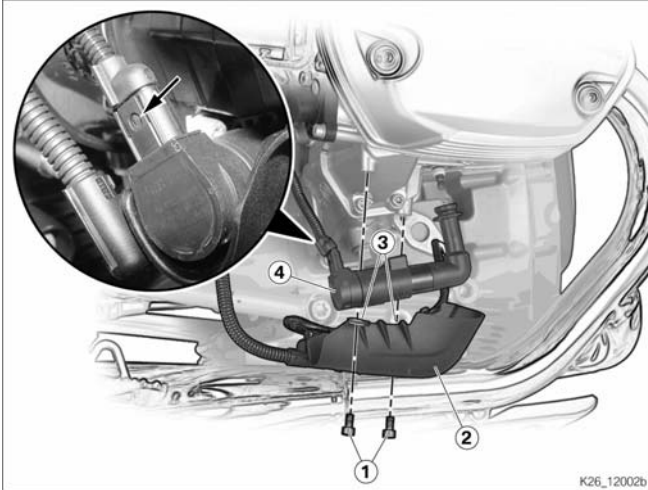
(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.




 Tightening torques		
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	

 Technical data			
Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE	




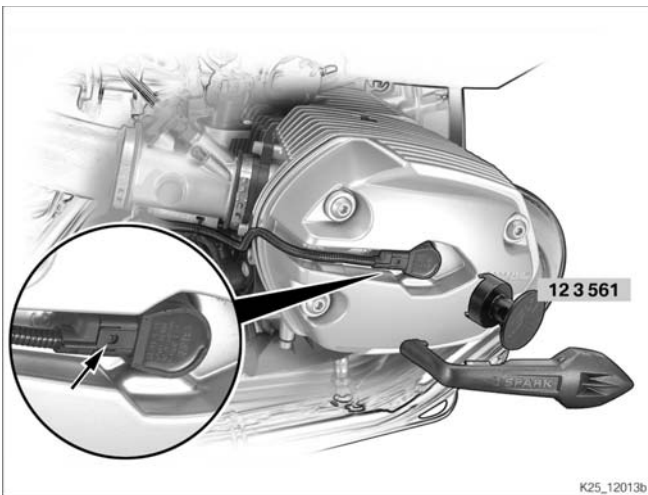
(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.

 Consumables/lubricants		
Talcum powder	Assembly aid	

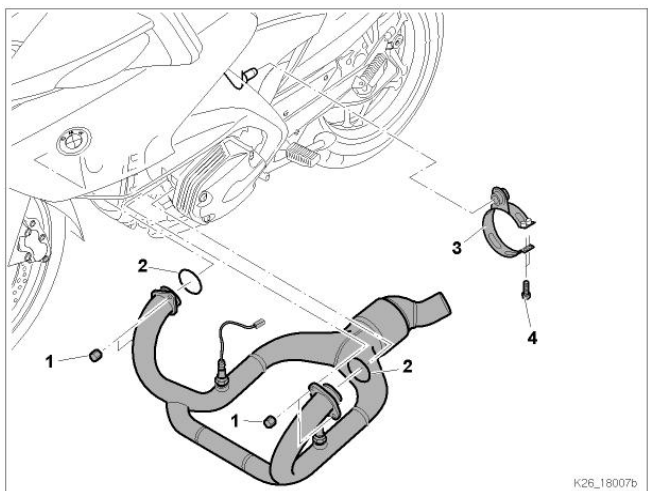
- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	




(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.



(-) Installing exhaust elbow

- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).



Tightening torques

Manifold to cylinder head, Acorn nut M8	21 Nm	
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- Align the clamp (arrow) on the manifold and tighten screws (1).



Tightening torques

Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	
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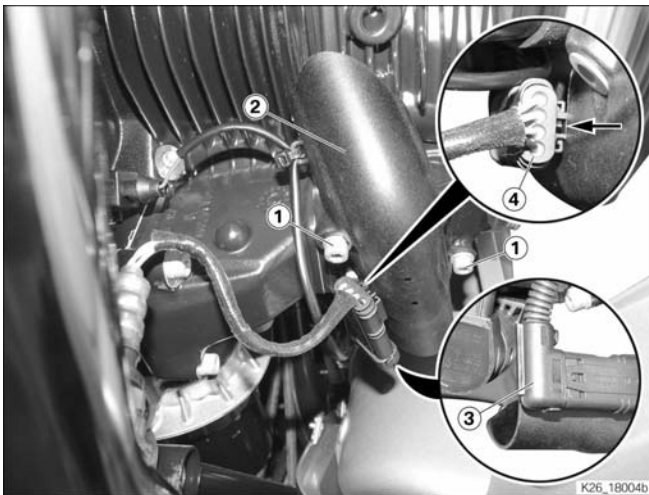
► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).



Tightening torques

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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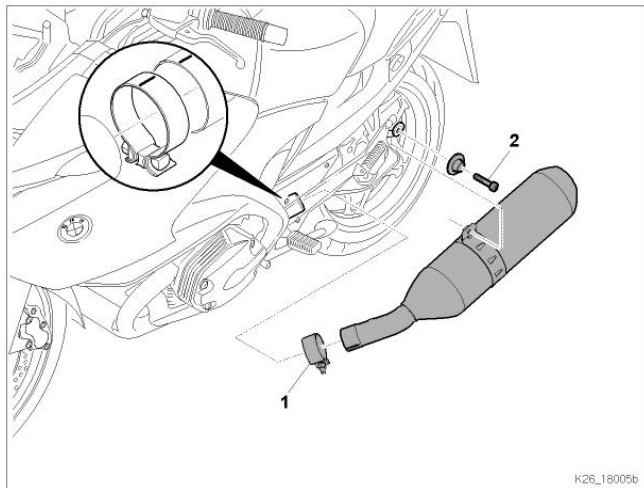



- Install front screw (1) in both bottom sections of the fairing.




◀ (-) Installing silencer

- Grease the inner face of Torca clamp (1).




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

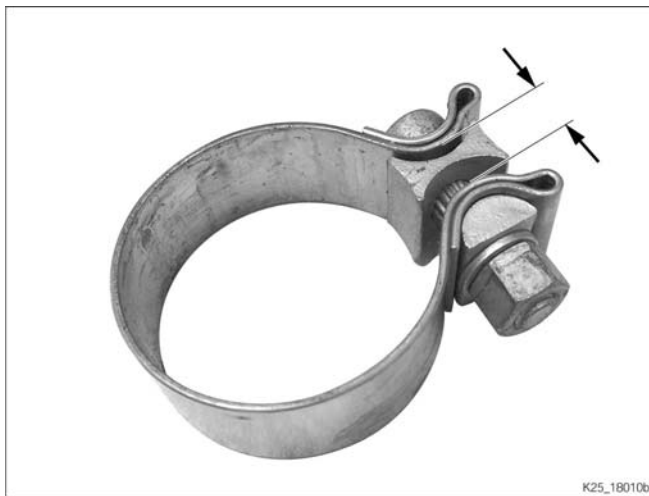
 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


▶ Checking Torca clamp on silencer



- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

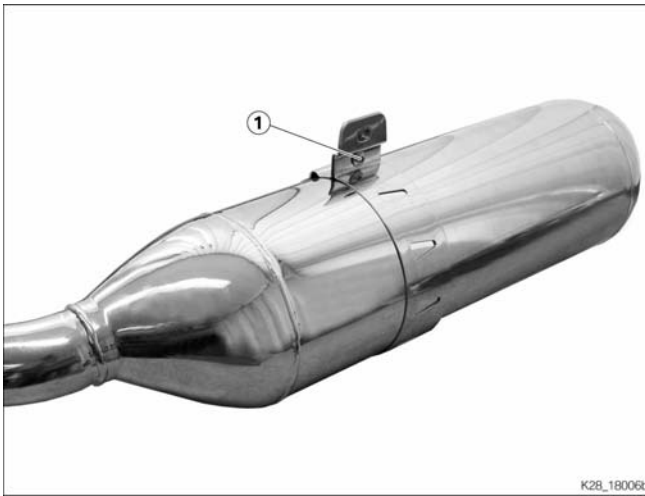


Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.



- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
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Checking Torca clamp on silencer

- Tighten the Torca clamp.

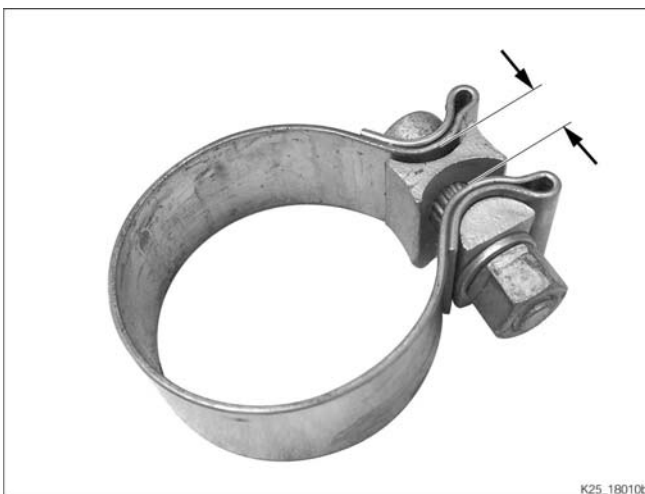
Test

- Check that a gap is visible at the clamp seat before final torque is applied.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
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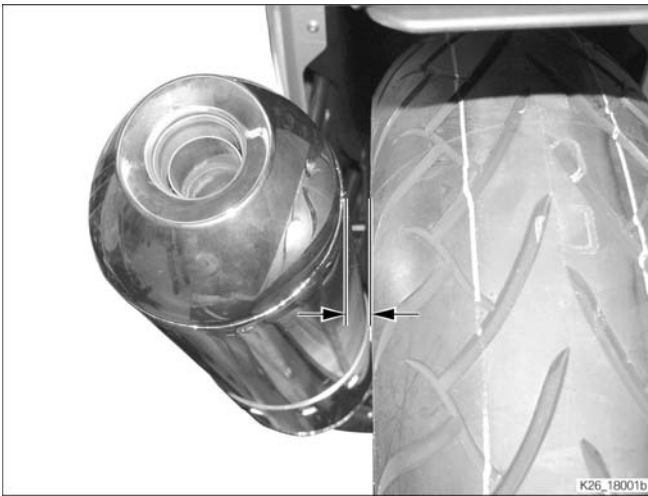
Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.



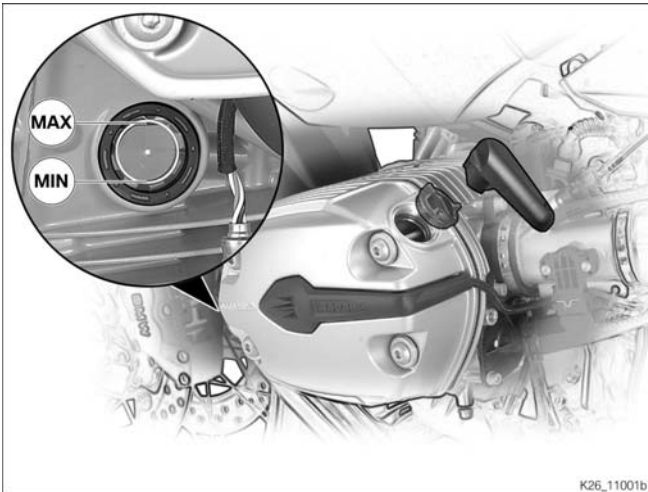
Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



Technical data

Oil level, engine		Maximum = top ring mark on sight glass	
Consumables/lubricants			
Engine oil, 20W-50			
		Minimum = bottom ring mark on sight glass	

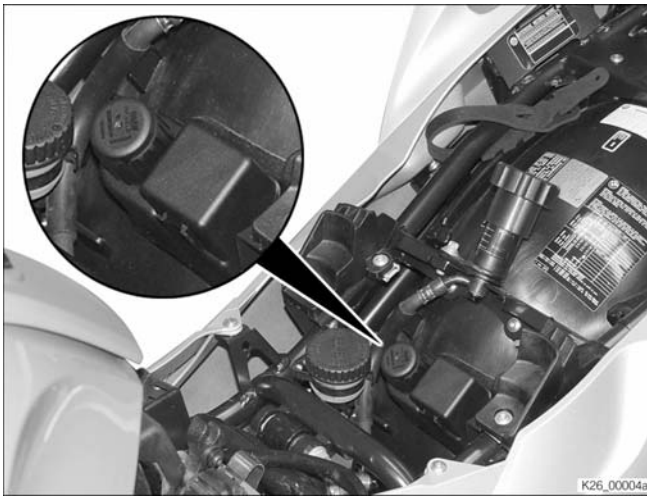
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the

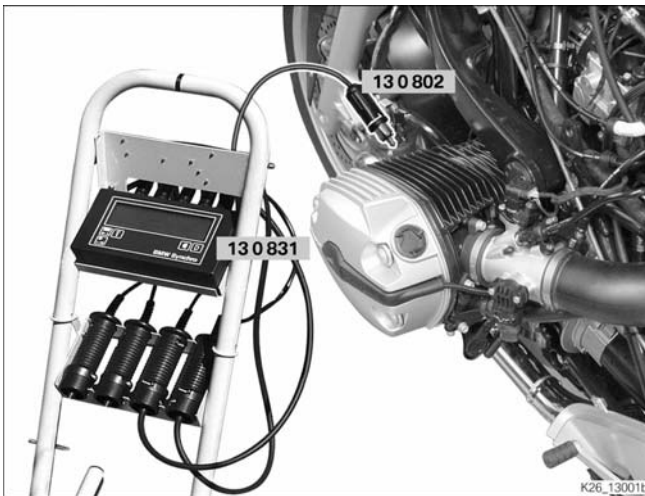
throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

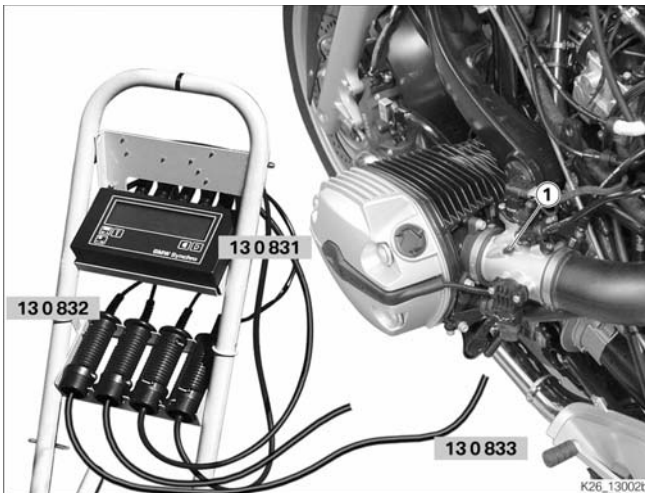
- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



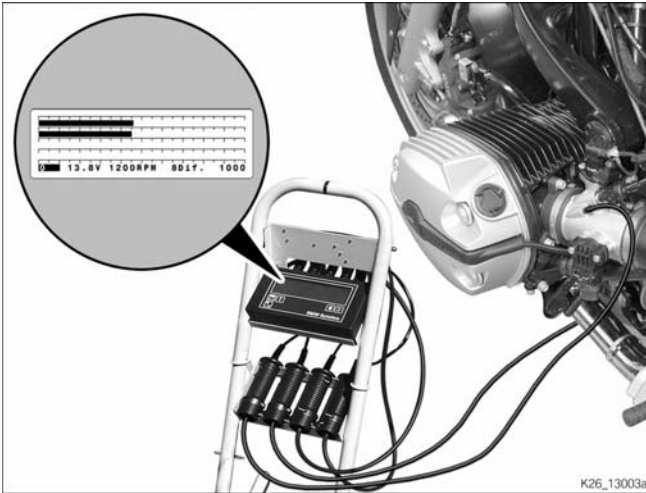
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to

synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

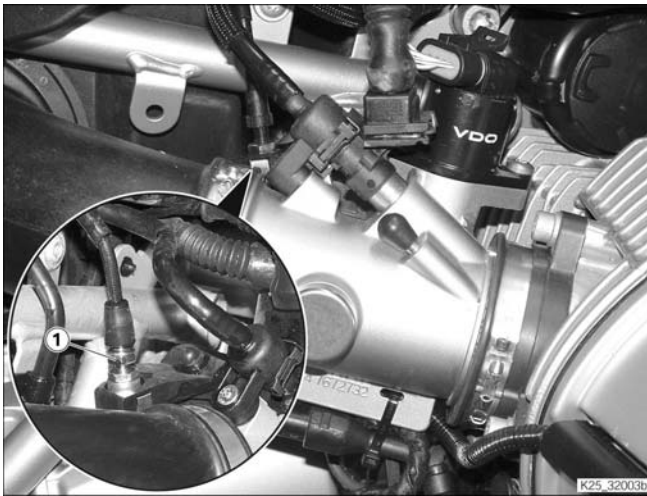
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change



- **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

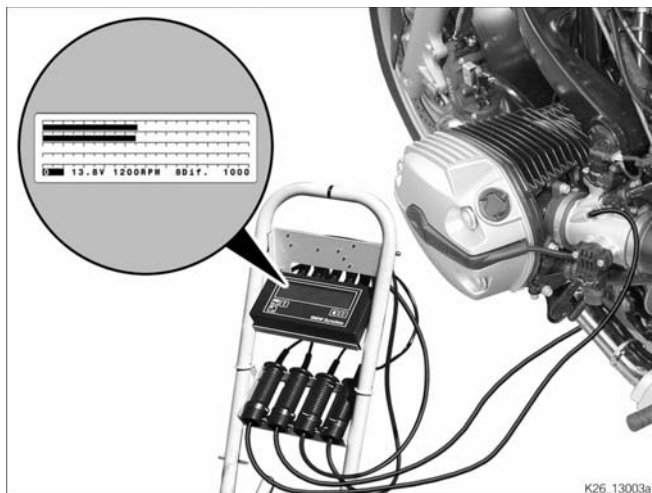
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic

system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

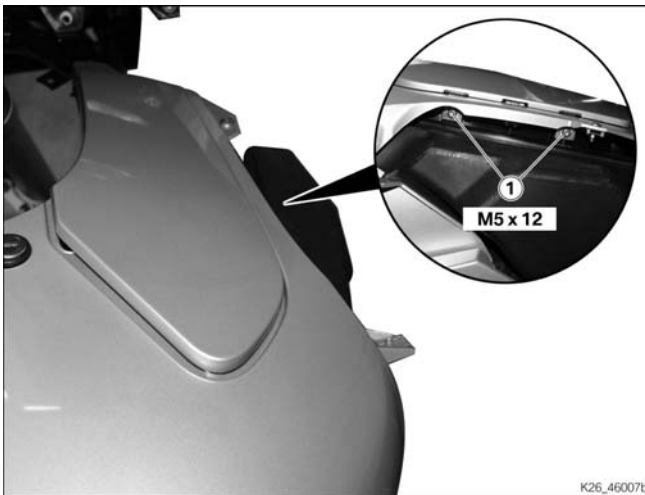
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



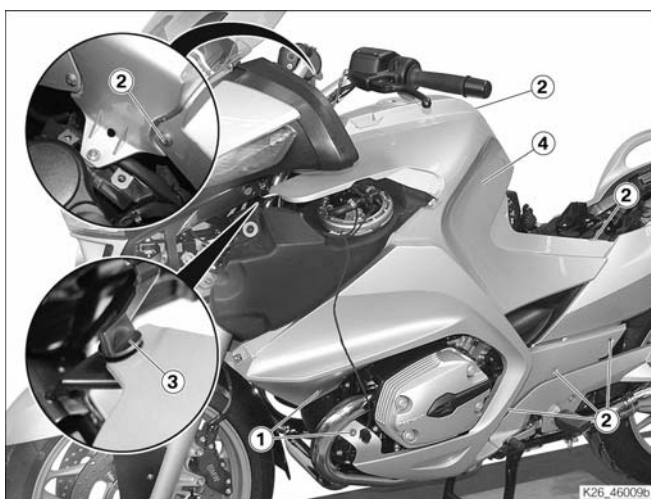
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

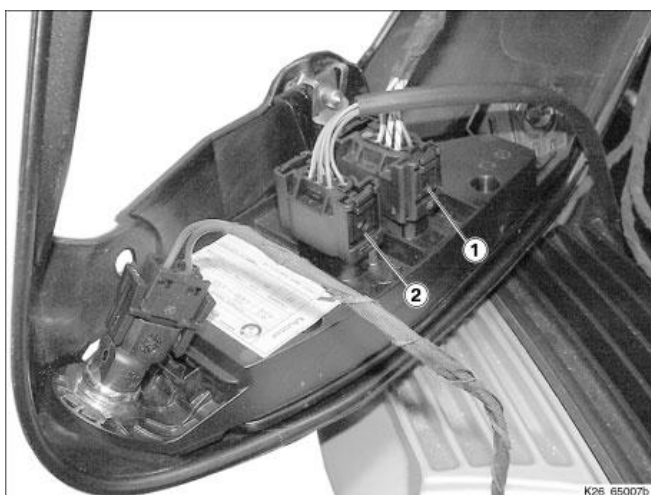
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

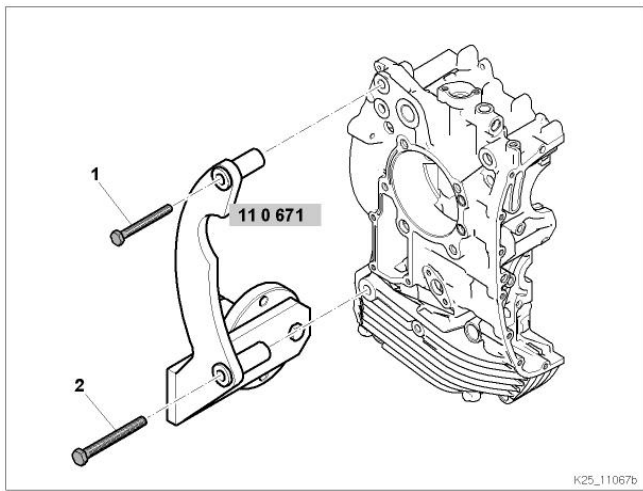
- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

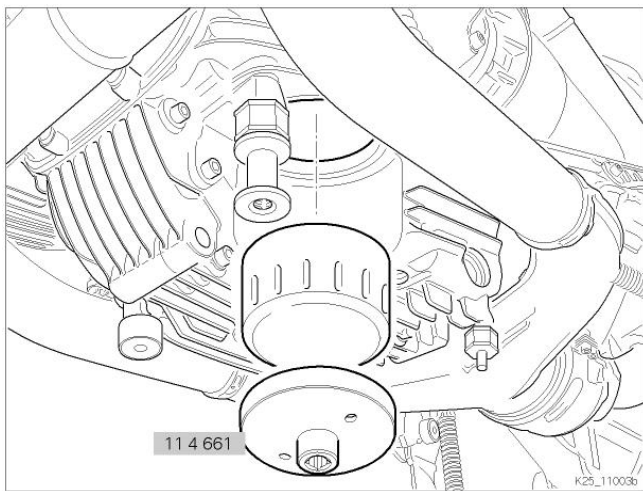
11 11 514 Replacing engine block (engine removed)

(-) Securing engine holder to right half of engine block



- Position engine holder (No. 11 0 671) at the right half of the engine block.
- Install screws (1) and (2).

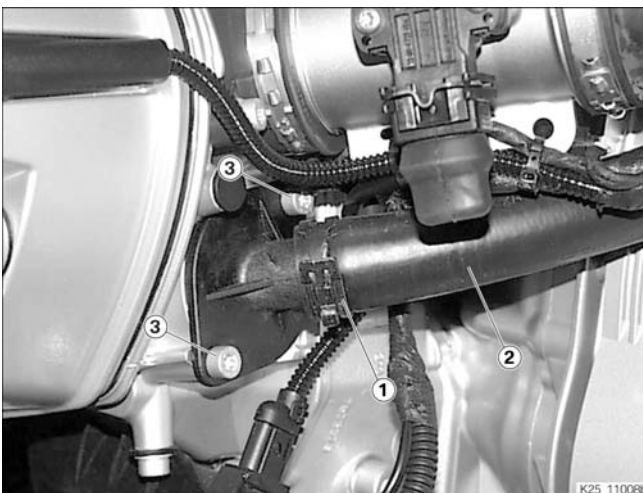
(-) Removing oil filter



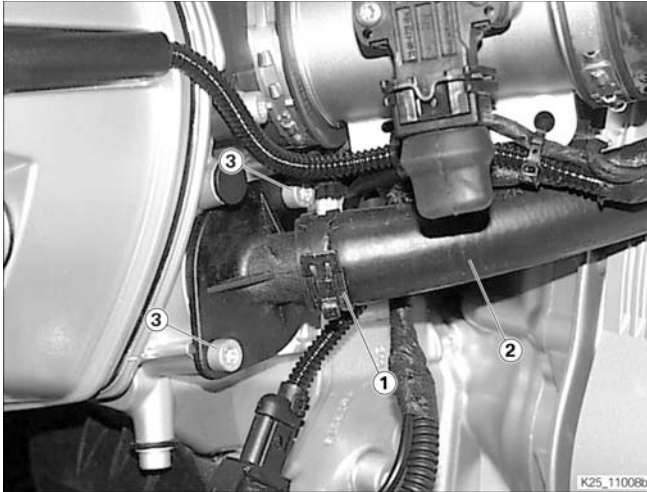
- Use wrench (No. 11 4 661) to remove the oil filter.
- Dispose of the oil filter in an environmentally friendly manner.

(-) Removing left camshaft cover

► Disconnecting hose for crankcase breather

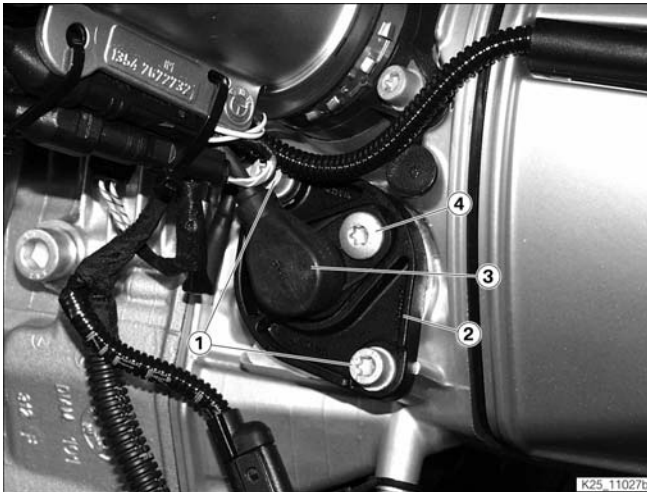


- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



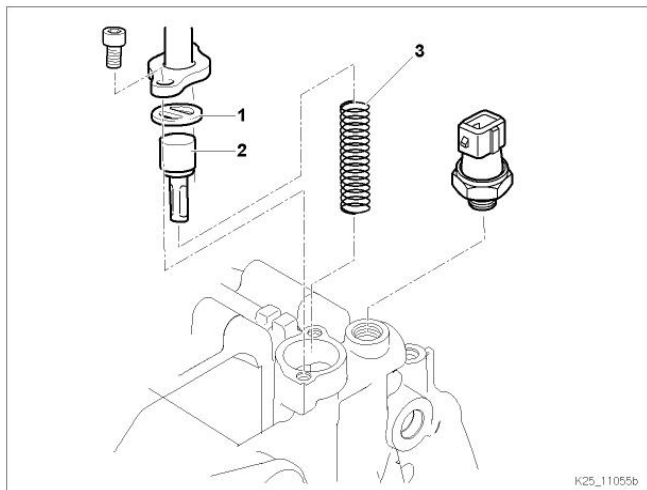
- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.

(-) Removing right camshaft cover



- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.

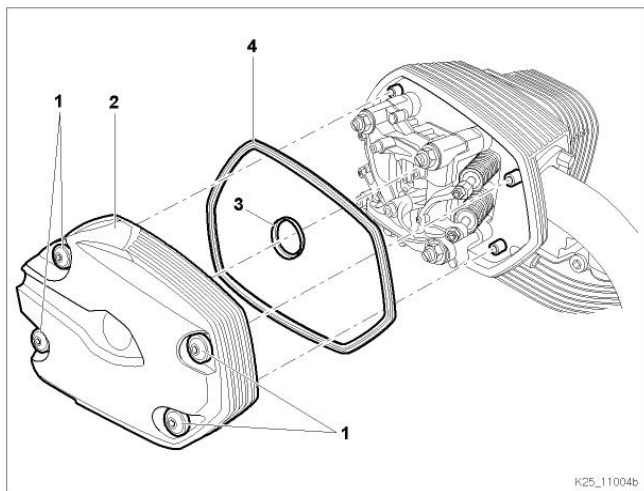
(-) Removing oil thermostat



- Remove supporting plate (1), control element (2), and spring (3).

(-) Removing cylinder head covers

- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head covers (2).

**Note**

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

**Technical data**

Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

(-) Removing left camshaft sprocket

- Release left timing-chain tensioner

**Note**

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.

**Note**

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.

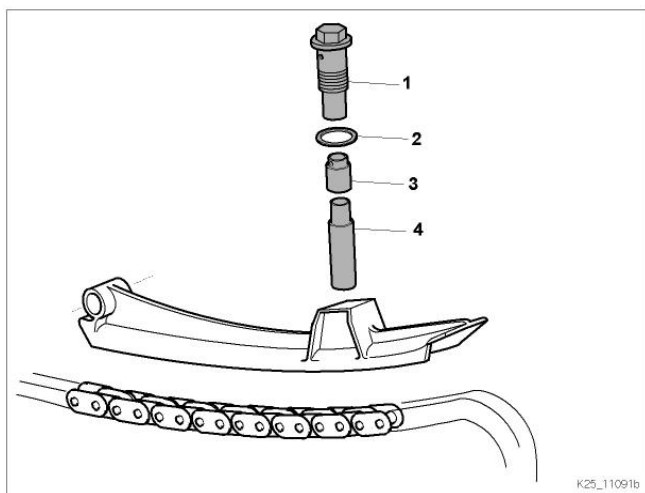
**Note**

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

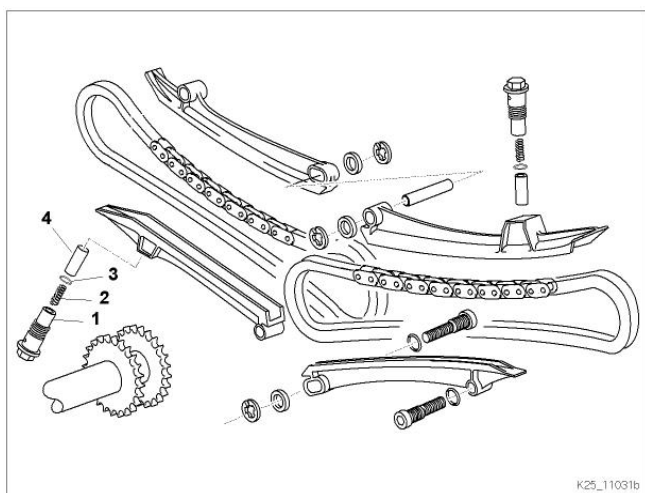
(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and



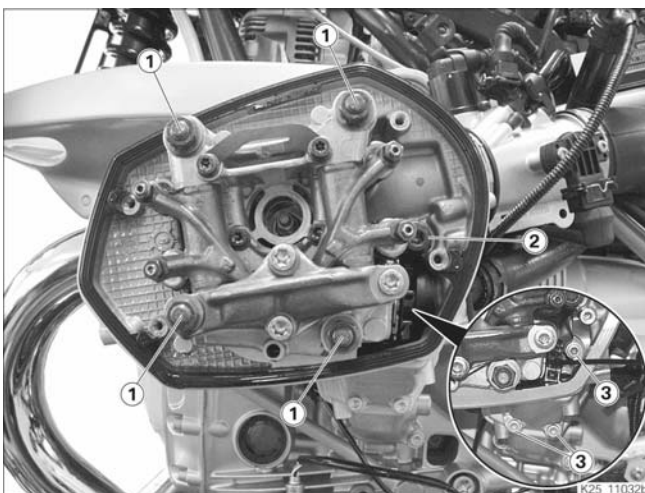
- dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.

(-) Removing right chain tensioner



- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.

(-) Removing left cylinder head



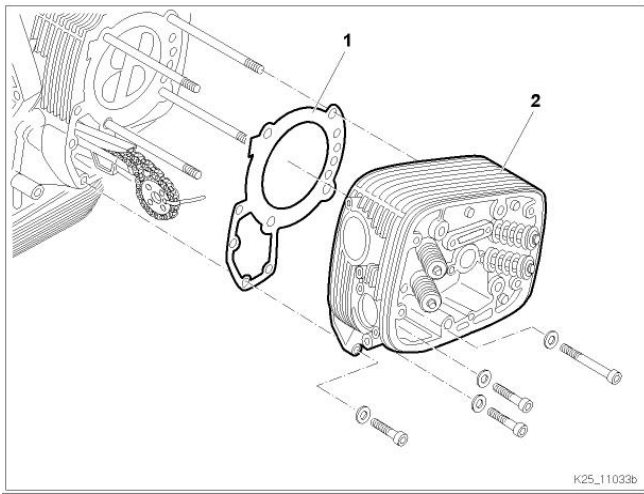
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.
- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



K25_11033b

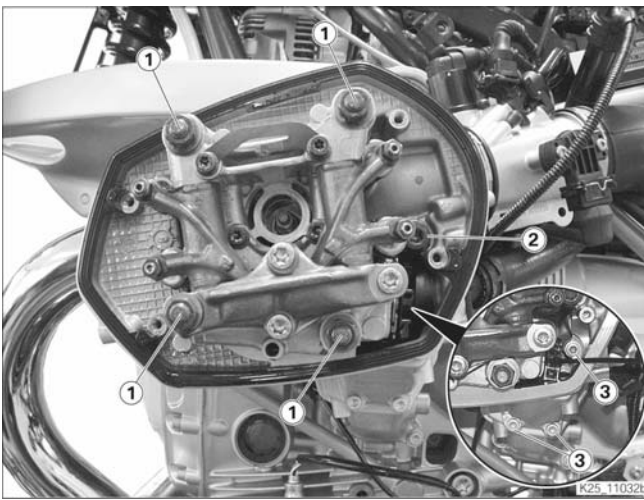
(-) Removing right cylinder head

- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



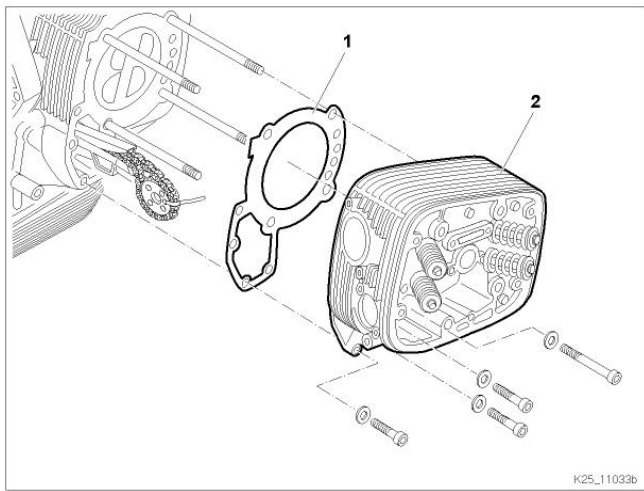
Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



K25_11032b

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.

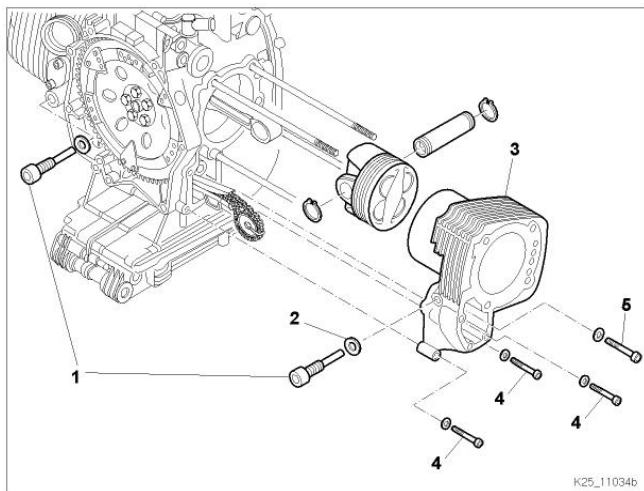


K25_11033b

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.

(-) Removing left cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

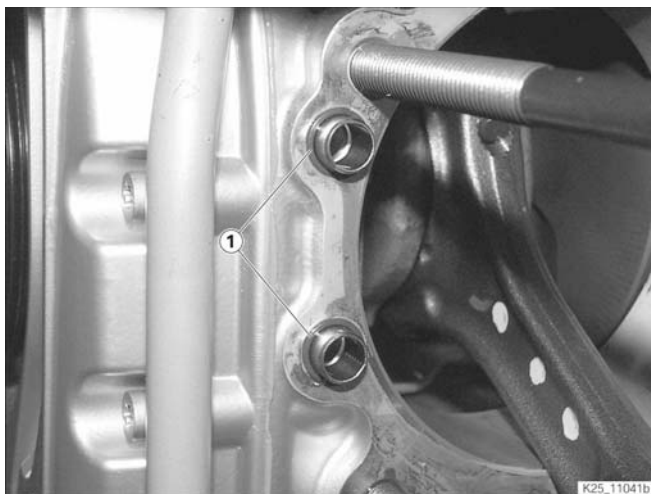
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Removing right cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



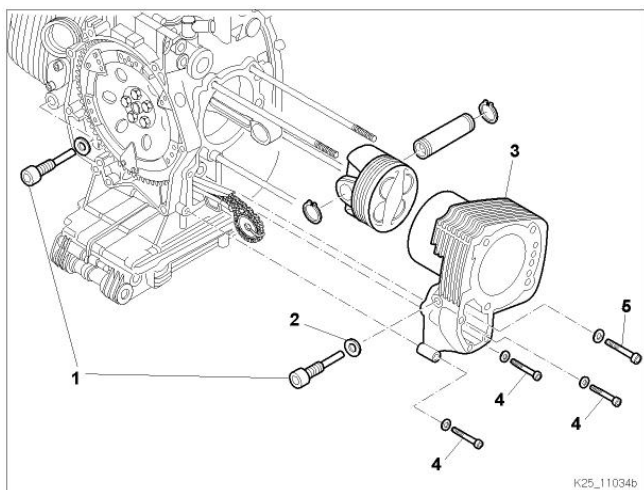
Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.



Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

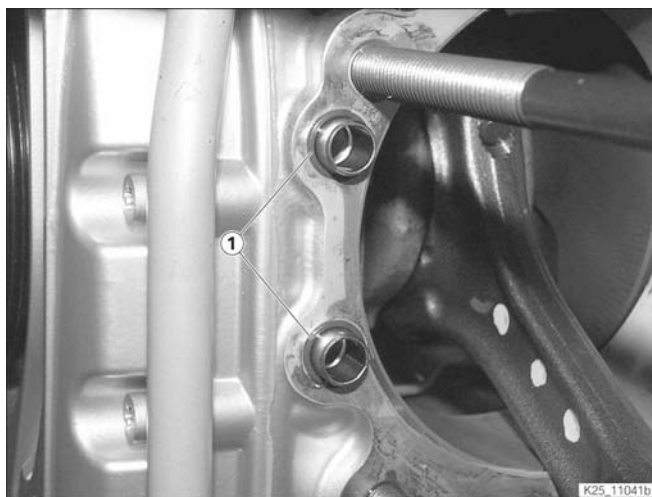
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Locking engine at TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until it is at TDC (TDC = top dead centre).
- » The inlet and exhaust valves of one cylinder are closed; those of the other cylinder are at overlap.
- » The TDC locating pin can be inserted.
- Insert locating pin (No. 11 2 650) to lock the engine in position.



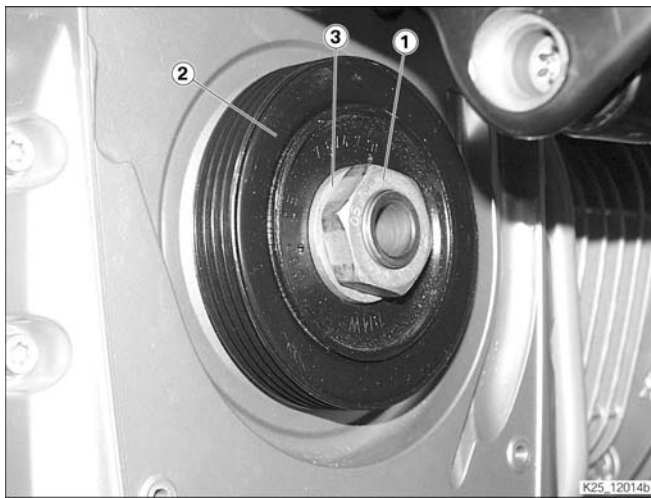
(-) Removing crankshaft belt pulley

Precondition

- Engine locked.



- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.



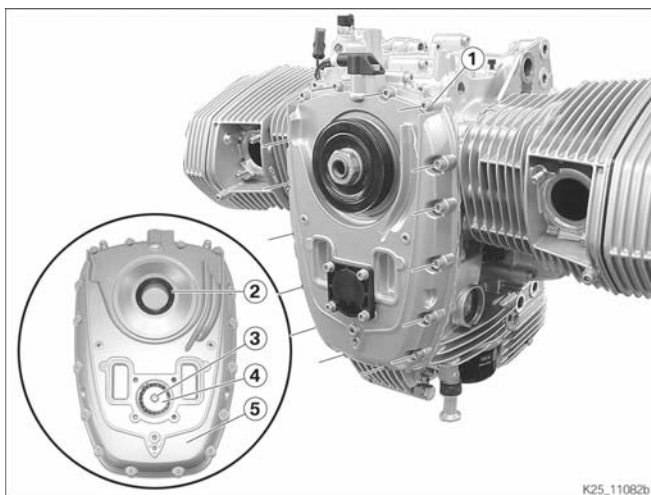
(-) Removing cover for counterbalance shaft

- Remove screws (1) and remove cover.



(-) Removing time case cover

- Remove screw (3) and washer (4).
- Remove screws (1).



- Install the puller and thrust piece (No. 31 3 671) .
- Remove the timing case cover, noting the inductive sensor of the crankshaft, which is still fixed in position.



► Releasing crankshaft inductive sensor from timing case cover

- Remove screw and remove crankshaft inductive sensor (2) from the timing case cover.

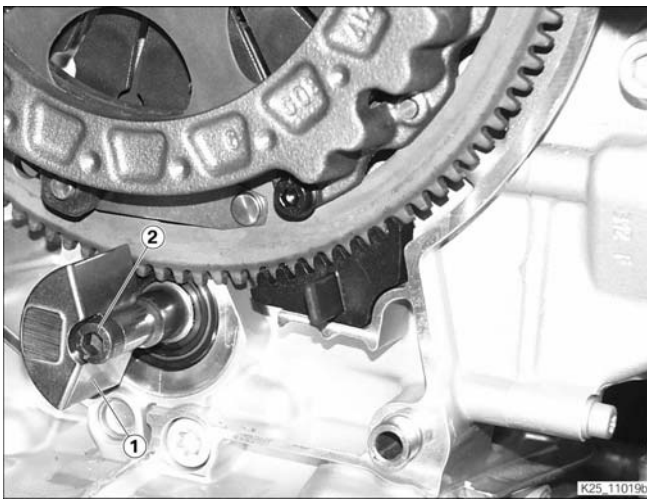


- Remove puller and thrust piece (No. 31 3 671) .



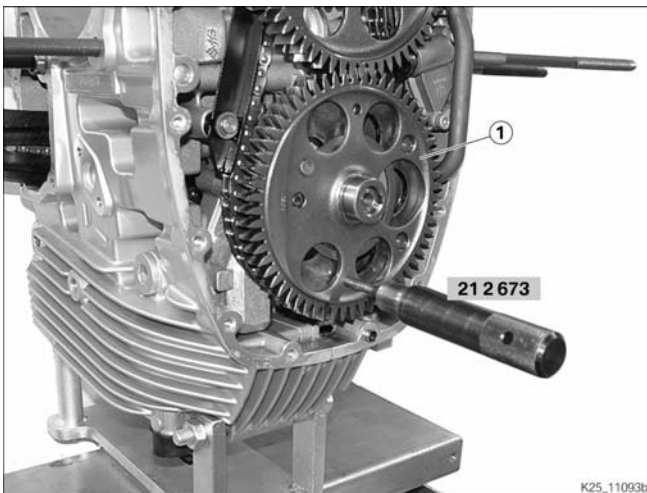
(-) Removing balance weight

- Remove screw (2) from the balance weight.
- Pull balance weight (1) back and off the counterbalance shaft.



(-) Removing tensioning wheel

- Use clutch centring pin (No. 21 2 673) to fix the tensioning wheel in position.
- Remove tensioning wheel (1).



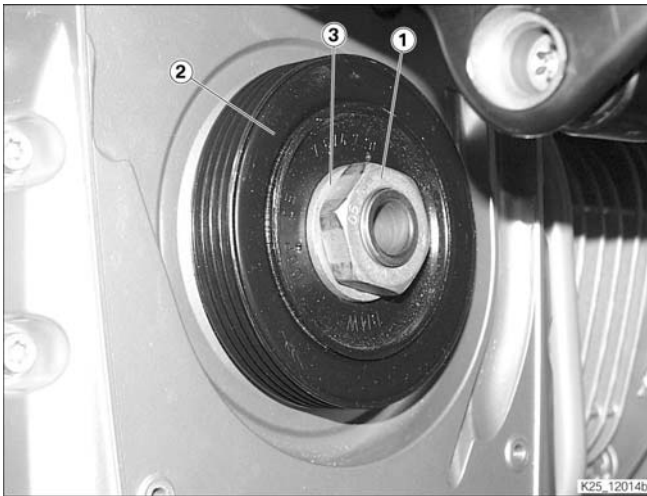
(-) Removing counterbalance shaft

- Pull balancing shaft (1) to the rear to remove.



(-) Removing drive gear on counterbalance shaft

- Tighten nut (1) until hand-tight.

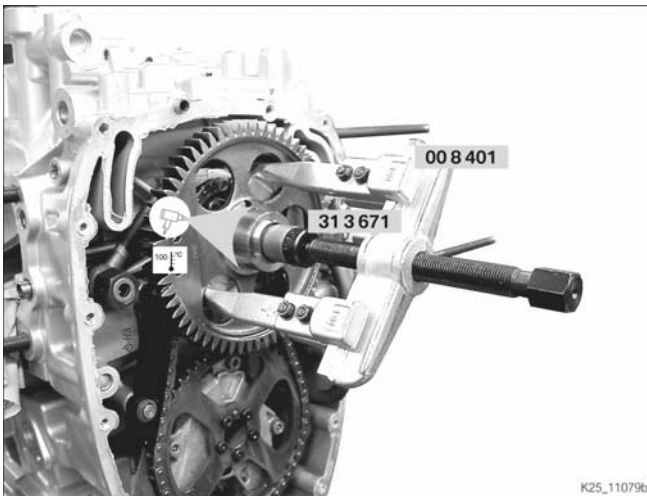


- Install puller (No. 00 8 401) and thrust piece (No. 31 3 671) and pretension.


⚠ Attention

Nature: Once the gear has been heated it can work loose suddenly and damage components in the vicinity.

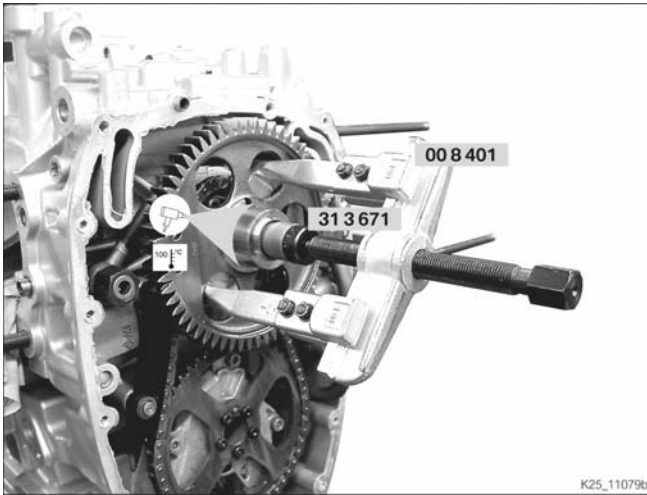
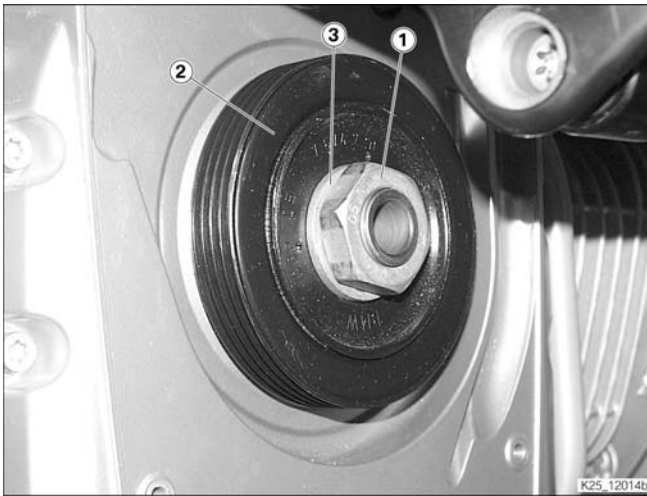
Avoidance: Cover components in the vicinity and protect them against damage.



- Heat the drive gear for the balancing shaft at the crankshaft and tap it to release.

 Technical data			
Release temperature, drive gear for balancing shaft on crankshaft		80 °C	

- Remove nut (1).

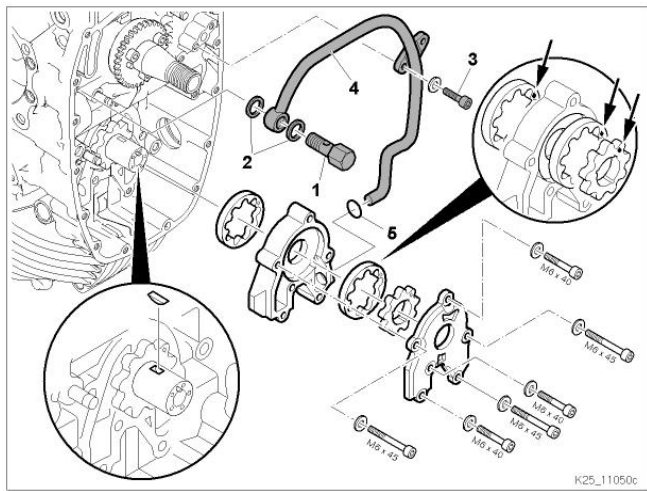


Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Remove the drive gear for the balancing shaft and remove puller (No. 00 8 401) and thrust piece (No. 31 3 671) .

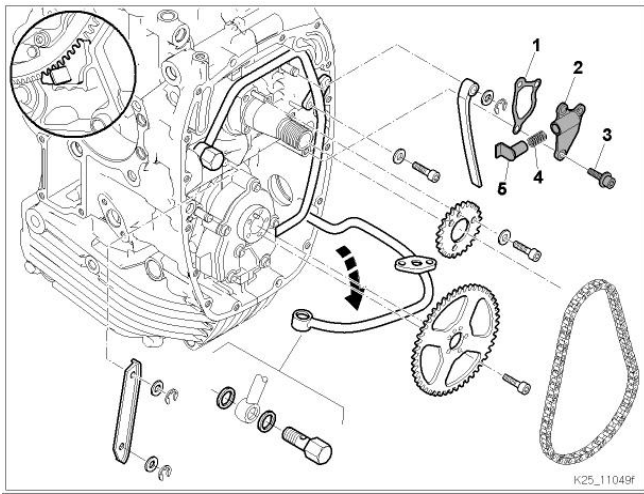


(-) Removing cooling oil line

- Remove banjo bolt (1) with sealing rings (2).
- Remove screws (3).
- Swing cooling oil line (4) forward and remove.
- Remove O-ring (5).

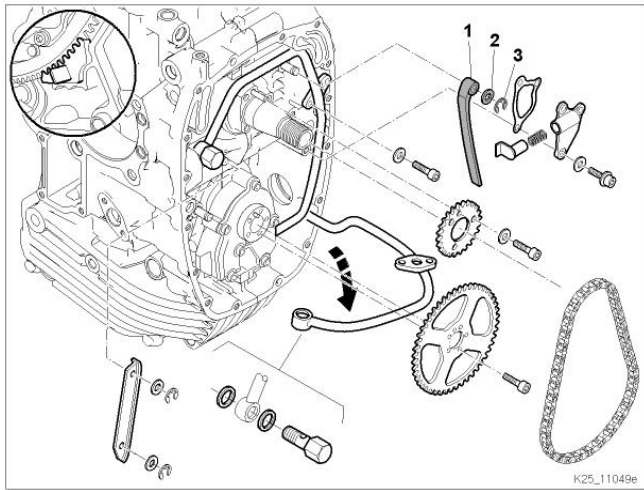
(-) Removing timing chain tensioner, crankshaft/auxiliary shaft

- Remove screws (3).
- Remove housing (2) with spring (4) and piston (5).
- Remove seal (1).



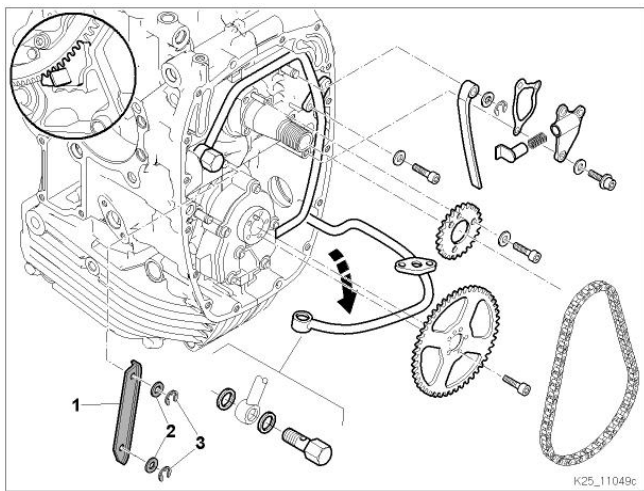
(-) Removing timing chain tensioner rail, crankshaft/auxiliary shaft

- Remove retaining washer (3) and lift off spacer (2).
- Remove timing-chain tensioning rail (1).



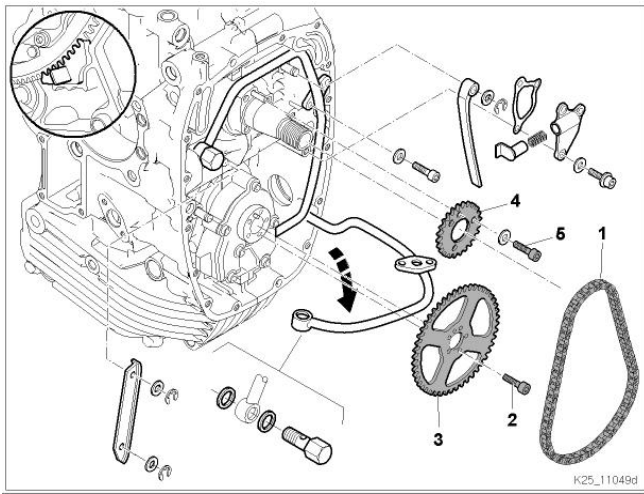
(-) Removing timing chain guide rail, crankshaft/auxiliary shaft

- Remove retaining washers (2) and lift off spacers (3).
- Remove timing-chain guide rail (1).



(-) Removing timing chain, crankshaft/auxiliary shaft

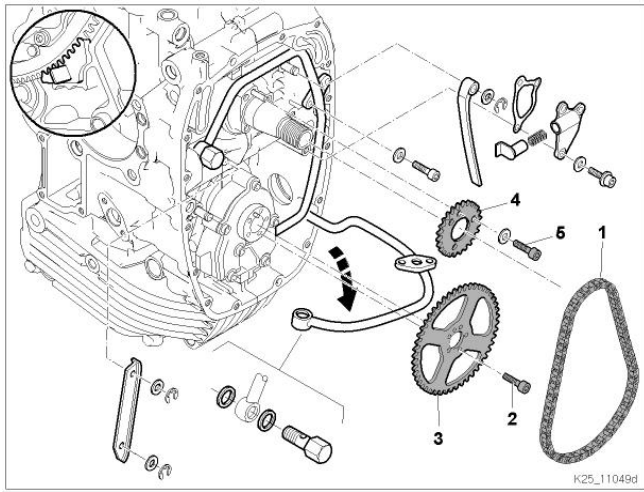
- Remove screws (2).
- Remove timing chain (1) with sprocket of countershaft



(3).

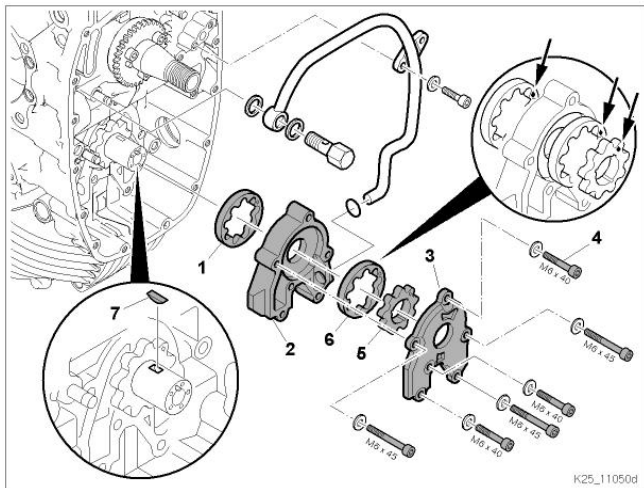
(-) Removing timing-chain pinion from crankshaft

- Remove screws (5).
- Remove timing-chain pinion (4).



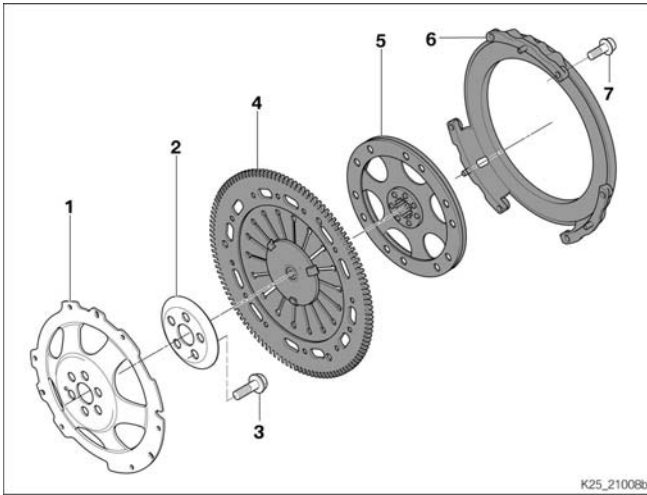
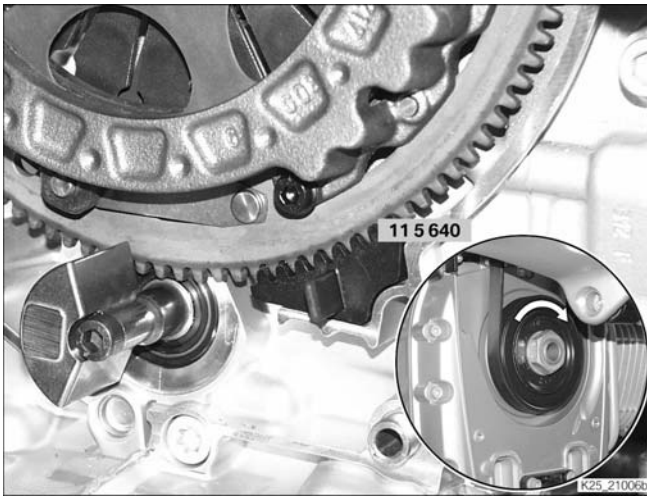
(-) Removing oil pump

- Remove screws (4).
- Remove oil-pump cover (3).
- Remove outer rotor for cooling oil (6) and inner rotor for cooling oil (5).
- Remove oil-pump housing (2) with outer rotor for lube oil (1).



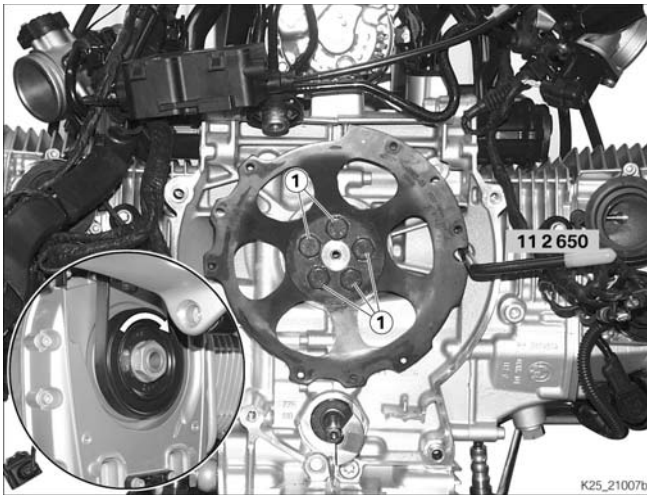
(-) Removing clutch

- By means of the belt pulley, turn the engine in the normal direction of rotation until the engine locking device can be inserted.
- Insert engine locking device (No. 11 5 640) .



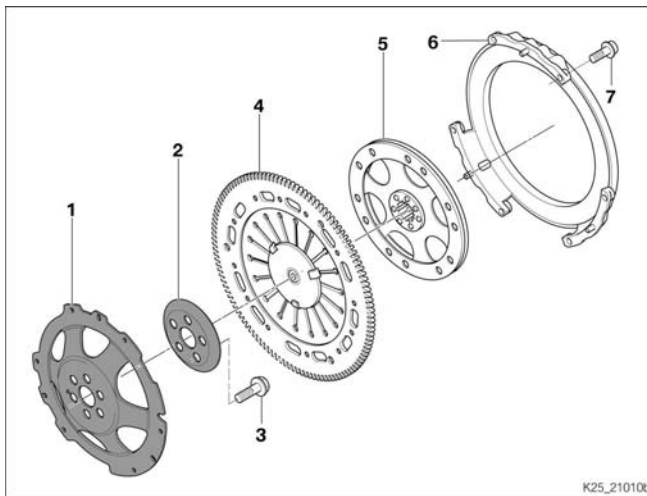
- Working in diagonally opposite sequence, loosen screws (7) in stages.
- Remove engine locking device (No. 11 5 640) .
- Remove the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6).

(-) Removing clutch housing



- By means of the belt pulley, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .

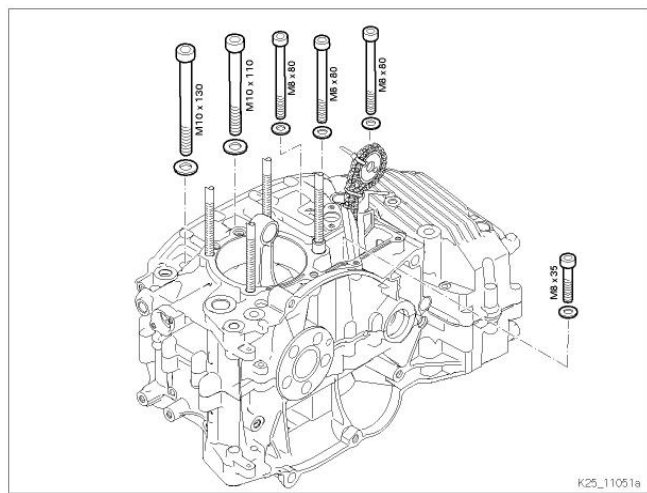
- Remove screws (3).
- Remove clutch housing (1) and reinforcing plate (2).
- Remove TDC locating pin (No. 11 2 650) .



K25_21010b

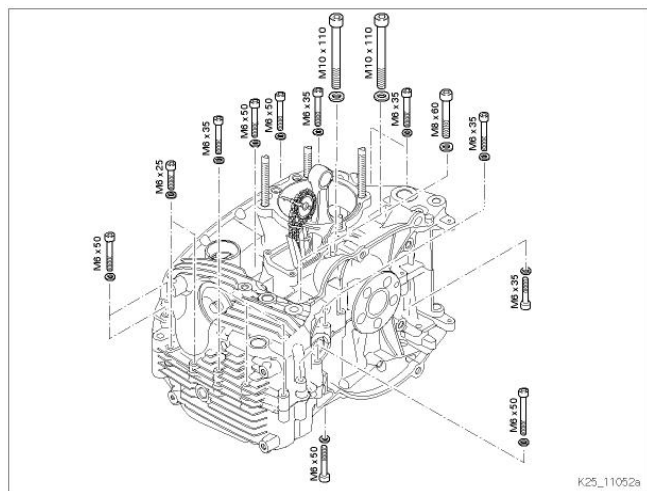
(-) Removing left half of engine casing

- Turn engine to side position.
- Remove the screws on the right-hand side.



K25_11051a

- Turn engine to side position.
- Remove the screws on the left-hand side.



K25_11052a



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.



Attention

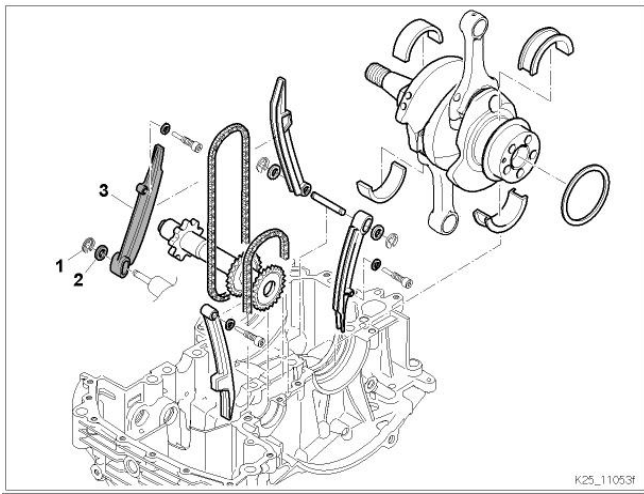
Nature: If the engine block is not kept straight during removal and installation, the bearing shells can be damaged.

Avoidance: Do not tilt the engine block when removing and installing.

- Remove left half of engine casing.

(-) Removing left timing chain slide rail

- Remove retaining washer (1) and spacer (2).
- Remove timing-chain slide rail (3), left.



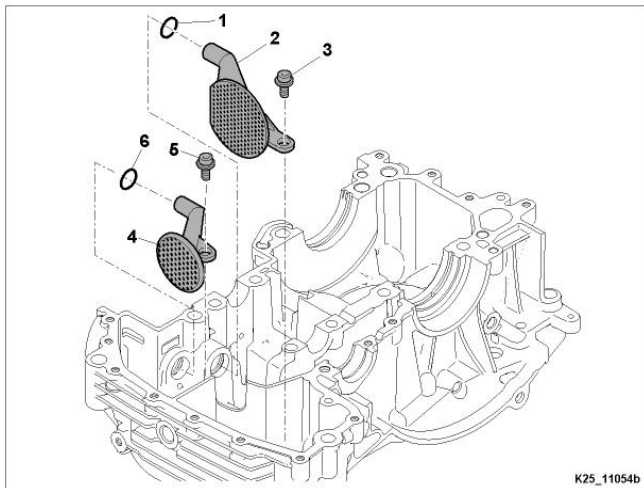
(-) Removing oil-pressure switch

- Remove oil-pressure switch (3).



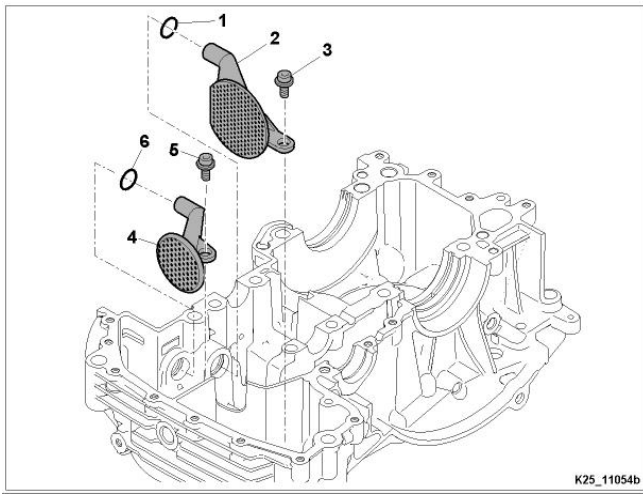
(-) Removing intake for lube oil

- Remove screw (3).
- Remove intake for lube oil (2).
- Remove O-ring (1).



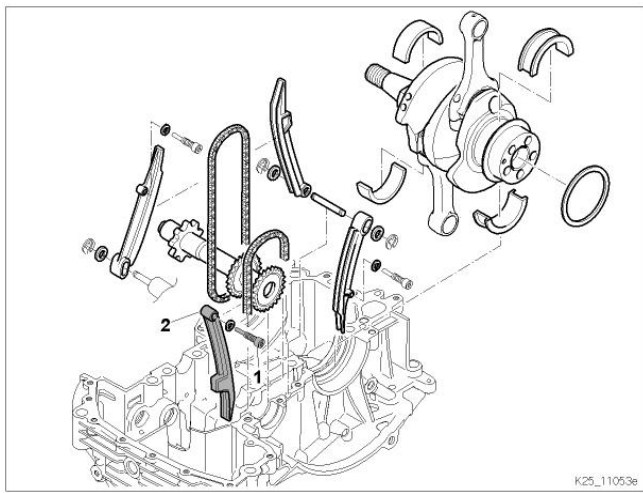
(-) Removing intake for cooling oil

- Remove screw (5).
- Remove intake for cooling oil (4).
- Remove O-ring (6).



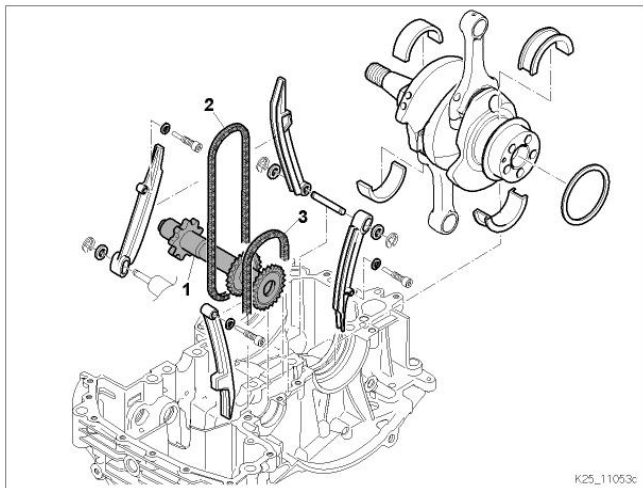
(-) Removing right timing chain tensioning rail

- Remove screw (1).
- Remove right timing chain tensioning rail (2).



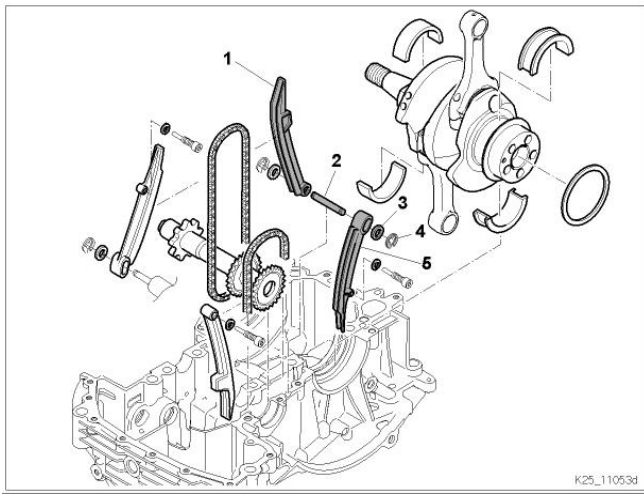
(-) Removing auxiliary shaft

- Remove auxiliary shaft (1) with both timing chains.
- Remove left timing chain (2) and right timing chain (3).



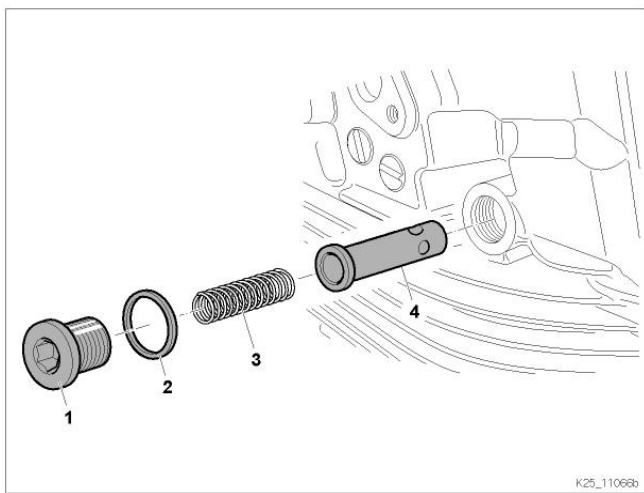
(-) Removing left tensioner rail and right slide rail

- Remove pin (2) with left tensioning rail (1) and right slide rail (3).



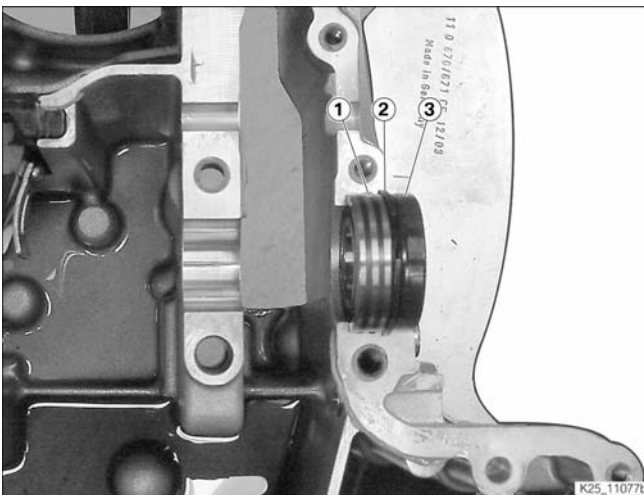
(-) Removing pressure relief valve for lube oil

- Remove threaded plug (1) with sealing washer (2).
- Remove coil spring (3) and valve plunger (4).



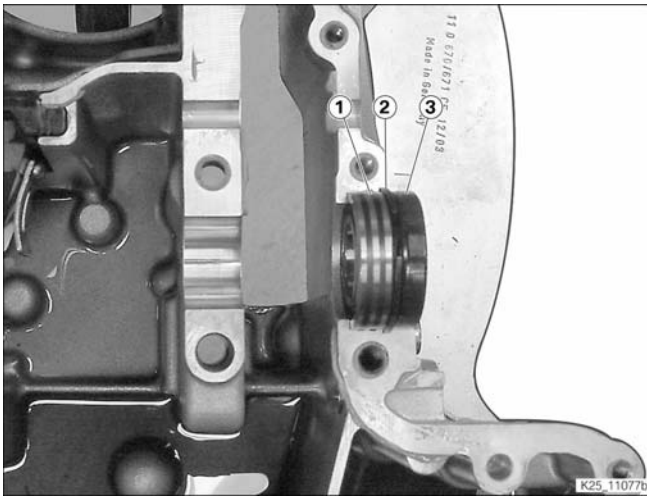
(-) Removing counterbalance shaft on clutch side

- Remove deep groove ball bearing (1).
- Remove circlip (2).



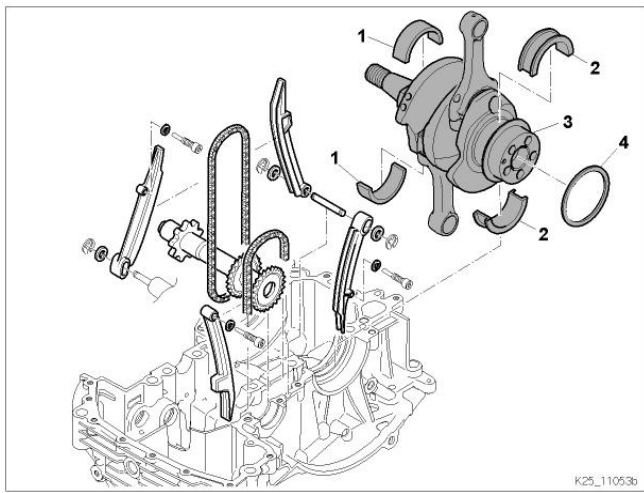
(-) Removing rotary shaft seal, counterbalance shaft

- Remove rotary shaft seal (3).



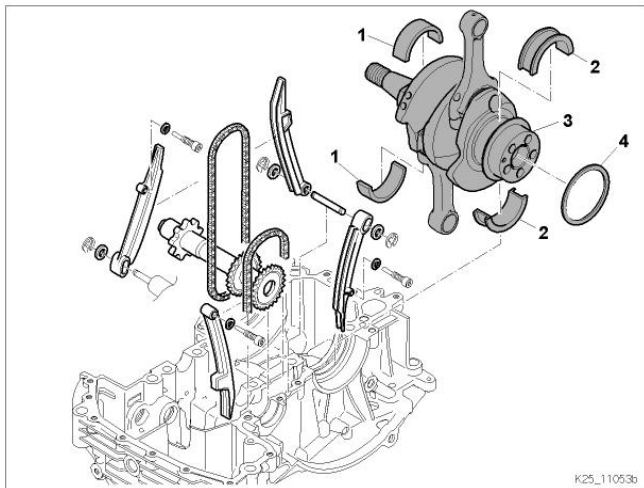
(-) Removing crankshaft

- Remove crankshaft (3) with connecting rod.



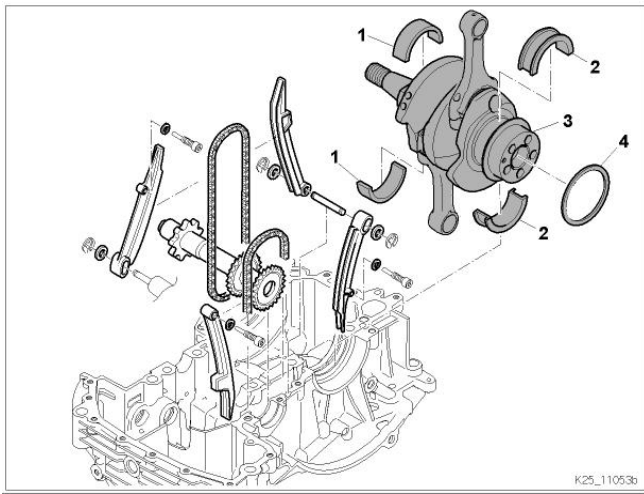
(-) Removing rotary shaft seal on crankshaft

- Remove shaft sealing ring (4).



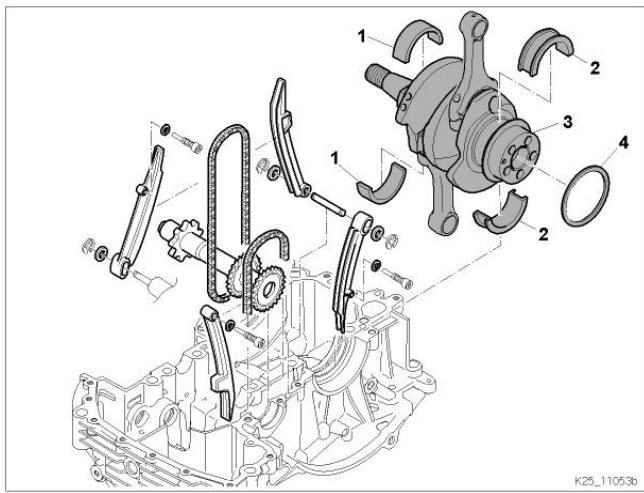
(-) Removing crankshaft guide-bearing shells

- Remove crankshaft guide-bearing shells (2) from the two halves of the engine block.



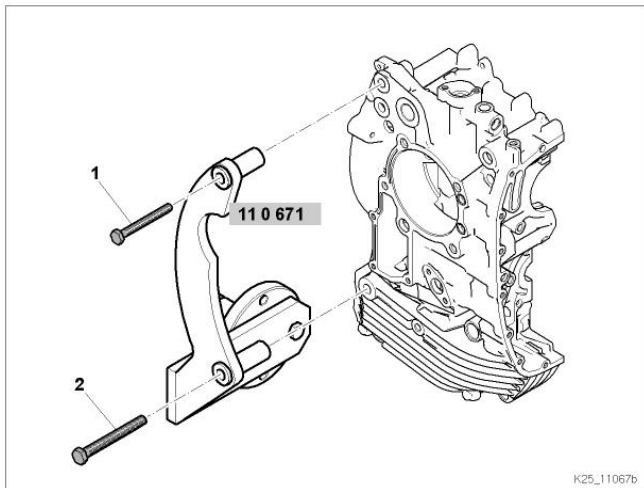
(-) Removing crankshaft main bearing shells

- Remove crankshaft main-bearing shells (1) from the two halves of the engine block.



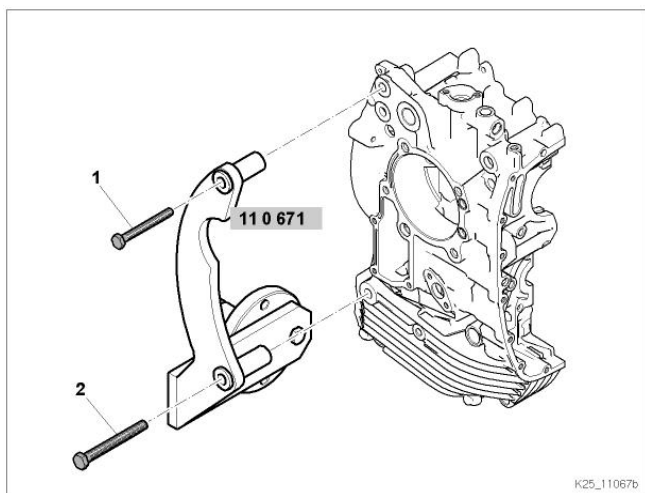
(-) Removing engine holder from right half of engine block

- Remove screws (1) and (2).
- Remove engine holder (No. 11 0 671) .



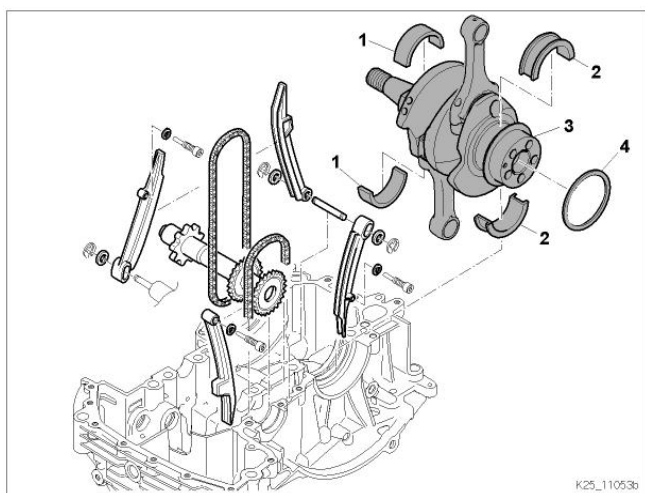
(-) Securing engine holder to right half of engine block

- Position engine holder (No. 11 0 671) at the right half of the engine block.
- Install screws (1) and (2).



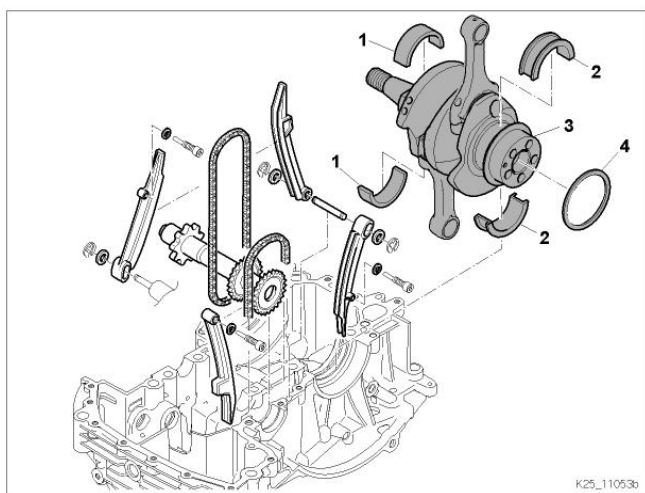
(-) Installing crankshaft main-bearing shells

- Install the oiled crankshaft main-bearing shells (1) in the two halves of the engine block, making sure that the "lugs" of the bearing shells engage the grooves in the engine-block halves.



(-) Installing crankshaft guide-bearing shells

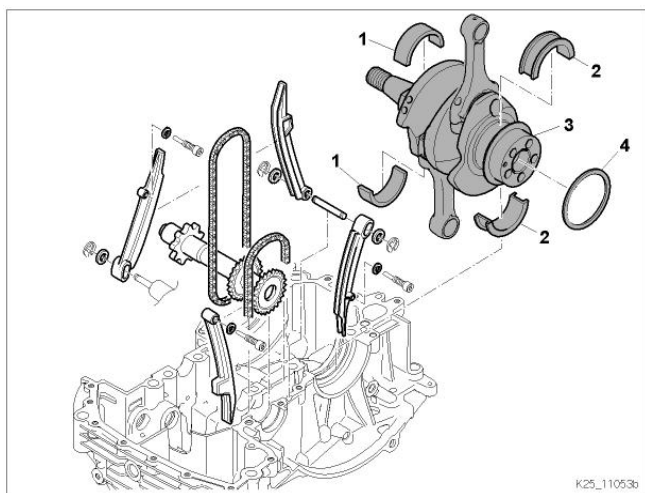
- Install the oiled crankshaft guide-bearing shells (2) in the two halves of the engine block, making sure that the "lugs" of the bearing shells engage the grooves in the engine-block halves.



(-) Installing crankshaft

- Oil the friction faces of crankshaft (3) and bearing shells (1) and (2).

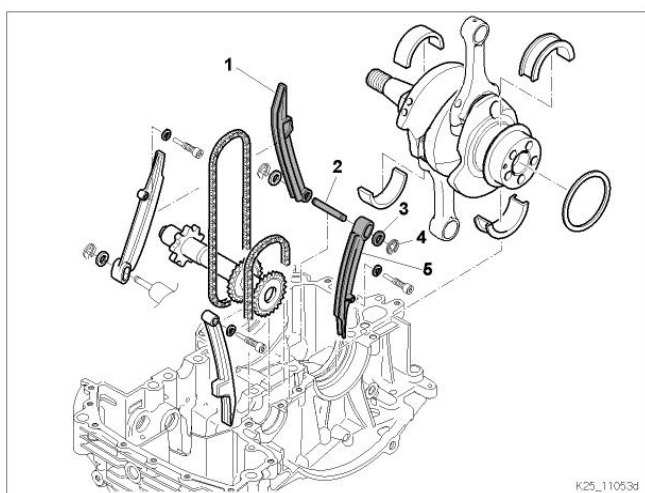





Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Install crankshaft (3) with connecting rod in the right half of the engine block.

(-) Installing left tensioner rail and right slide rail

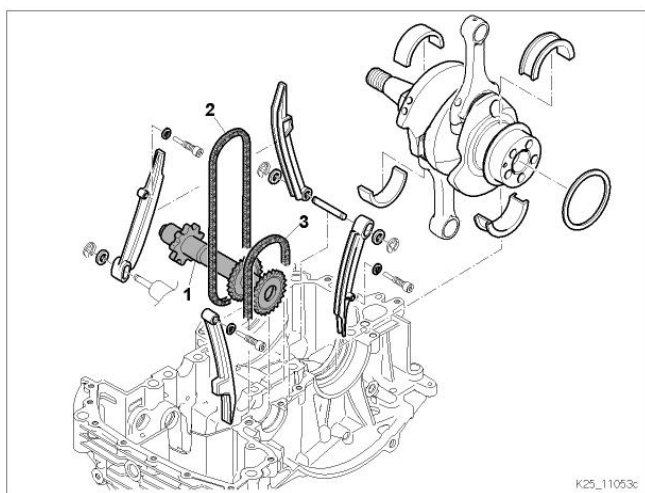


- Check the bearing surfaces of the bearing pin for damage.
- Apply sealant to the clean and grease-free sealing surfaces of the bearing pin.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Install pivot pin (2) together with left tensioning rail (1) and right slide rail (5) in right half of engine block.

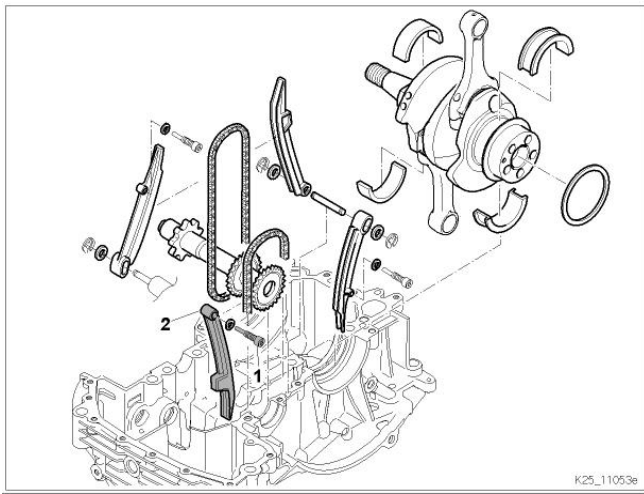
(-) Installing auxiliary shaft




- Check bearing surfaces for damage.
- Oil bearing surfaces.
- Fit left timing chain (2) and right timing chain (3) on auxiliary shaft.
- Install auxiliary shaft (1) together with both timing chains in right half of engine casing.

(-) Installing right timing chain tensioner rail

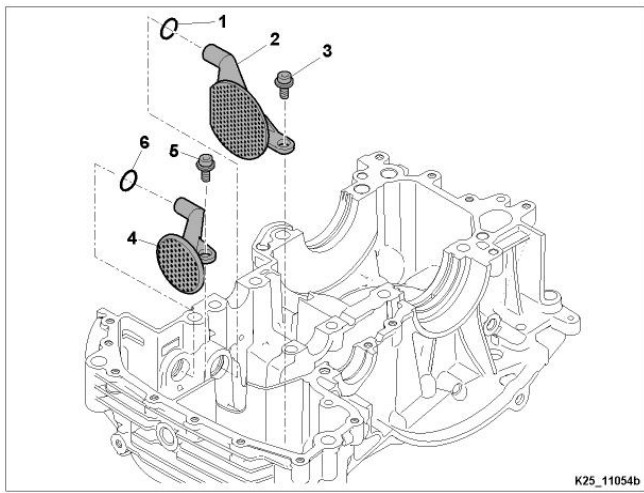
- Fit right timing chain tensioning rail (2) in position.
- Install screw (1).




 Tightening torques		
Mounting screw for timing chain tensioner, crankcase, M10	18 Nm	

(-) Installing intake for cooling oil

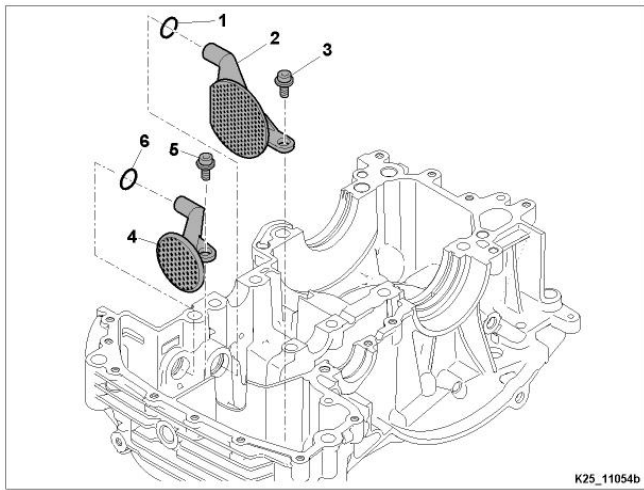
- Check the O-ring for damage; replace if necessary.
- Install O-ring (6).
- Install intake for cooling oil (4).
- Install screw (5).




 Tightening torques		
Oil intake in crankcase, right, M6 x 25	8 Nm	

(-) Installing intake for lube oil

- Check the O-ring for damage; replace if necessary.
- Install O-ring (1).
- Install intake for lube oil (2).
- Install screw (3).

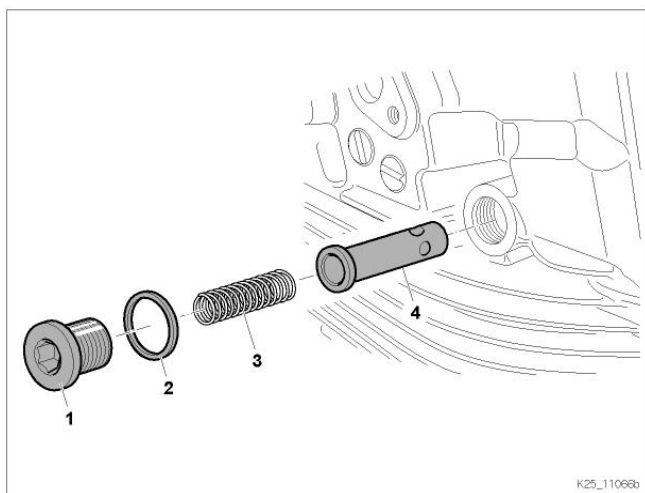


 Tightening torques		
Oil intake in crankcase, right, M6 x 25	8 Nm	

(-) Installing pressure relief valve for lube oil

- Install valve plunger (4) and coil spring (3).
- Install threaded plug (1) with a new sealing washer (2).

 Tightening torques		




Screw plug, M20 x 1.5	42 Nm	
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(-) Installing oil-pressure switch

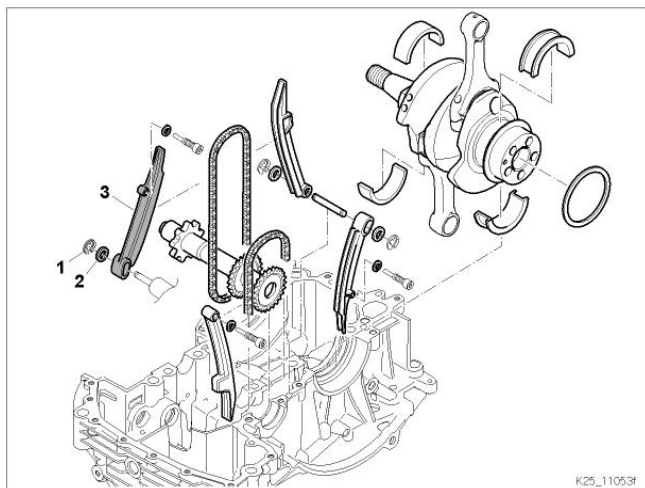
- Install oil-pressure switch (3).



 Tightening torques		
Oil pressure switch	30 Nm	

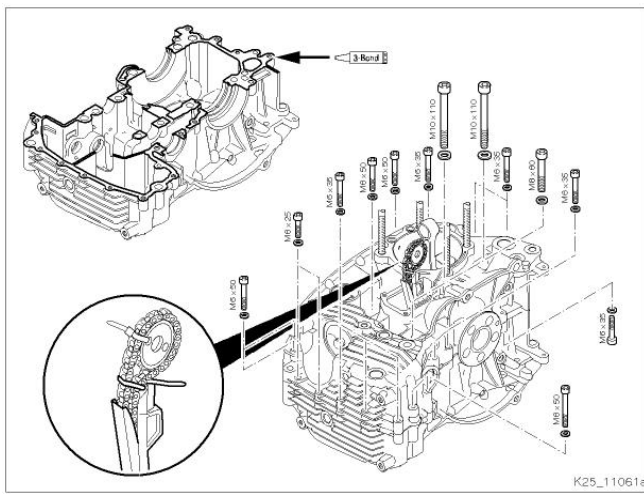
(-) Installing left timing chain slide rail

- Install left timing-chain slide rail (3).
- Install spacer (2) and retaining washer (1).



(-) Installing left half of engine casing

- Secure timing chain with rubber band to timing chain tensioning and slide rail.
- Apply lubricant to the clean and grease-free sealing surfaces.



Consumables/lubricants

3 - Bond 1209	Surface sealant	07 58 9 062 376
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Attention

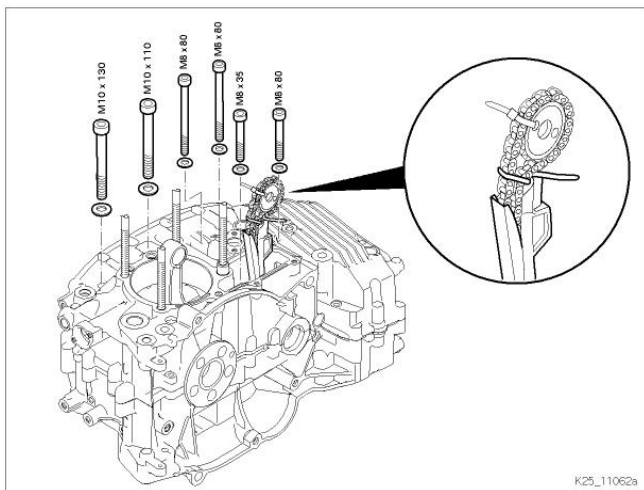
Nature: If the engine block is not kept straight during removal and installation, the bearing shells can be damaged.


Avoidance: Do not tilt the engine block when removing and installing.

- Place left half of engine casing in position.
- Install the screws on the left-hand side.

 Tightening torques		
Engine block, M6 x 35	8 Nm	
Engine block, M6 x 50	8 Nm	
Engine block, M6 x 25	8 Nm	
Engine block, M8 x 60, Bolted with sealing ring, A8 x 13 Al	19 Nm	
Engine block, M8 x 35	19 Nm	
Engine block, M10 x 110/130	Initial torque, 25 Nm	
	Final torque, 90 °	

- Turn engine to side position.
- Install the screws on the right-hand side.

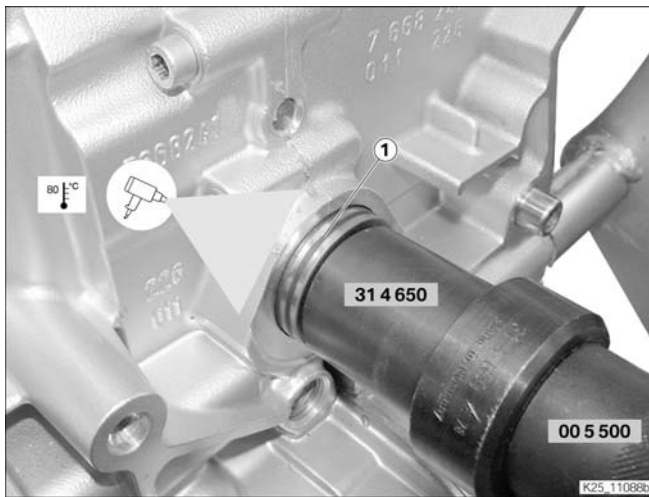



 Tightening torques		
Engine block, M6 x 35	8 Nm	
Engine block, M6 x 50	8 Nm	
Engine block, M6 x 25	8 Nm	
Engine block, M8 x 60, Bolted with sealing ring, A8 x 13 Al	19 Nm	
Engine block, M8 x 35	19 Nm	
Engine block, M10 x 110/130	Initial torque, 25 Nm	

	Final torque, 90 °	
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(-) Installing counterbalance shaft on clutch side

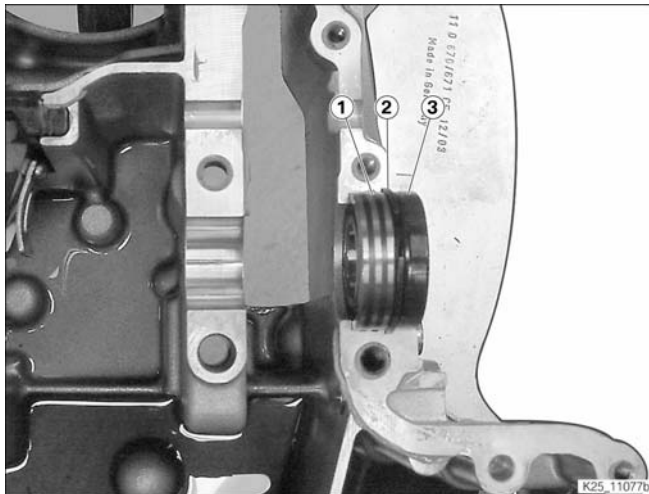
- Heat up engine casing in area of deep groove ball bearing.



 Technical data			
Release/mating temperature		80 °C	

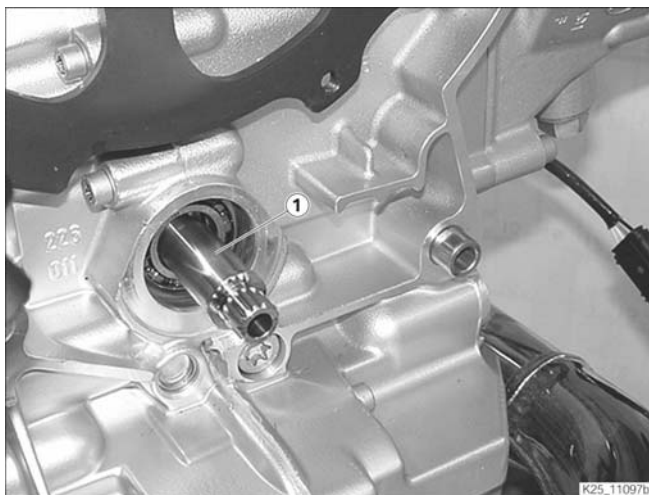
- Fit deep groove ball bearing (1) with handle (No. 00 5 500) and drift (No. 23 4 660) .

- Install circlip (2).



(-) Installing counterbalance shaft

- Install balancing shaft (1) from behind.



(-) Installing rotary shaft seal, counterbalance shaft



! Attention

Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.

Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.

- Using handle (No. 00 5 500) and drift (No. 23 1 770), drive the rotary shaft seal into the crankcase.

(-) Installing rotary shaft seal, crankshaft, output side

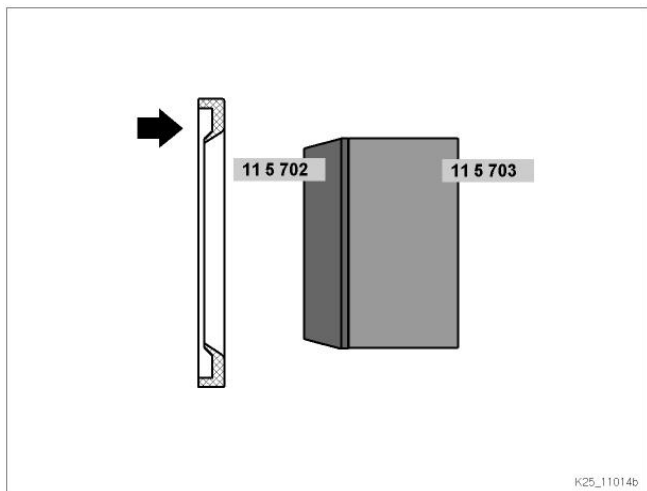
! Attention

Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.

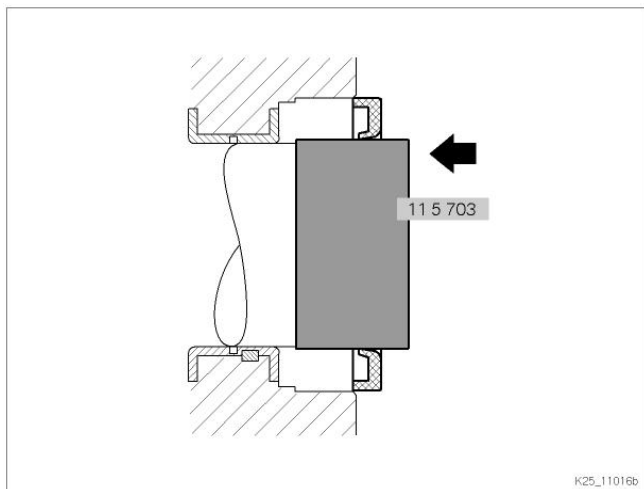
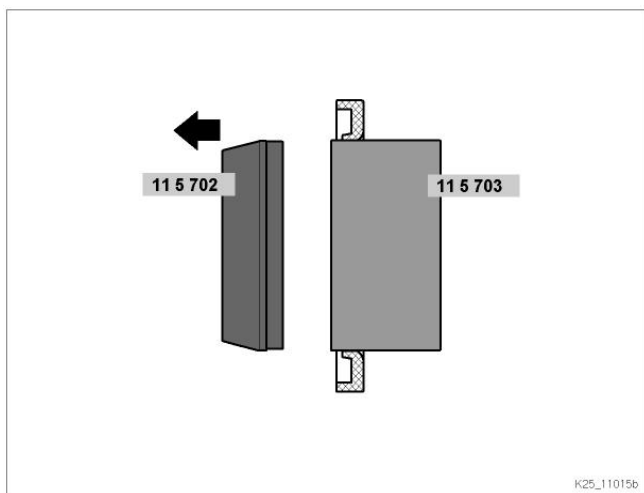
Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.

- Using sliding sleeve (No. 11 5 702), slip the rotary shaft seal with the closed side toward the clutch onto sleeve (No. 11 5 703).

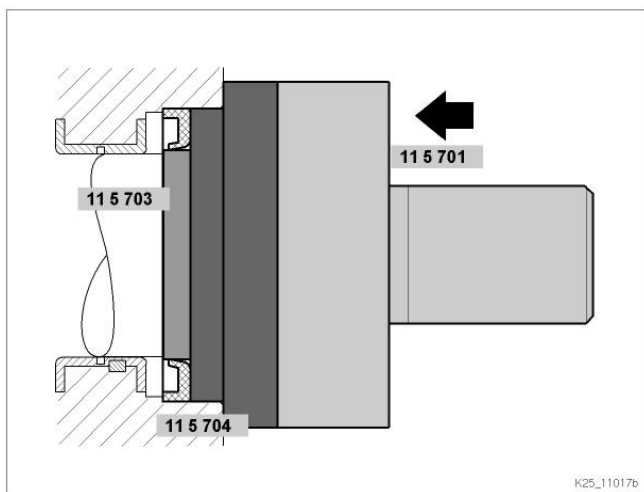
» The sealing lip of the rotary shaft seal is correctly preshaped.



- Remove sliding sleeve (No. 11 5 702) from sleeve (No. 11 5 703).

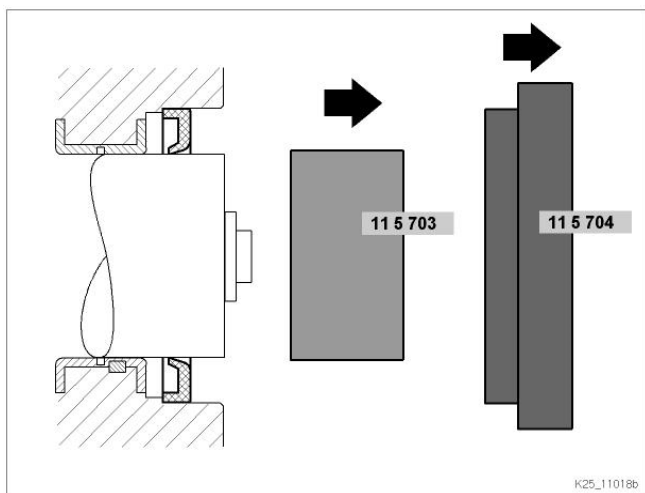


- Seat sleeve (No. 11 5 703) with the rotary shaft seal on the crankshaft.



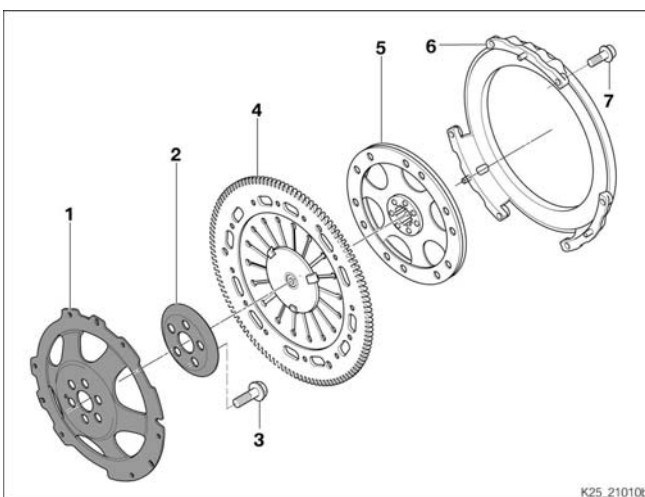
- Seat ring (No. 11 5 704) and drift (No. 11 5 701) on sleeve (No. 11 5 703) and uniformly drive the rotary shaft seal into the crankcase until the special tool comes into contact with the crankcase.
- Remove drift (No. 11 5 701) .

- Remove ring (No. 11 5 704) and sleeve (No. 11 5 703) from the crankshaft.

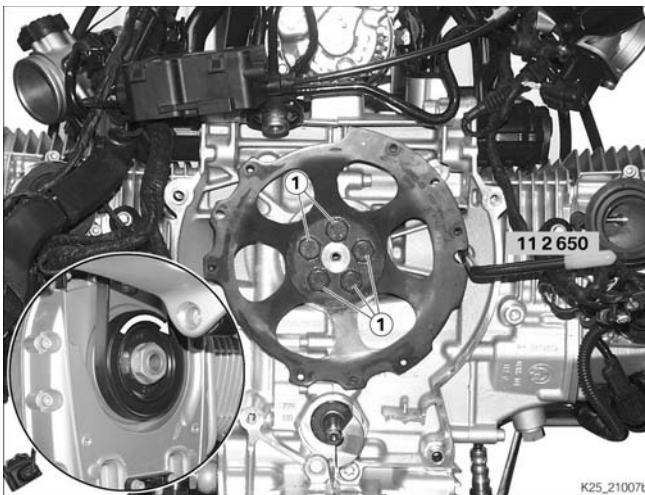



(-) Installing clutch housing

- Install clutch housing (1) with the locating lug engaged in the locating bore of the crankshaft.
- Install reinforcing plate (2) and install screws (3) to hold it in position.



- By means of the clutch housing, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .
- Install new screws (1) and tighten in correct tightening sequence.

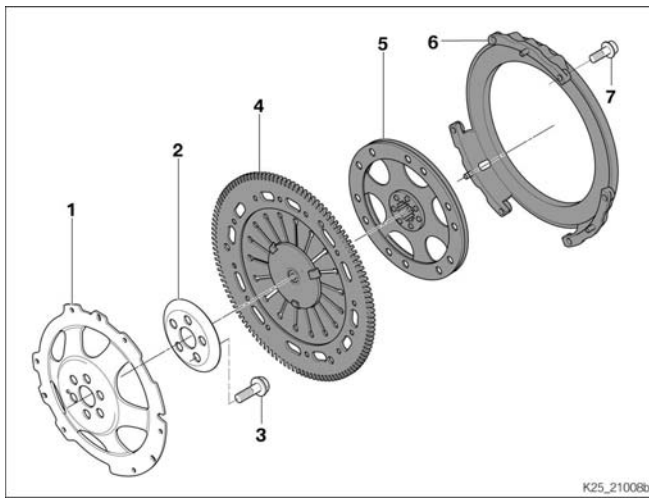


 Tightening torques		
Never re-use the original screws, M11 x 1.5 12.9	Threads and underside of head lightly oiled	
	Initial torque, 40 Nm	
	Final torque, 40 °	

- Remove TDC locating pin (No. 11 2 650) .

(-) Installing clutch

- Install the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6) in clutch




housing (1).



Note

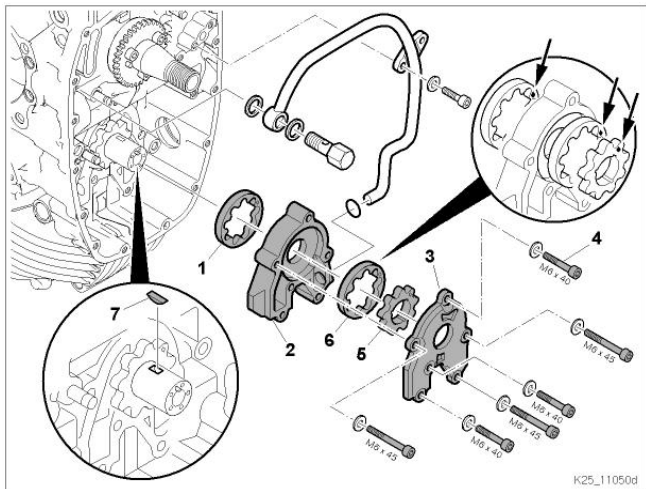
The clutch components are all precision-balanced. It is not necessary to check for identification marks when assembling.

- Insert screws (7).
- Use centering pin for clutch (No. 21 2 673) to centre the clutch plate.
- Insert engine locking device (No. 11 5 640) .
- Install screws (7) and tighten in correct tightening sequence.


 Tightening torques		
Never re-use the original screws, M6 x 20, in diagonally opposite sequence and stage by stage	12 Nm	

- Remove engine locking device (No. 11 5 640) and centering pin for clutch (No. 21 2 673) .

(-) Installing oil pump

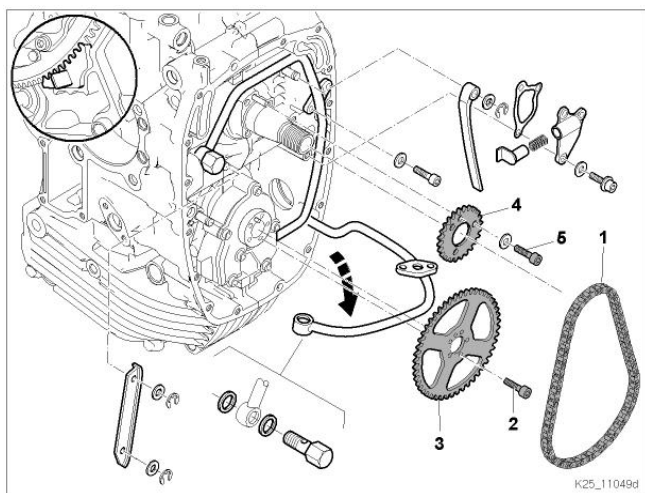


- Ensure Woodruff key (7) is seated correctly.
- Install outer rotor for lube oil (1) in the oil pump housing with the mark (arrow) facing forward. Take care not to mix up the outer rotors.
- Hold oil pump housing (2) in position.
- Install outer rotor for cooling oil (6) with the mark (arrow) facing forward.
- Install inner rotor for cooling oil (5). Make sure that the groove in the inner rotor is in line with Woodruff key (7) of the countershaft and that the mark (arrow) is pointing forward.
- Install new screws (4), noting the different lengths of the screws.

 Tightening torques		
Never re-use the original screws, M6 x 40	Initial torque, 4 Nm	
	Final torque, 90 °	
Never re-use the original screws, M6 x 45	Initial torque, 4 Nm	
	Final torque, 90 °	


(-) Installing timing-chain pinion on crankshaft

- Install timing chain pinion (4), making sure that the



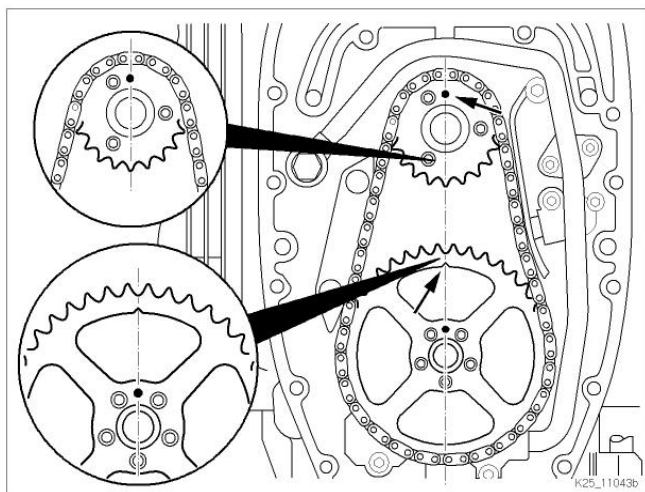
locating pin for the crankshaft engages the hole in the timing chain pinion.

- Install screws (5).

 Tightening torques		
Chain sprocket to crankshaft, M6 x 16	8 Nm	

(-) Adjusting crankshaft and auxiliary shaft to ignition TDC

- Make sure that the crankshaft and countershaft are in the **"firing TDC, right cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



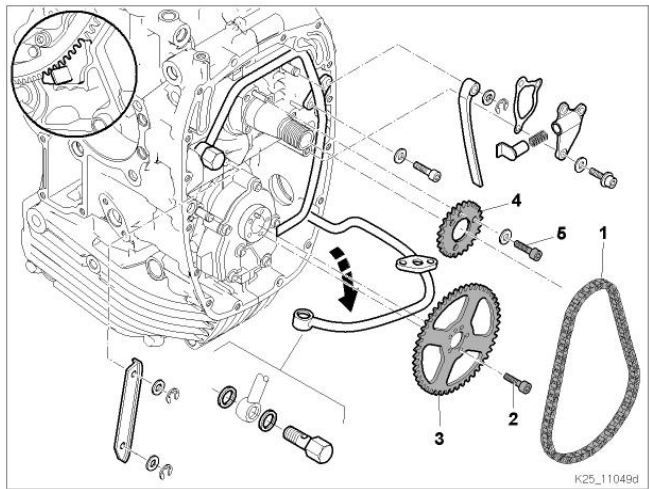
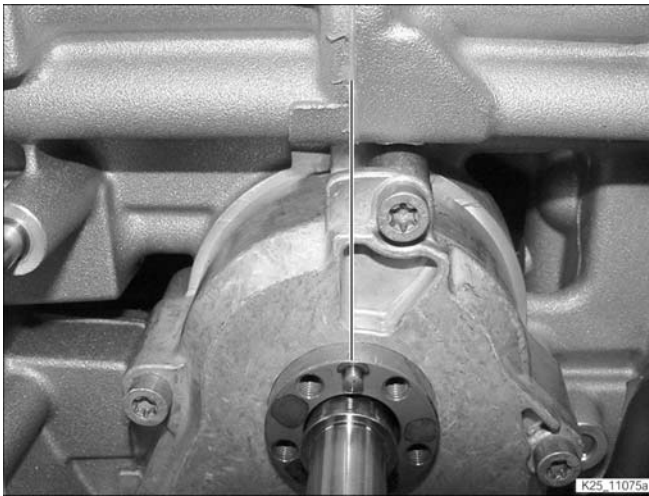
(-) Installing timing chain, crankshaft/auxiliary shaft

Precondition

- The countershaft is at firing TDC for right-hand cylinder, the locating pin of the countershaft is at the top, at the split line between the two halves of the crankcase.



- If necessary, turn the countershaft to firing TDC for the right-hand cylinder, so that the locating pin of the countershaft is at the top, at the split line between the two halves of the crankcase.




! Attention

Nature: Installing the timing chain in the wrong position will result in poor engine performance or cause parts to collide because the valve timing is off

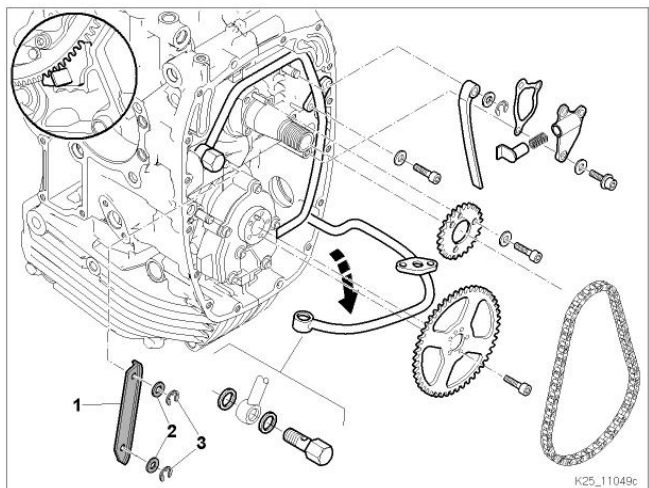
Avoidance: When turning the crankshaft, make sure that the timing chain does not come away from the crankshaft pinion (keep the timing chain taut).

- Install timing chain (1) with countershaft sprocket (3), making sure that the locating pin for the countershaft engages the hole in the countershaft sprocket.
- Install new screws (2).

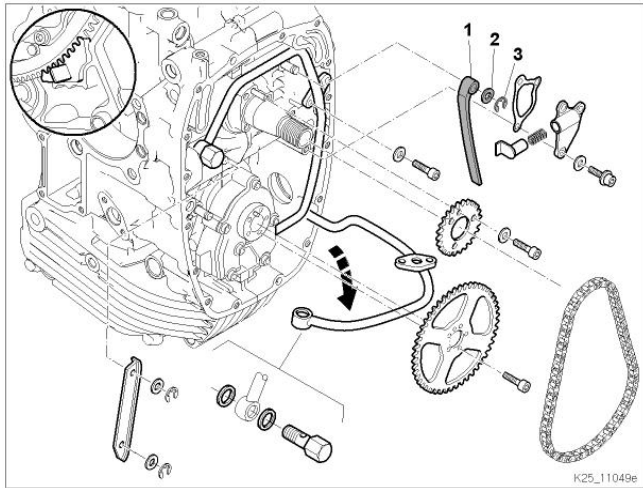
 Tightening torques	
Sprocket to auxiliary shaft, M5 x 16, Replace screws	8 Nm

(-) Installing timing chain guide rail, crankshaft/auxiliary shaft

- Install timing-chain guide rail (1).
- Install spacers (2) and retaining washers (3).



(-) Installing timing chain tensioner rail,

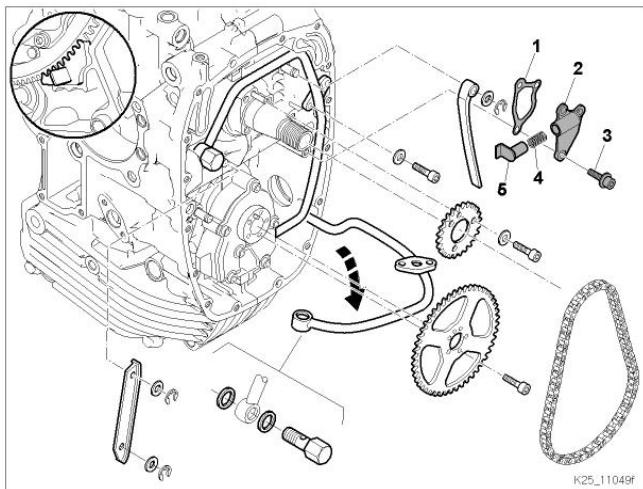



crankshaft/auxiliary shaft

- install timing-chain tensioning rail (1).
- Install spacer (2) and retaining washer (3).

(-) Installing timing chain tensioner, crankshaft/auxiliary shaft

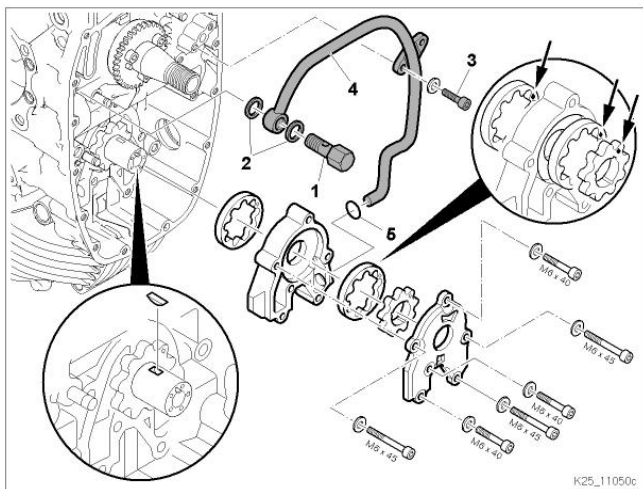
- Check gasket (1) for damage; replace if necessary.
- Install seal (1).
- Place housing (2) in position together with spring (4) and piston (5), making sure that the piston is angled toward the rear.
- Install screws (3).




 Tightening torques		
Housing for chain tensioner to crankcase, M6 x 25	8 Nm	


(-) Installing cooling oil line

- Install new O-ring (5).
- Install cooling oil line (4) and pivot it up.
- Install screws (3).



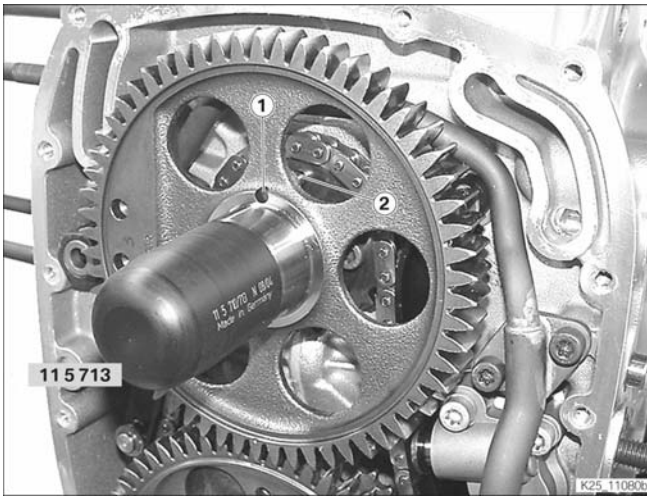
 Tightening torques		
Cooling oil line (inside engine) to crankcase, left, M6 x 16	8 Nm	

- Install banjo bolt (1) with new sealing rings (2).

 Tightening torques		
Banjo bolt, M14 x 4.5	25 Nm	

(-) Installing counterbalance shaft drive gear

- Clean inner taper of counterbalance drive gear and outer taper of crankshaft, **both must be free of oil**



and grease.

- Install the drive gear for the balancing shaft, making sure that straight pin (2) of the crankshaft engages hole (1) in the drive gear.
- Install a suitable tool for holding the drive gear and preventing it from turning.

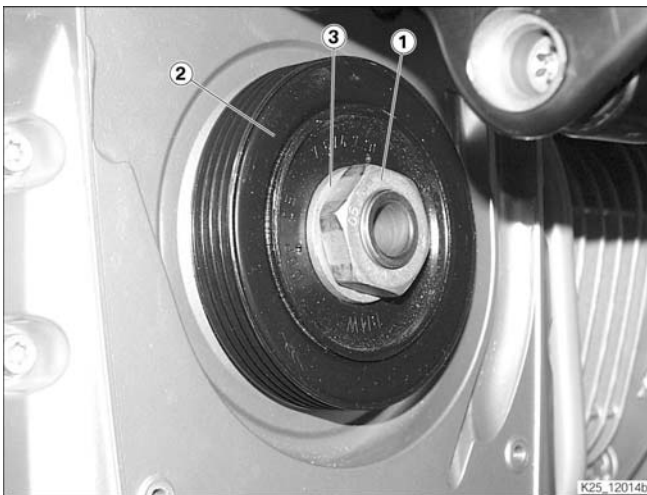
► **Installing crankshaft belt pulley**


Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.



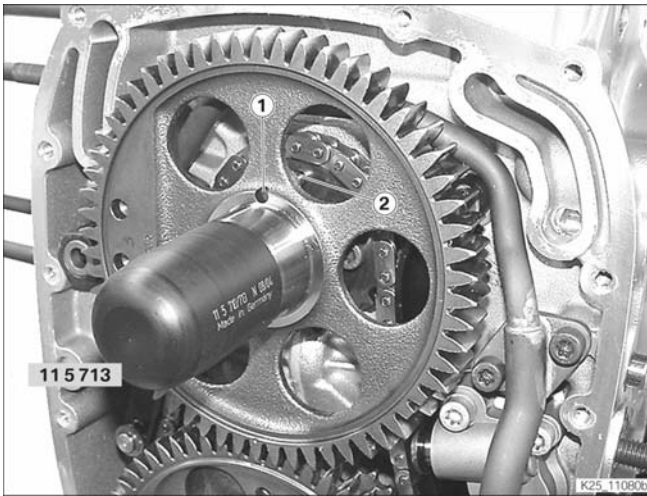
 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	



- Remove TDC locating pin (No. 11 2 650) .



- Remove the tool for holding the drive gear and preventing it from turning.



► **Removing crankshaft belt pulley**

Precondition

- Engine locked.

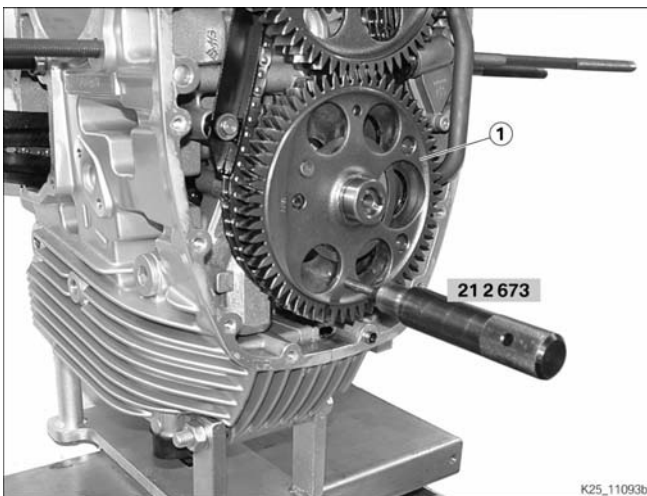


- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

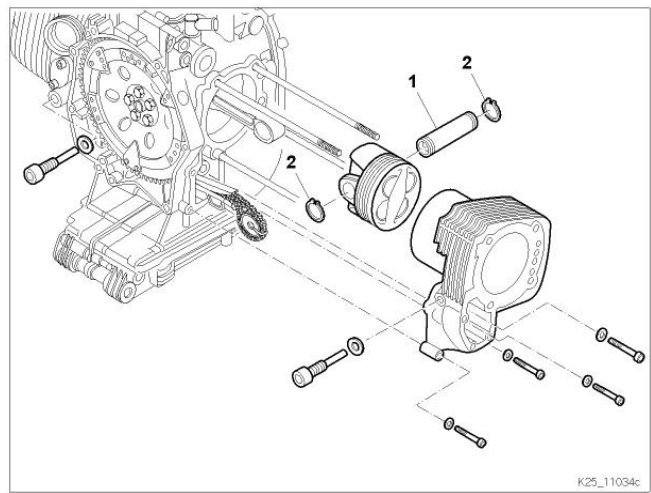
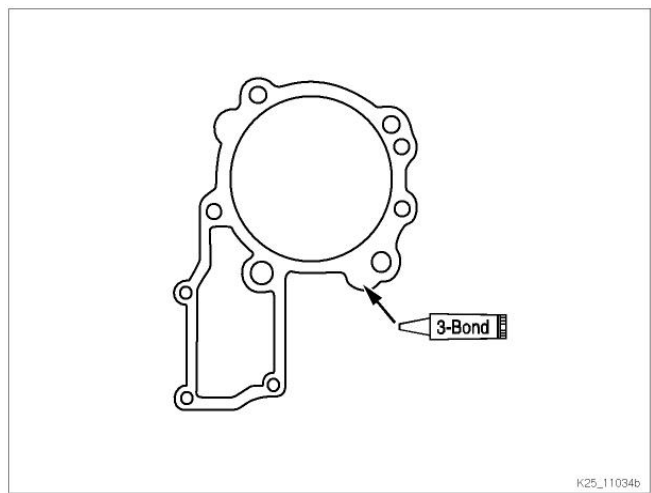
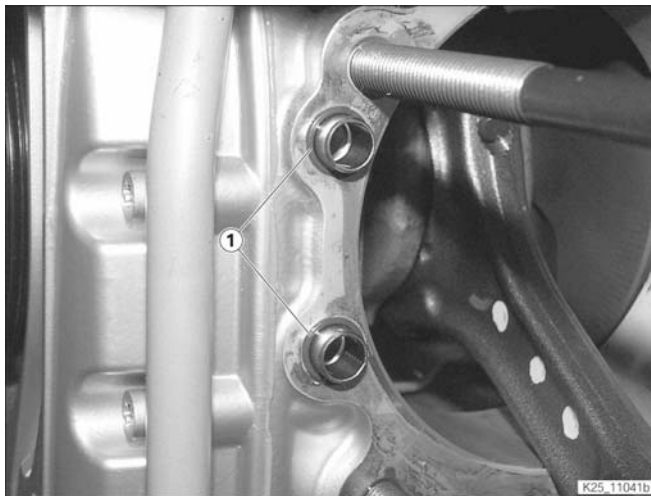


◄ **(-) Installing tensioning wheel**

- Install tensioning gear (1), if necessary noting the feather key in the balancing shaft.
- Remove clutch centring pin (No. 21 2 673) .



(-) Installing right cylinder




Precondition

- Crankshaft is locked at TDC.




- Slip new O-rings (1) over the reamed sleeves and into the crankcase.

- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 <p>Consumables/lubricants</p>		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.

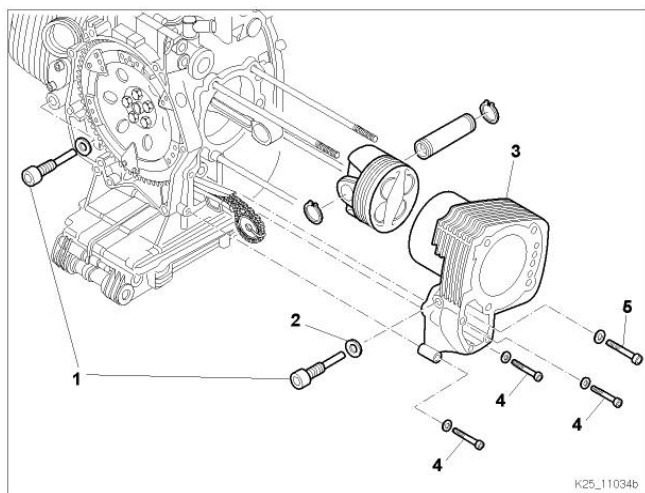
 <p>Consumables/lubricants</p>		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain



cavity, take care not to drop parts into the engine.

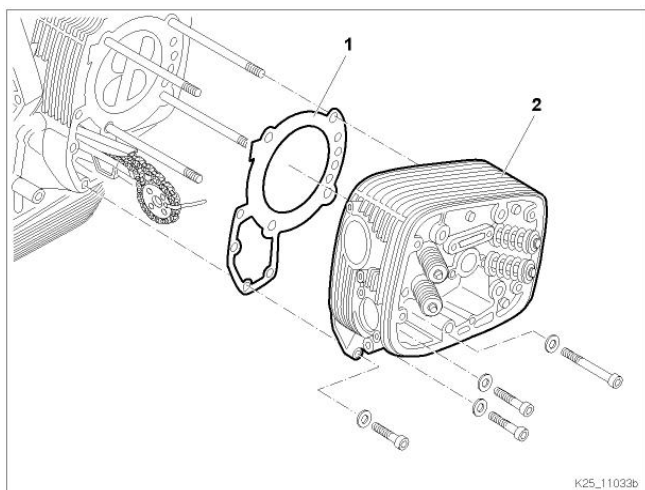
Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



⚠ Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

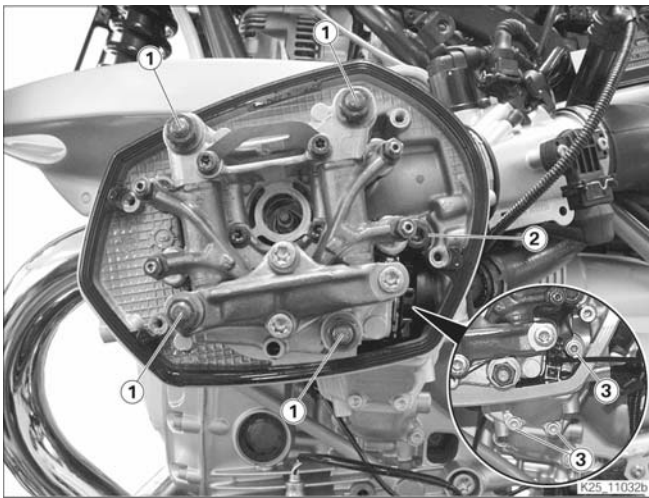
- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

⚠ Attention


Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mils at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.



Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

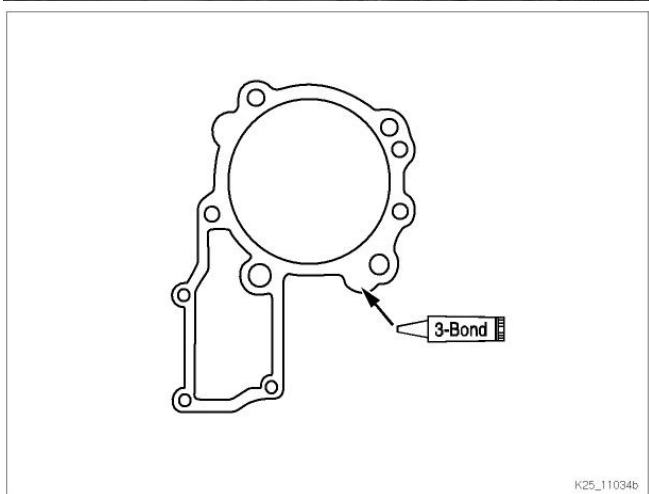
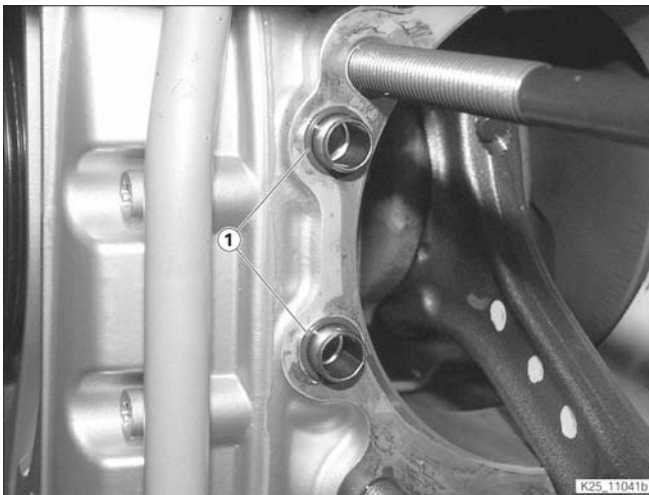
(-) Installing left cylinder

Precondition


- Crankshaft is locked at TDC.

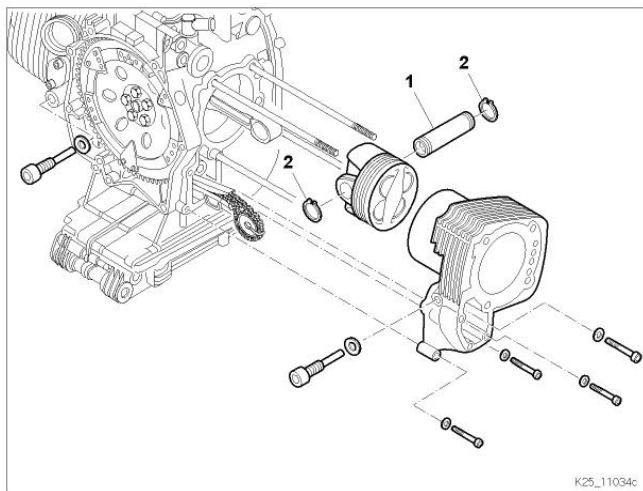


- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376



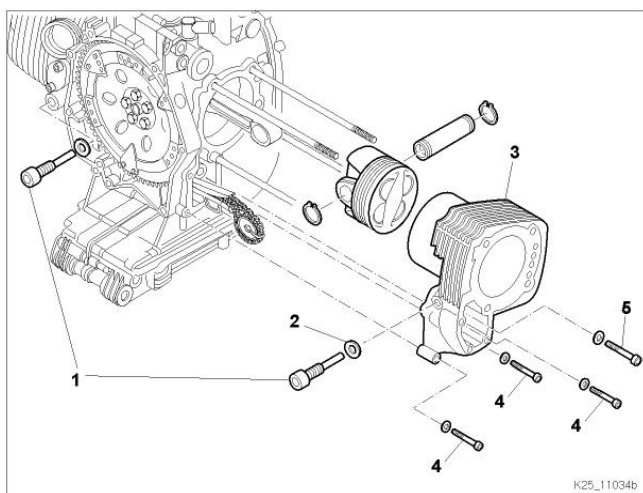
- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Tightening torques

right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).



Tightening torques

Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	
--	-------	--

(-) Installing left cylinder head

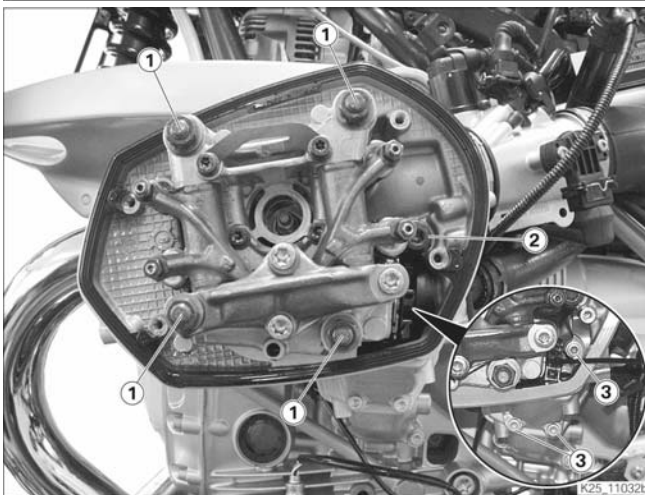
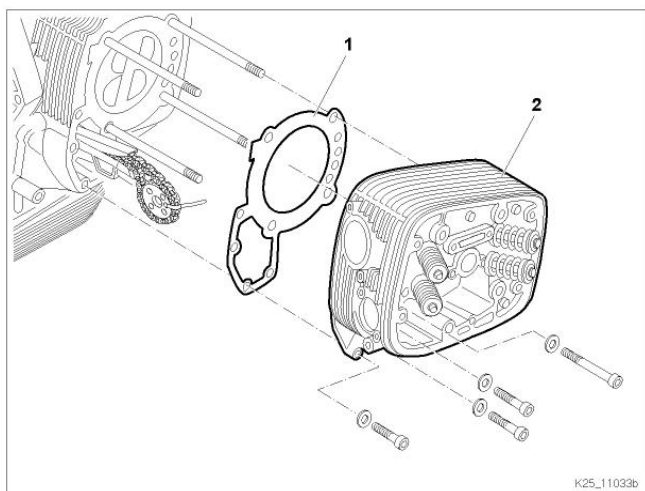
- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed



(firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

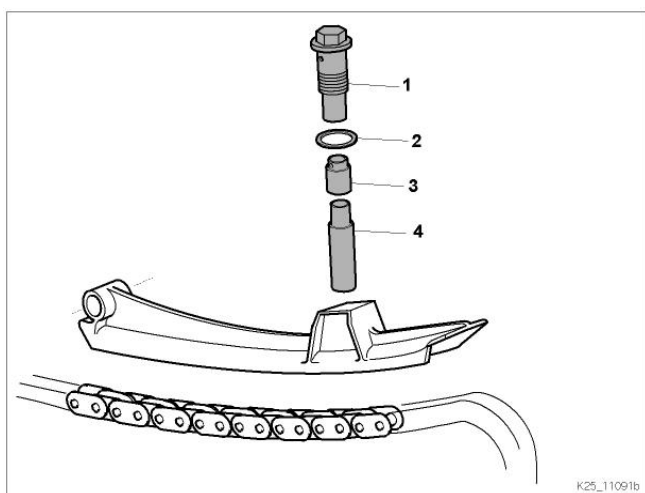
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Installing left timing chain tensioner


- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore up in the chain tensioner.
- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.

>>



The chain tensioner must slide onto the piston without tilting.

- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	

(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and that the screw is tightened hand-tight.



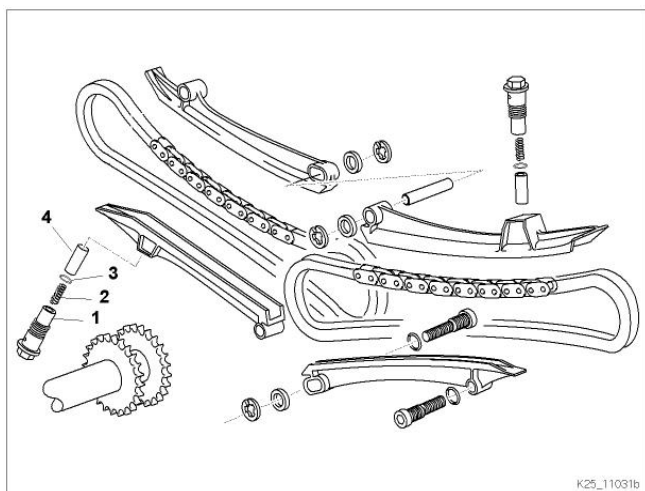
▶ Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.




- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.



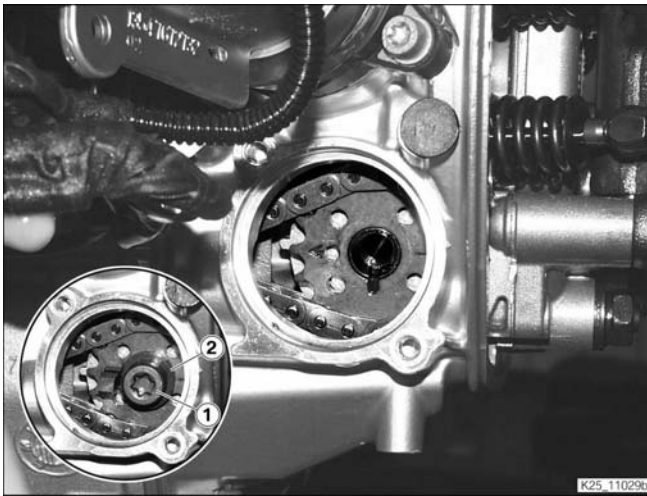
 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



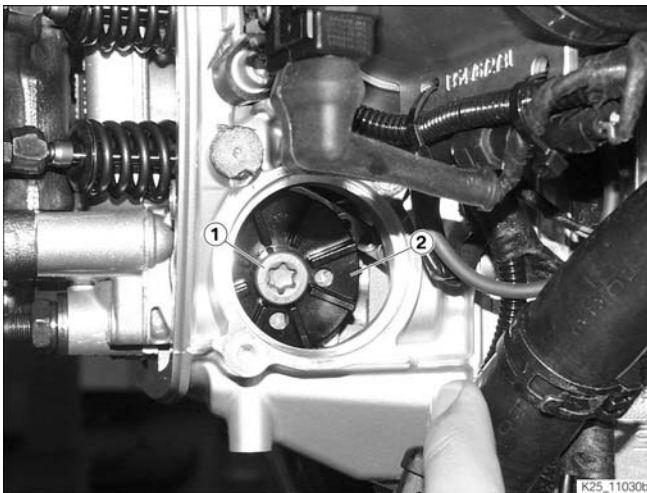
(-) Securing left camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).



Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

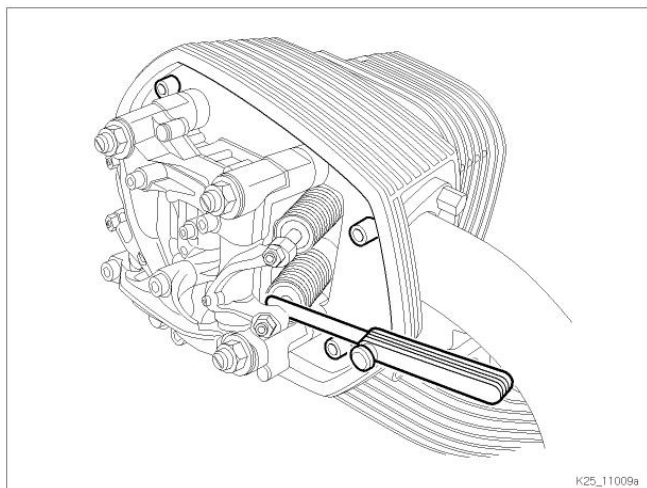
Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	

Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	
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Result: Valve clearance is out of tolerance.

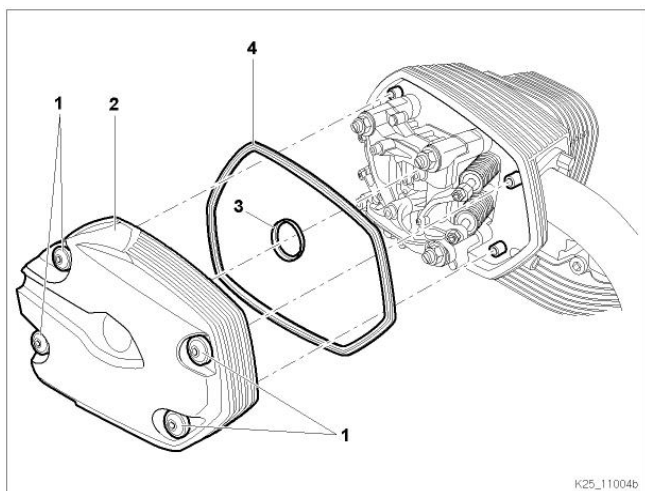
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.


 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing cylinder head covers



- Gaskets must be free from oil and grease, replace if damaged.
- Fit gaskets (3) on cylinder head covers.
- Fit gaskets (4) on cylinder heads.
- Install the cylinder head covers, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

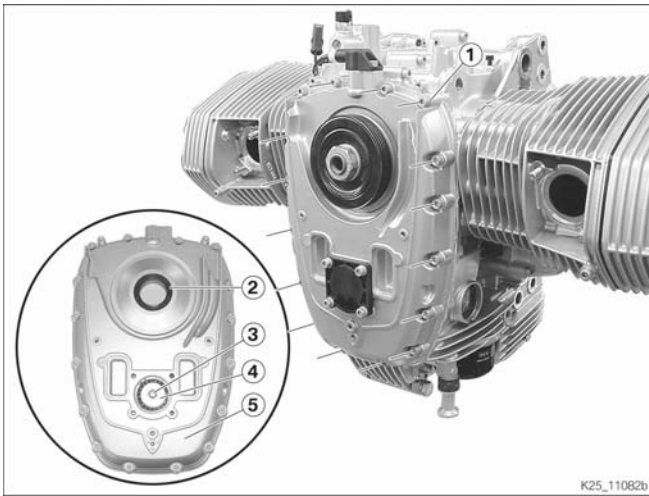
 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing timing case cover




- Install sliding sleeve (No. 11 5 713) .

- Make sure the sealing surface of the timing case cover is clean and free of grease and run a uniform bead of




sealant round the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

► **Securing crankshaft inductive sensor in timing case cover**

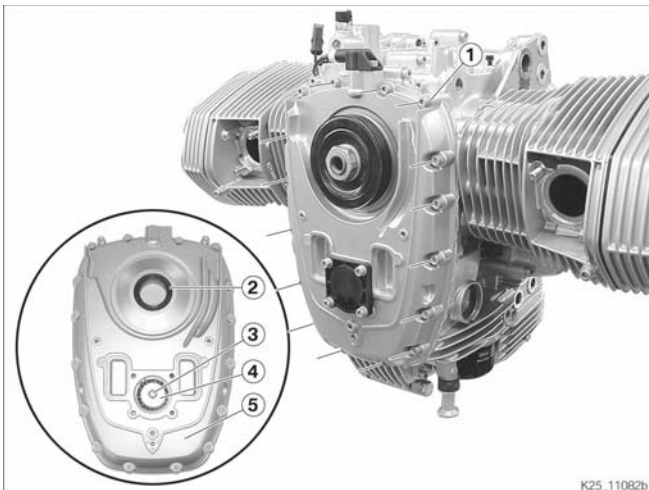
- Position inductive sensor for crankshaft (2) on the timing case cover and install the screw.




 Tightening torques		
Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	




- Place timing case cover (5) in position.
- Install screws (1).



 Tightening torques		
Timing case cover to crankcase, M6	8 Nm	


- Remove sliding sleeve (No. 11 5 713) .
- Install screw (3) and washer (4).

 Tightening torques		
Gear wheel to balancing shaft, M8 x 50	19 Nm	

(-) Installing counter balance shaft cover

- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).



 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

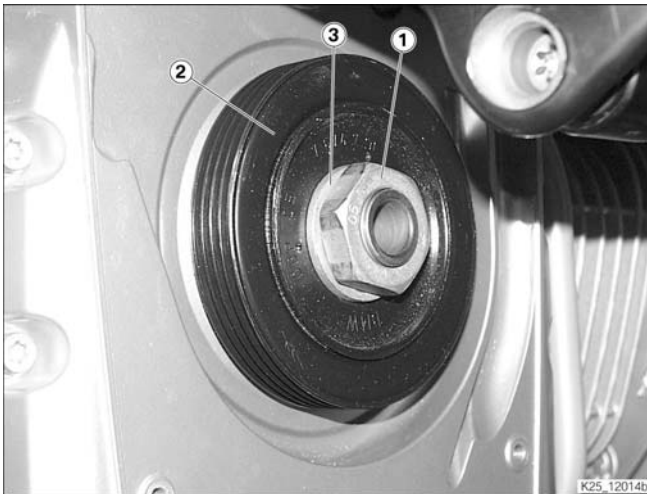
(-) Installing crankshaft belt pulley


Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.



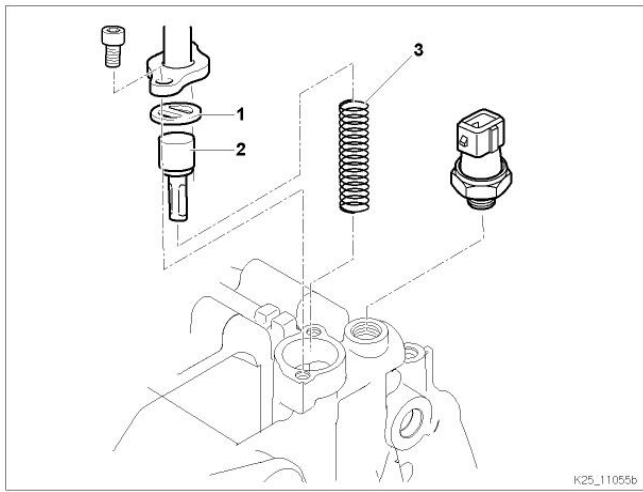
 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	

- Remove TDC locating pin (No. 11 2 650) .



(-) Installing oil thermostat

- Install spring (3), control element (2), and supporting plate (1).



(-) Installing right camshaft cover

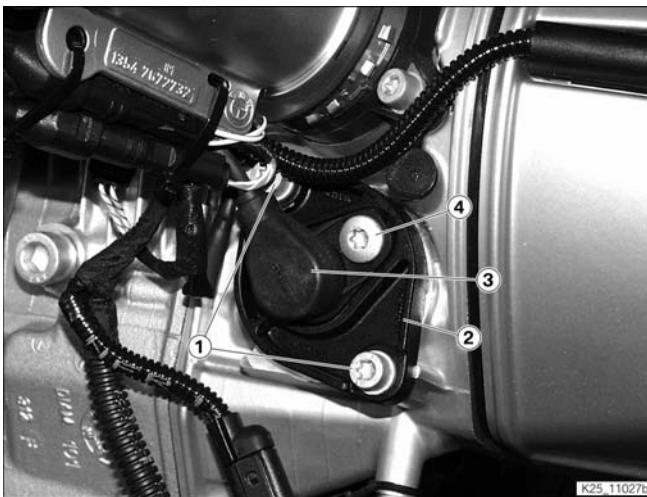


Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).



(-) Installing left camshaft cover

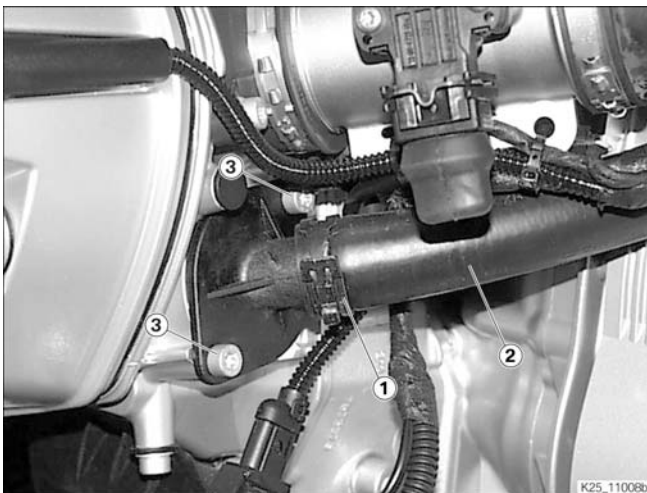


Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

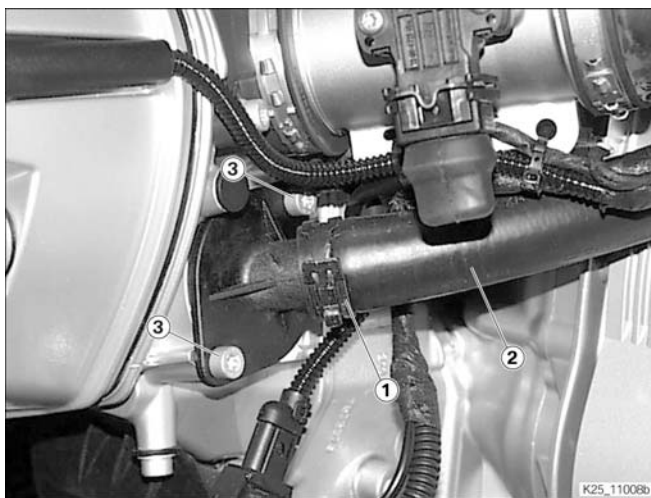
Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).



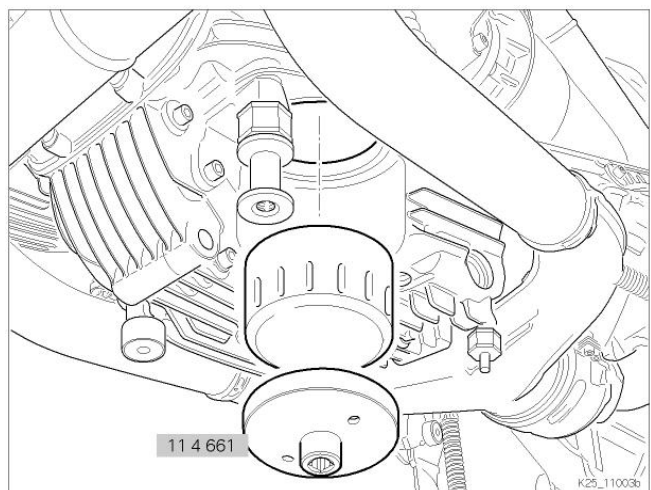
► Connecting hose for crankcase breather


- Connect hose (2) to the camshaft cover.
 - Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



◀ (-) **Installing oil filter**

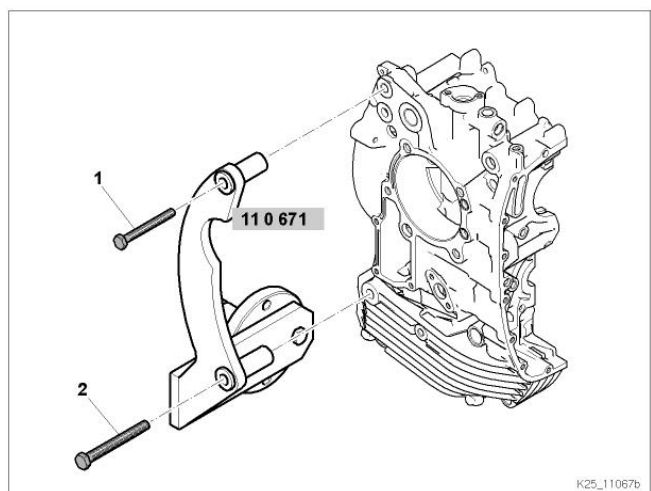
- Coat the sealing ring for the new oil filter with engine oil.
- Using wrench (No. 11 4 661) , install and tighten the oil filter.



 Tightening torques		
Oil filter, Sealing ring wetted with engine oil	11 Nm	

(-) **Removing engine holder from right half of engine block**

- Remove screws (1) and (2).
- Remove engine holder (No. 11 0 671) .



11 12 009 Tightening cylinder head



Note

If a cylinder tiebolt was slackened in order to permit repairs to be effected, for example, the security of the cylinder head fasteners must be checked after approx. 1000 km (600 miles).

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



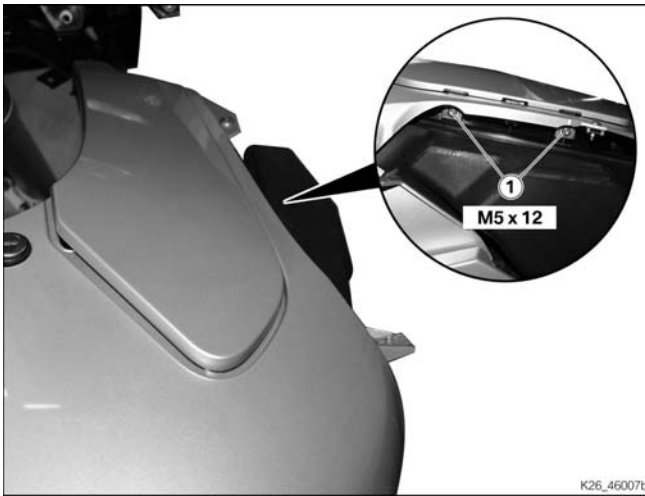
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing trim panels

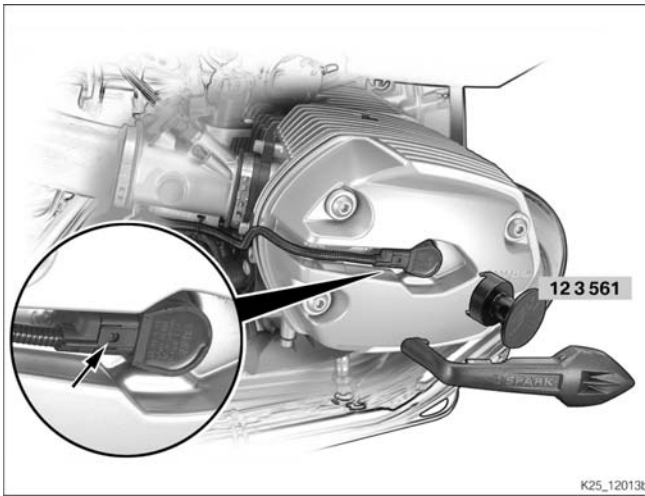
- Undo front screw (1) from both bottom sections of the fairing.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF
- ▶ **—————**
- Remove the primary spark plug cover.



⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

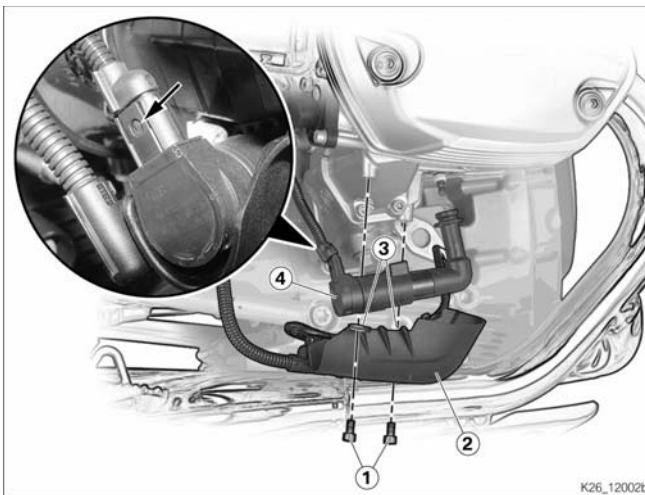
(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



- Slacken screws (1) and remove cover (2) with sleeves (3).



⚠ Attention

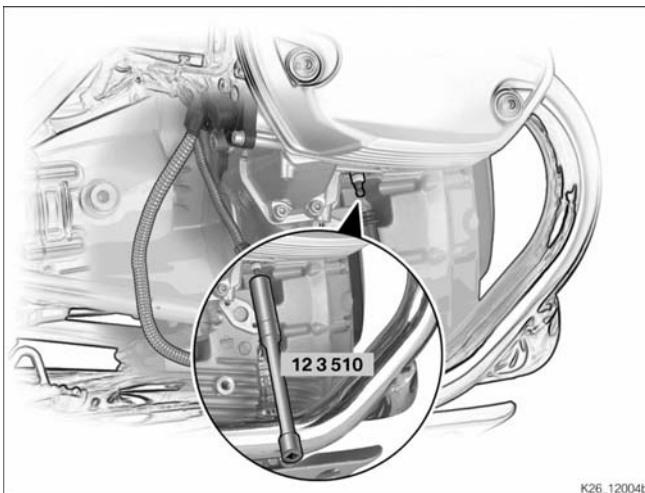
Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

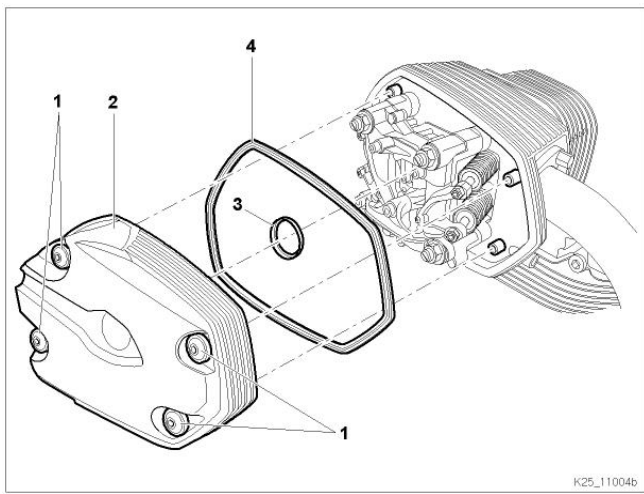
- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



(-) Removing cylinder head cover




- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

 Technical data			
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	

- Remove gaskets (3) and (4).

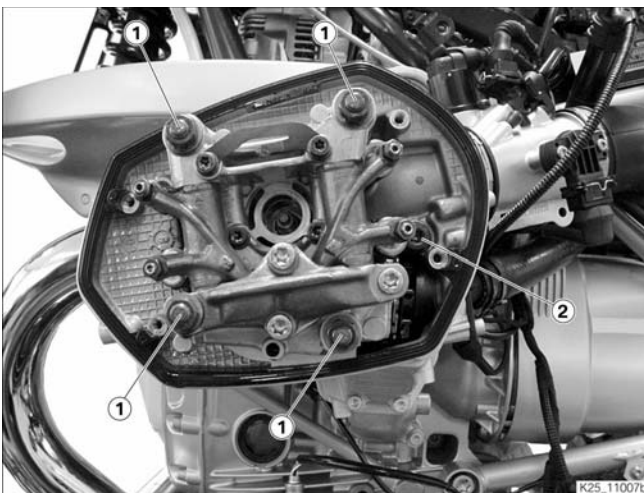
(-) Setting engine to firing TDC




- Engage the highest gear and turn the rear wheel until the piston of the cylinder in question is at firing TDC (TDC = top dead centre).
- » The inlet and exhaust valves in the cylinder concerned are closed; those of the other cylinder are at overlap.
- You can make sure the cylinder is at TDC by inserting locating pin (No. 11 2 650) .

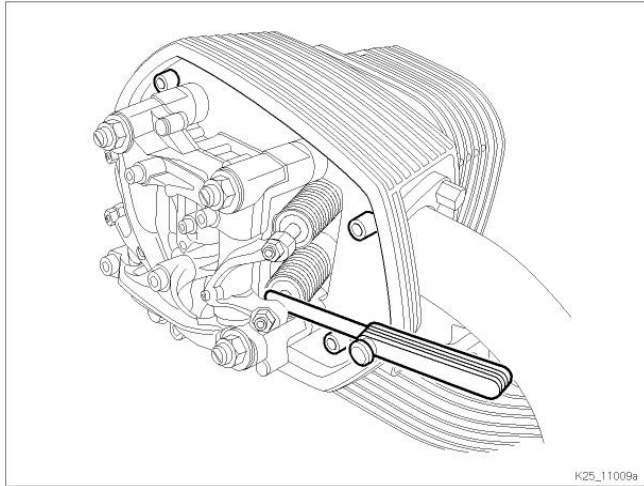
(-) Tightening cylinder head fasteners

- Slacken and retighten cylinder-head nuts (1) of tie-bolts and M10 screw (2) in correct sequence.



 Tightening torques		
Nuts of tie bolts, M10, In diagonally opposite sequence, slacken and then retighten each nut	Closing torque, 20 Nm	
	Final torque, 180 °	
Screw, M10 x 85, Slacken and retighten screw	40 Nm	

(-) Adjusting valve clearance




Test

- Measure valve clearance with feeler gauge.



Note


You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.

 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

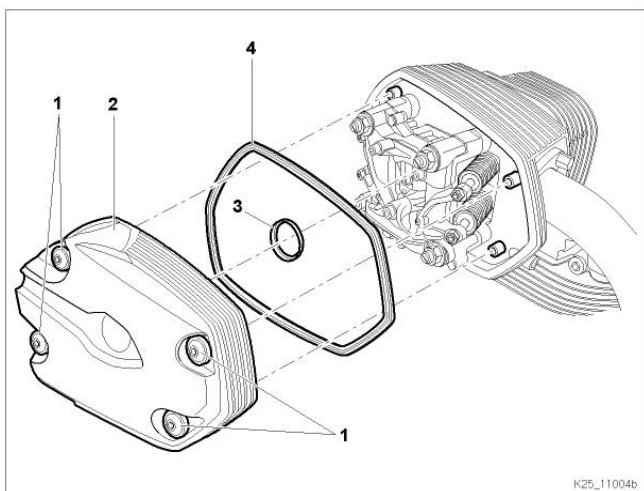
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.


 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing cylinder head cover

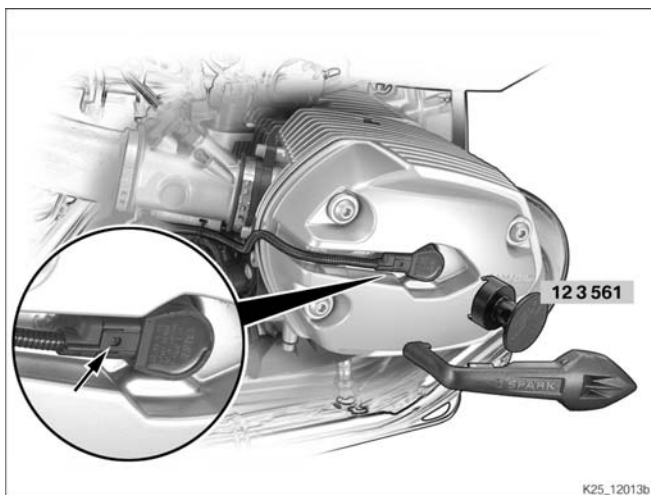


- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing direct ignition coil

-



Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.

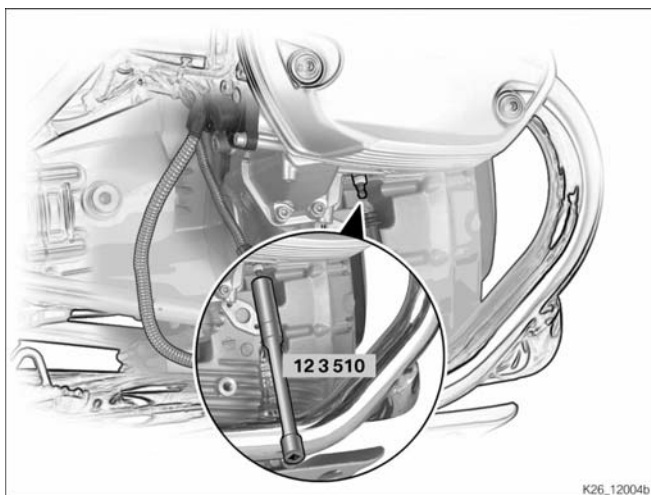
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.


(-) Checking secondary spark plugs


- Visually inspect the secondary spark plugs.
- Dispose of damaged spark plugs in an environmentally compatible manner.
- If the appearance of the spark plugs is abnormal, ascertain and rectify the cause.

(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.




 Tightening torques		
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	

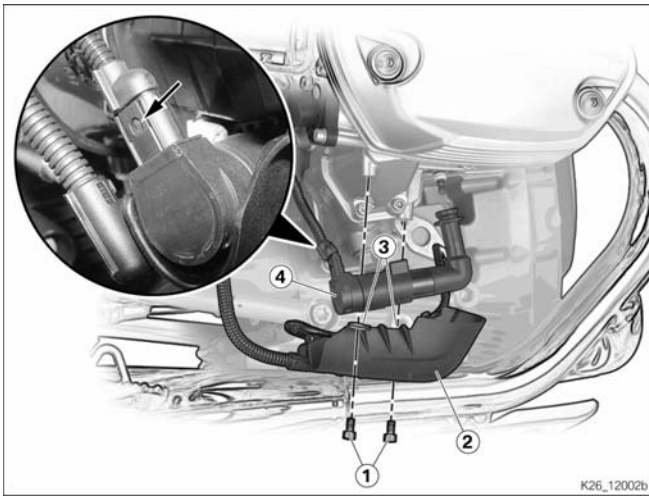
 Technical data			
Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE	

(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.

 Consumables/lubricants		
Talcum powder	Assembly aid	

- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.



Tightening torques

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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(-) Securing trim panels



- Install front screw (1) in both bottom sections of the fairing.

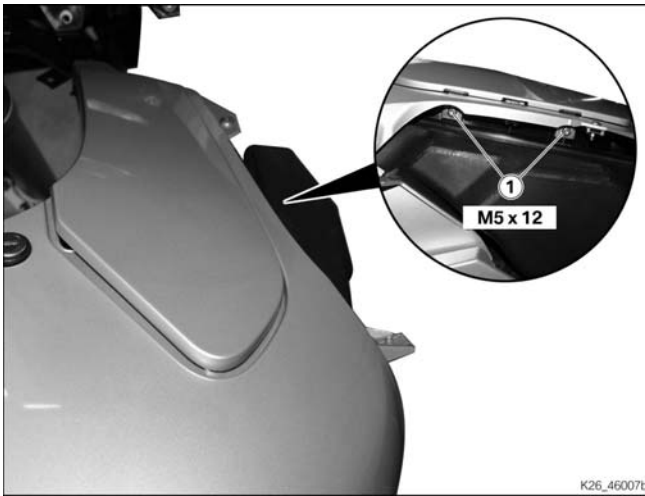
(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.




(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



Technical data

 Technical data			



Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 12 050 Replacing cylinder-head covers**

(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF



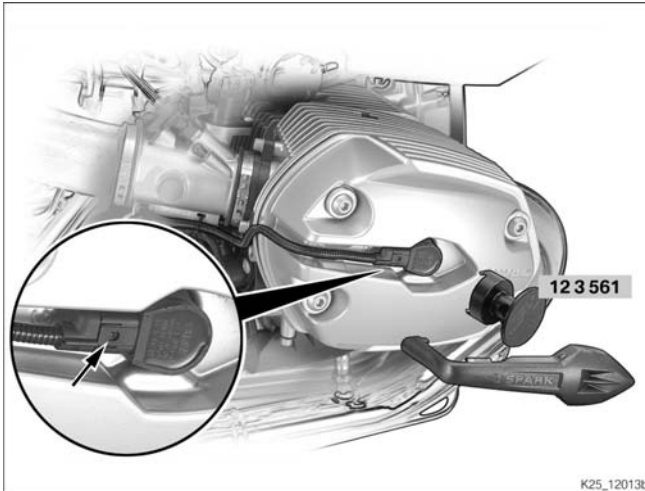
- Remove the primary spark plug cover.



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

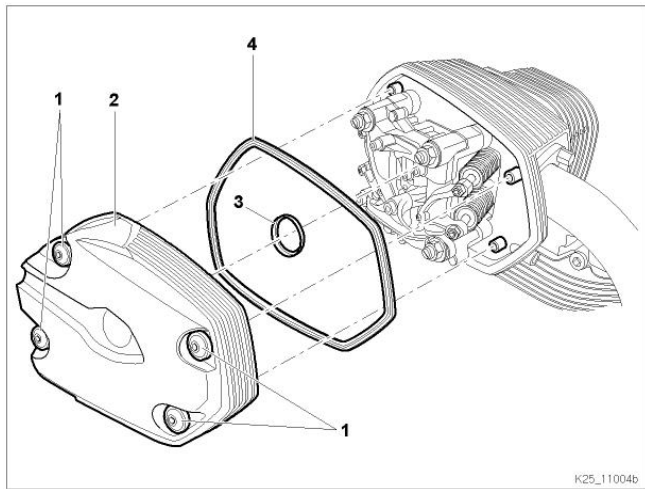
(-) Removing cylinder head cover


- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

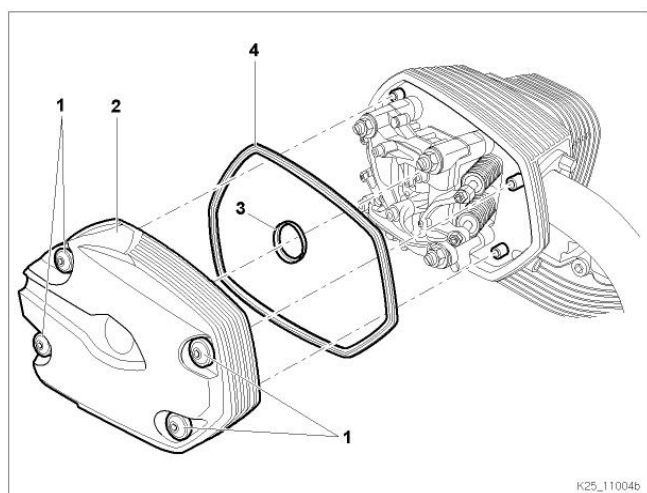


 Technical data			
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	


- Remove gaskets (3) and (4).

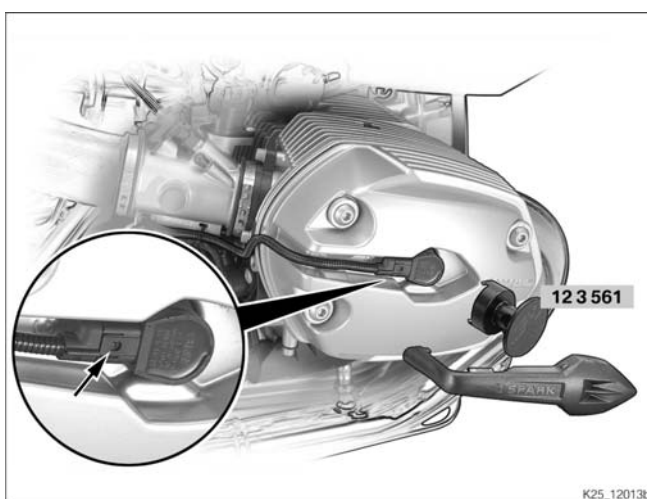
(-) Installing cylinder head cover

- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.



Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	



(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

11 12 060 Replacing left cylinder-head gasket



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

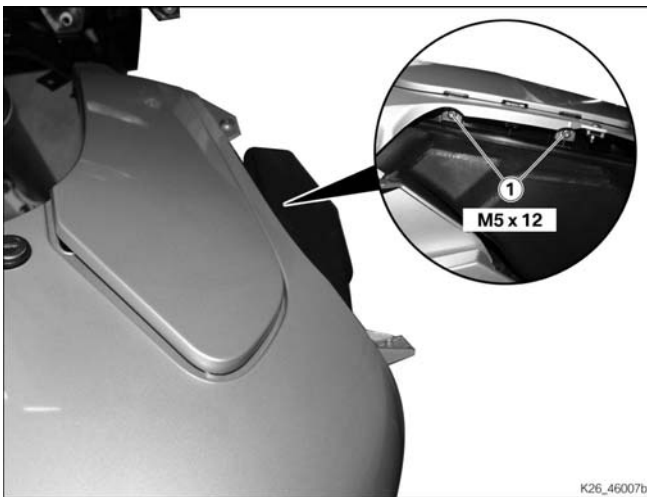
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



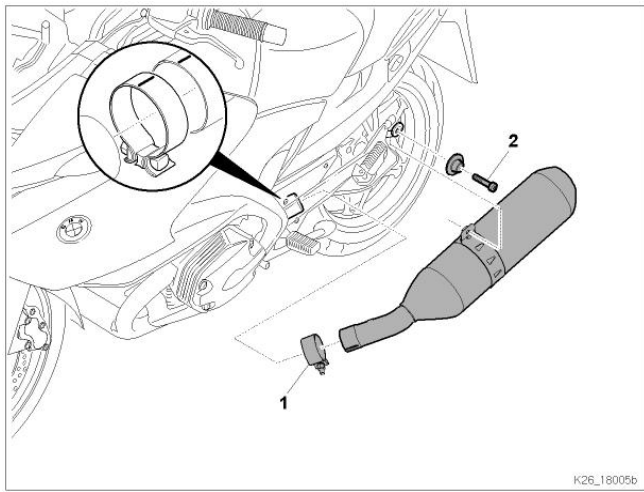
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



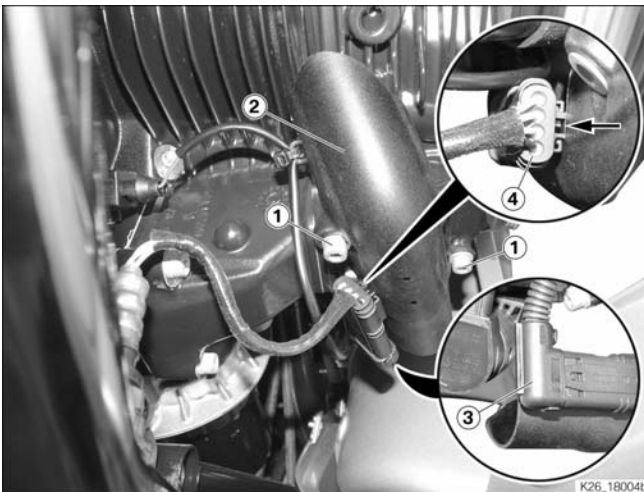
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

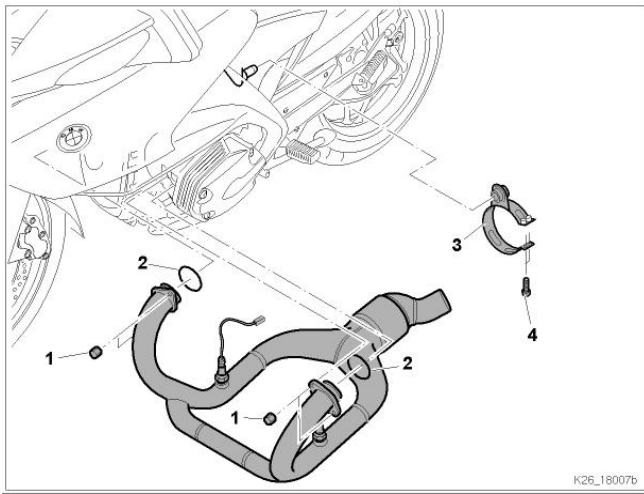
- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- ◀ Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.



(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



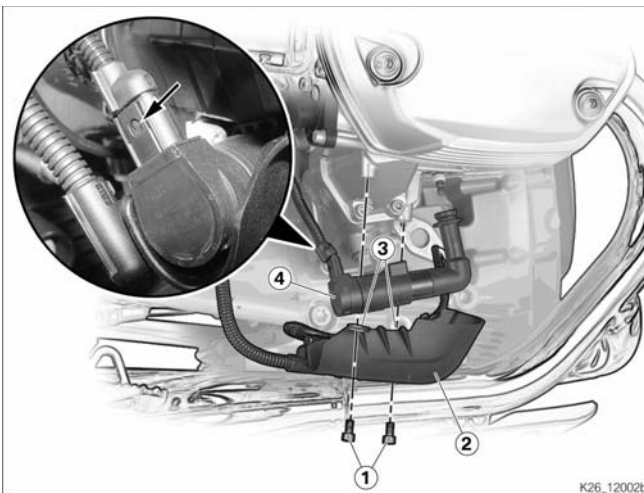
- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

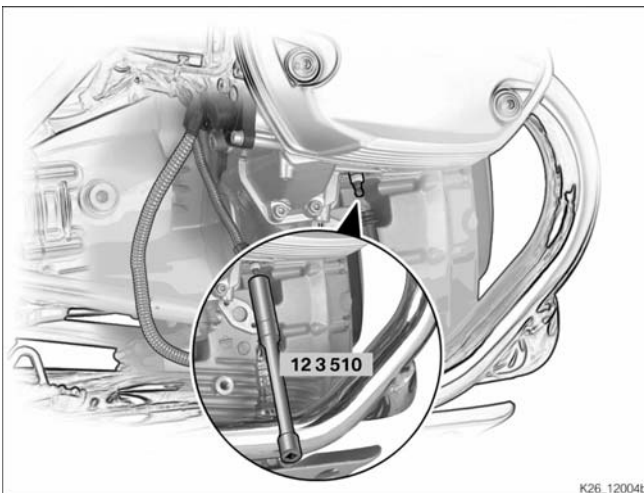
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



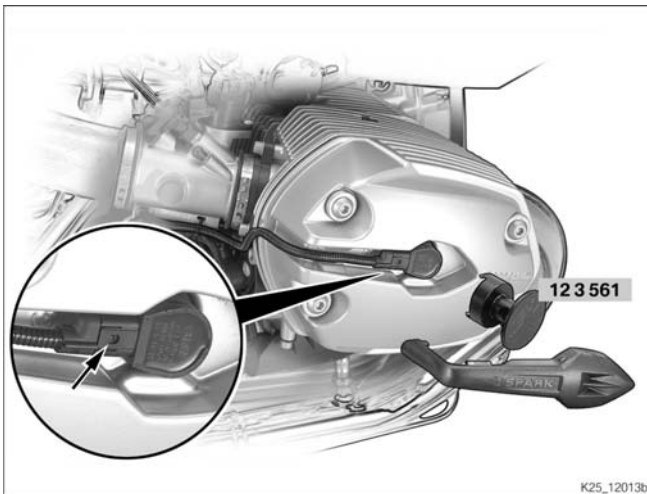
- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.




(-) Removing direct ignition coil



Precondition


- Ignition is switched OFF

- ▶  Remove the primary spark plug cover.

Attention

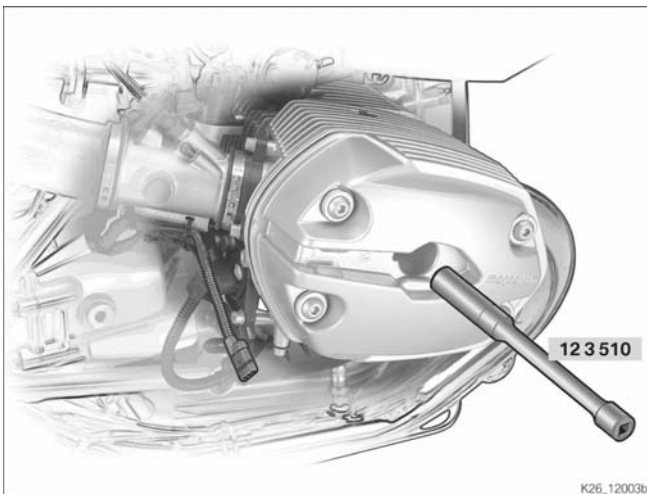
Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab () and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

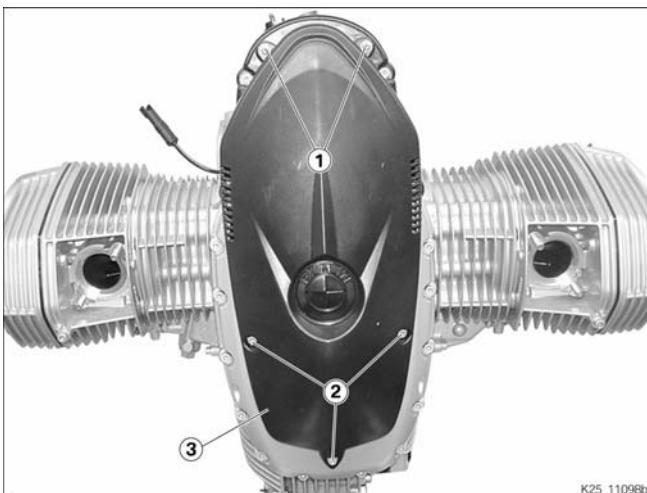
(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the primary spark plug.



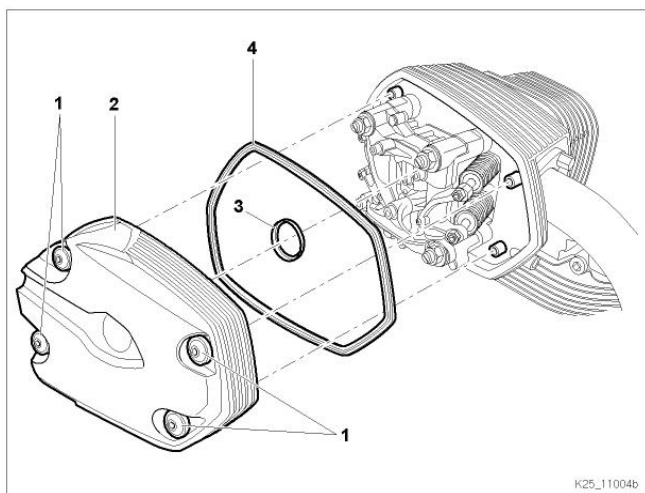
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

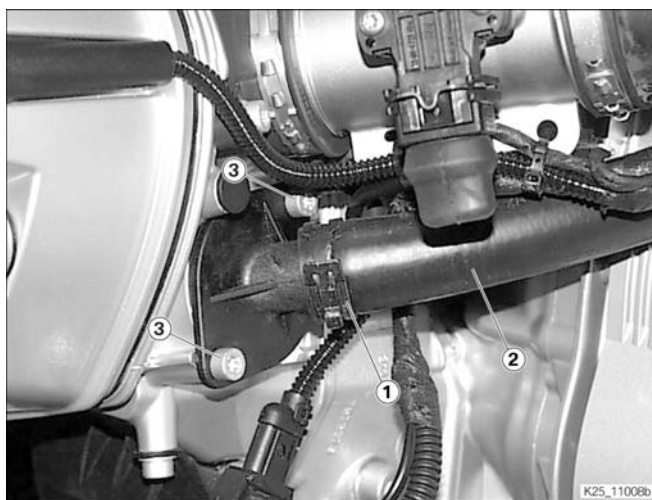


Technical data

Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

(-) Removing left camshaft cover

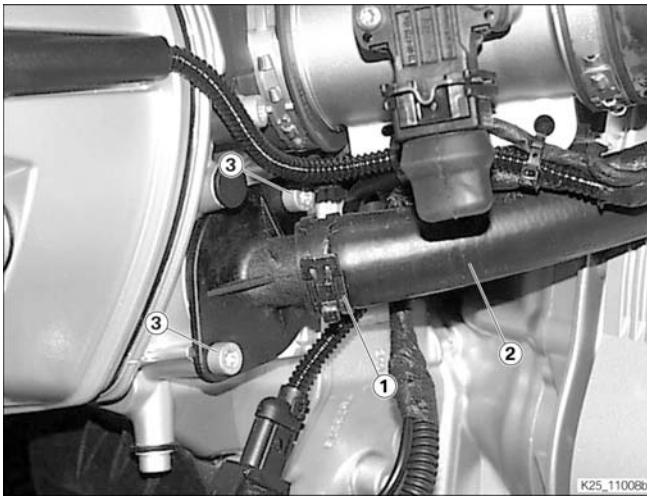


▶ **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



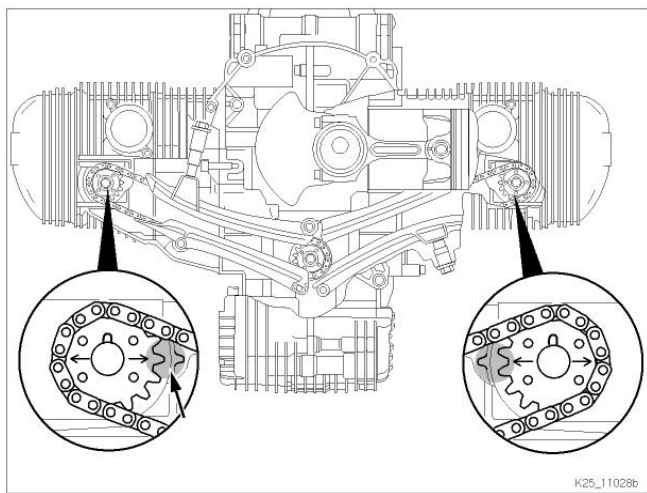
(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.



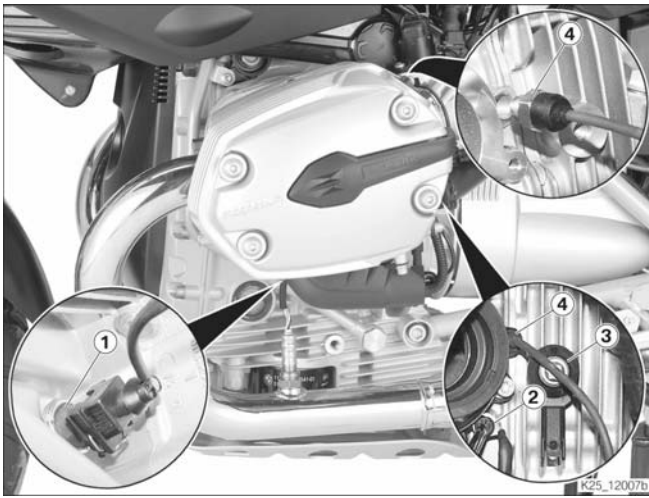
- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



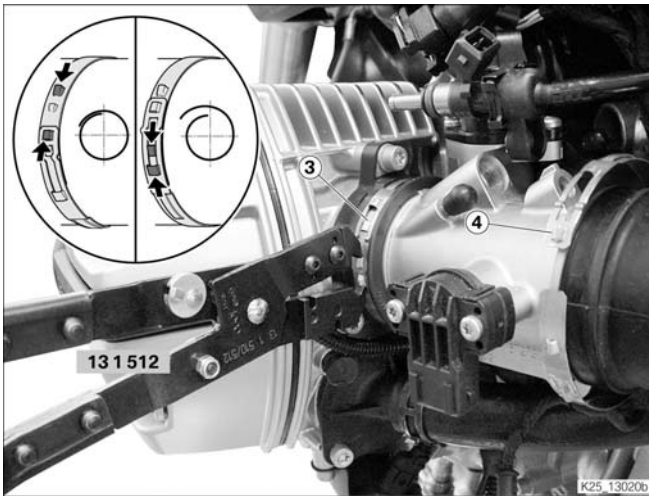
(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).



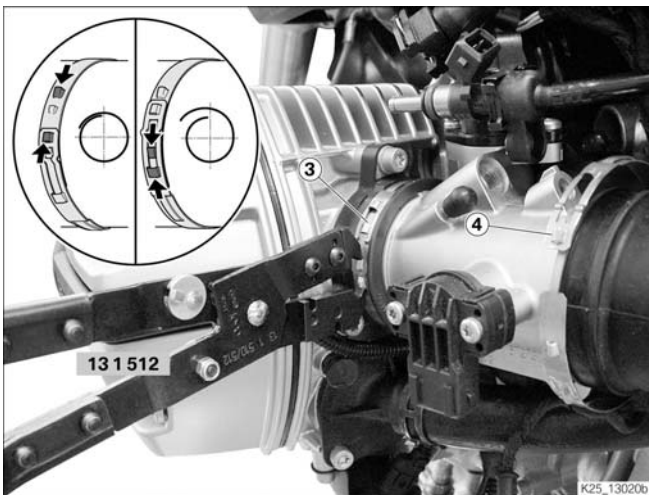
(-) Disconnecting intake air pipe from throttle-valve stub

- Open clips (4) on left and right with pliers (No. 13 1 512) .

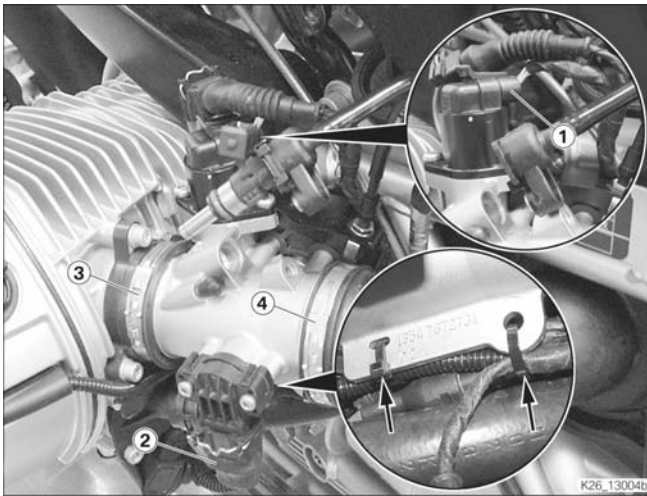


(-) Disconnecting left throttle-valve stub

- Open hose clips (3) at the left throttle valve stub with pliers (No. 13 1 512) .



- Cut through the cable tie (arrow) on the left.
- Disconnect plug of left idle actuator (1).
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the throttle-valve stub on the left and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.



- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

(-) Removing breather plate

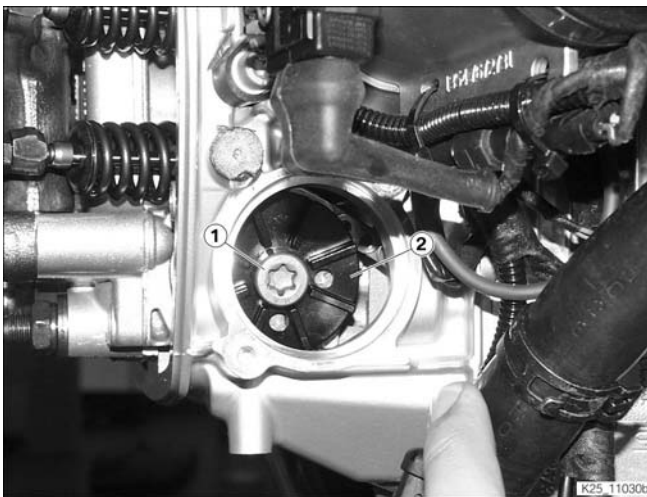
- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).



(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

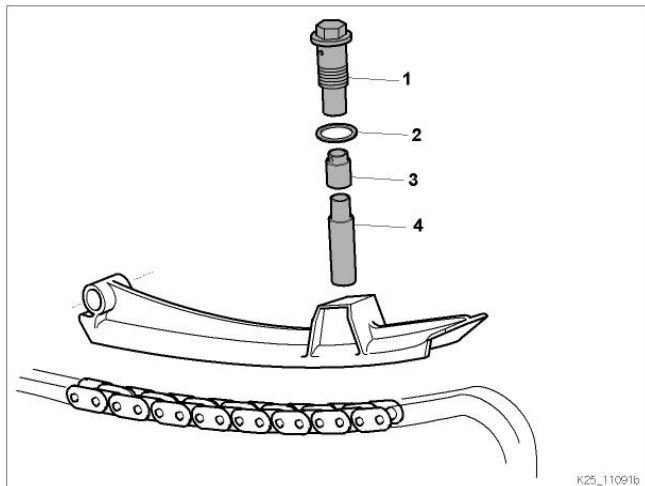
- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

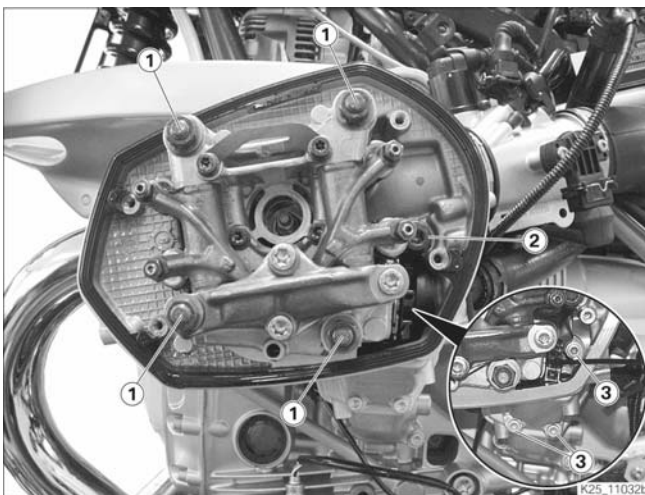
When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.



(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



(-) Removing left cylinder head

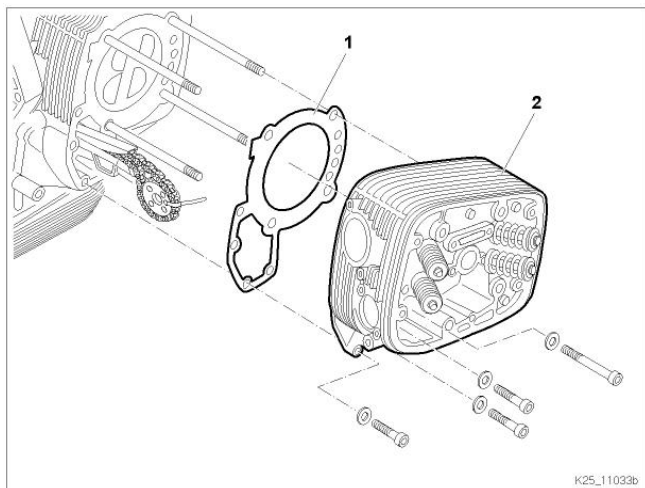
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



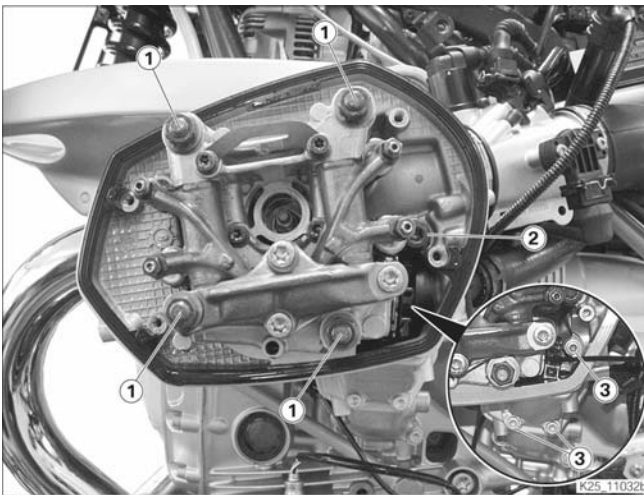
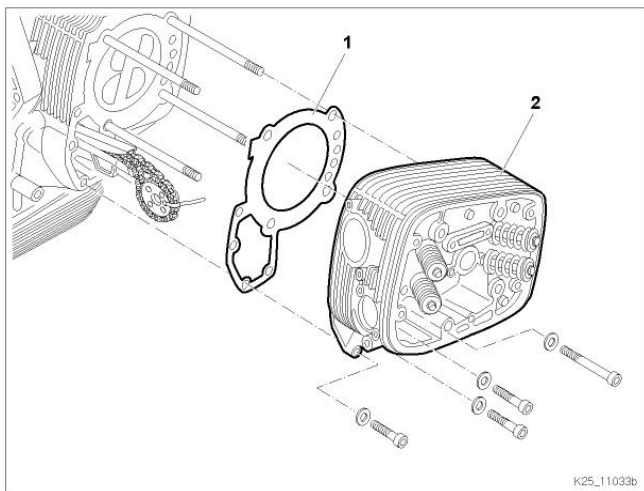
- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.

(-) Installing left cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention



Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

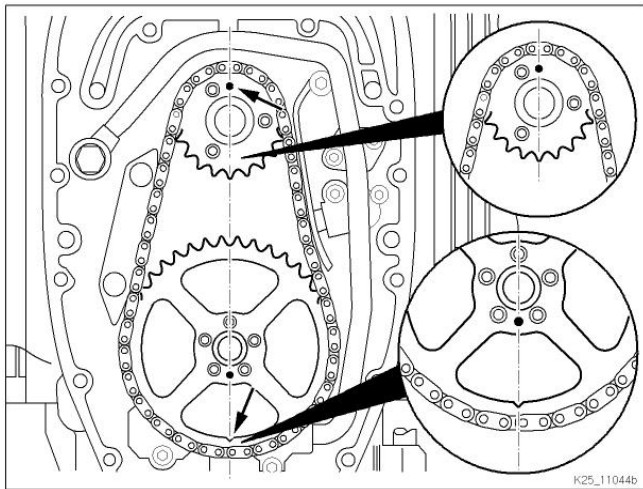
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

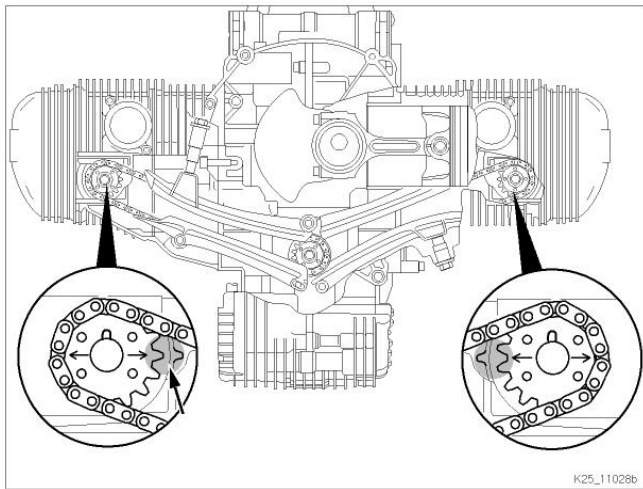
Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, left (cylinder No. 2)

- Make sure that the crankshaft and countershaft are in the "firing TDC, left cylinder" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the sprocket for the timing chain of the



countershaft is **down** and at the top the split line between the two halves of the crankcase is between two teeth.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **up**.
- » The valves in the left-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

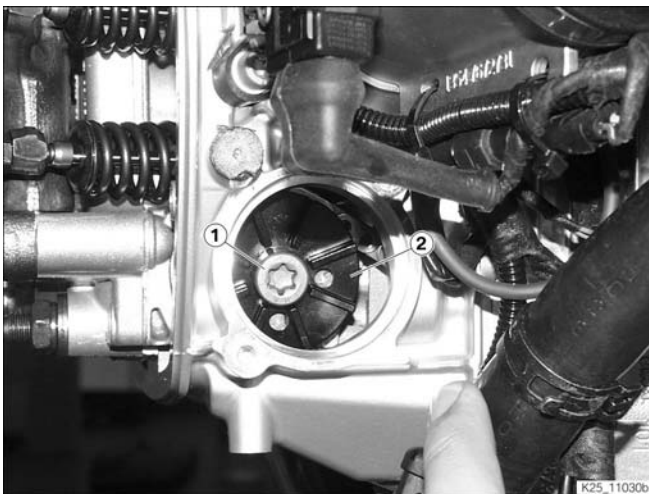


- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.



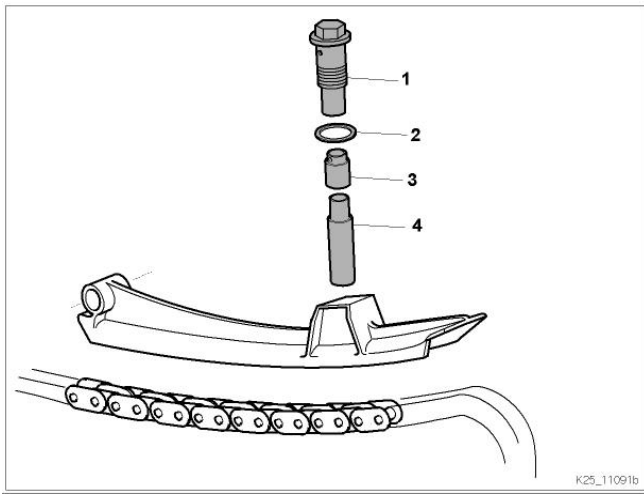
Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.




(-) Installing left timing chain tensioner

- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore



up in the chain tensioner.

- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.
- » The chain tensioner must slide onto the piston without tilting.
- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	

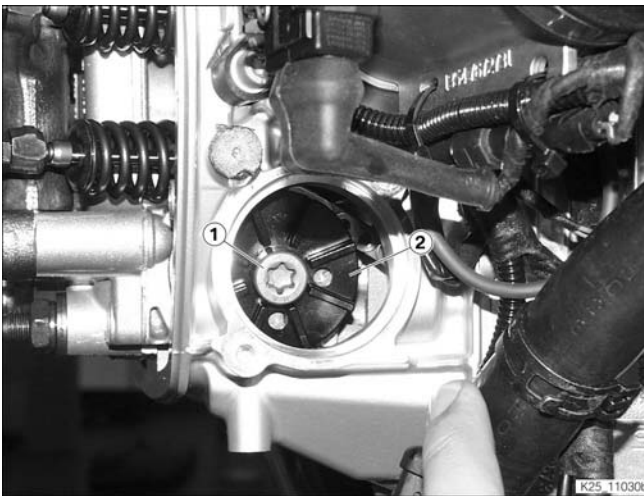
(-) Securing left camshaft sprocket


Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).



 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

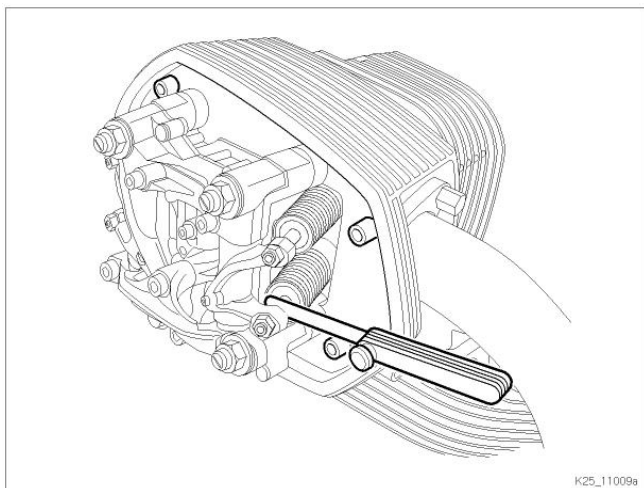
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	

Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	
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Result: Valve clearance is out of tolerance.

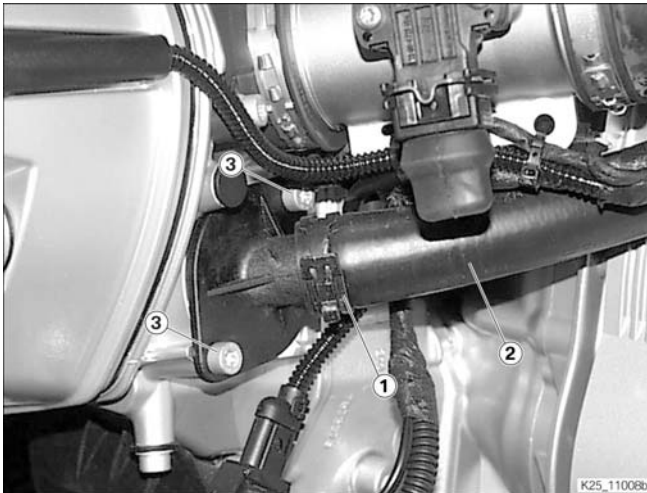
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing left camshaft cover



⚠ Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

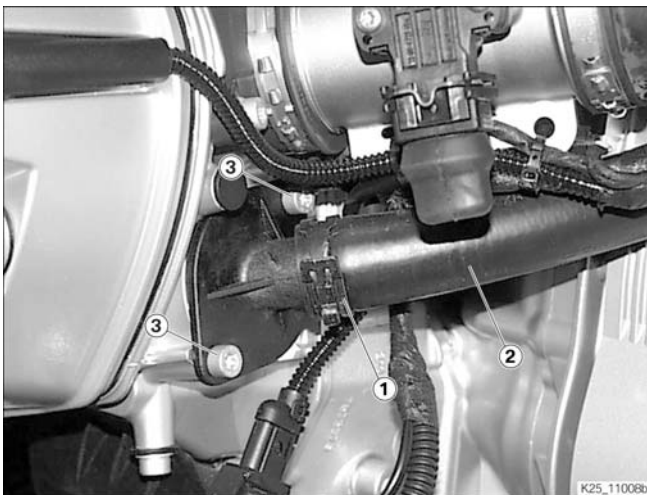
Avoidance: Deburr sharp edges of the housing.

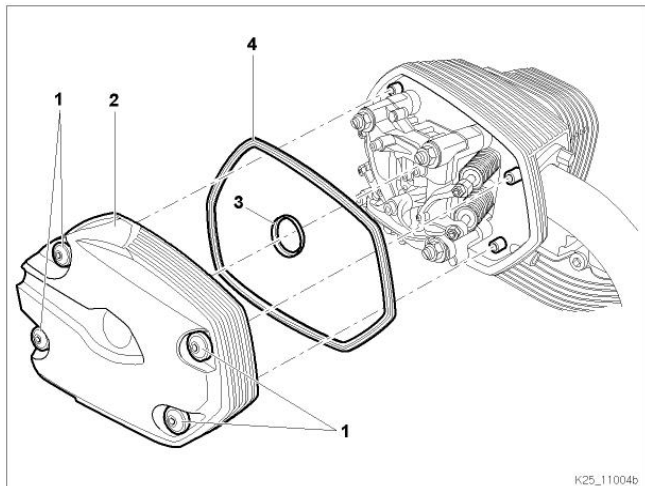
- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

▶ Connecting hose for crankcase breather

- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.


» The hose is located on the camshaft cover.



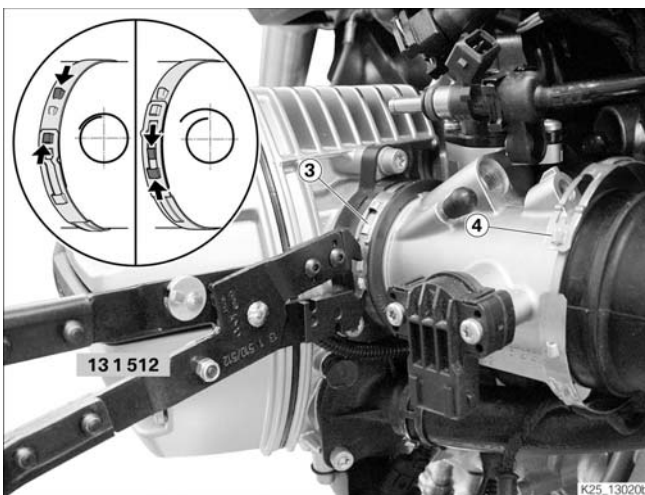


(-) Installing cylinder head cover

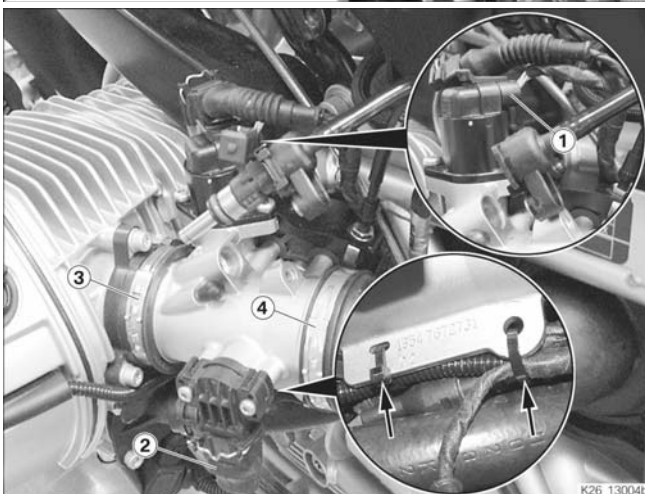
- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing left throttle-valve stub



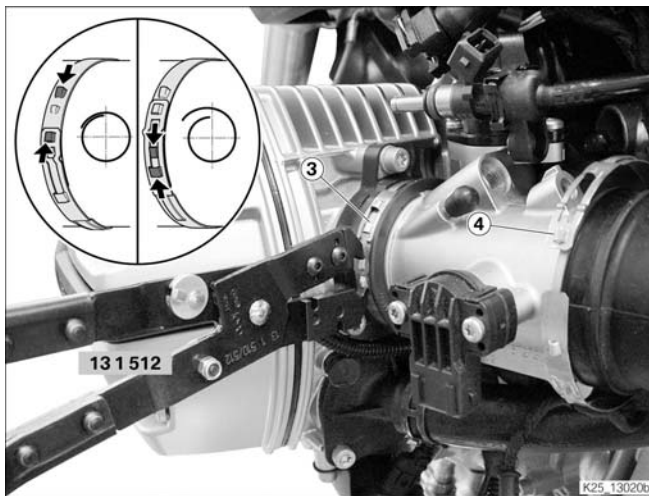
- Remove the cover from the intake.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamps (3) and close them with pliers (No. 13 1 512).



- Connect plug of left idle actuator (1).
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stub on left.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

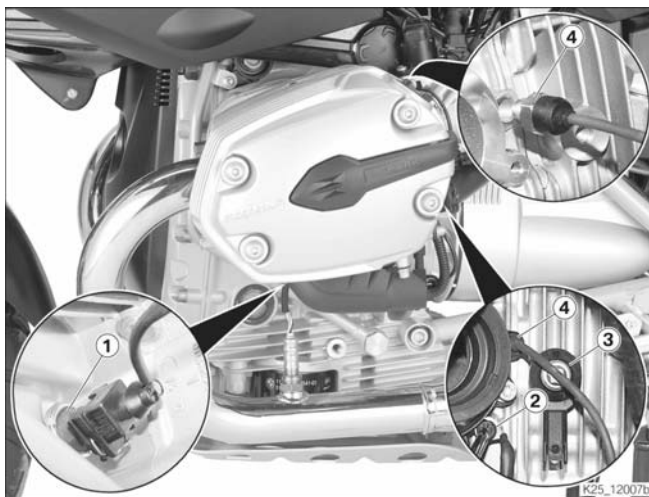
(-) Installing air intake pipe


- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512).



(-) Connecting plugs of engine sensors and switches, left

- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.

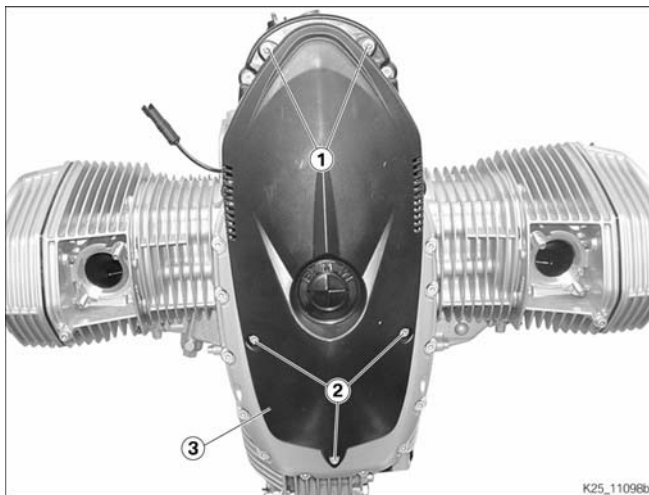



 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (3).
- Connect temperature sensor (4).

(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).

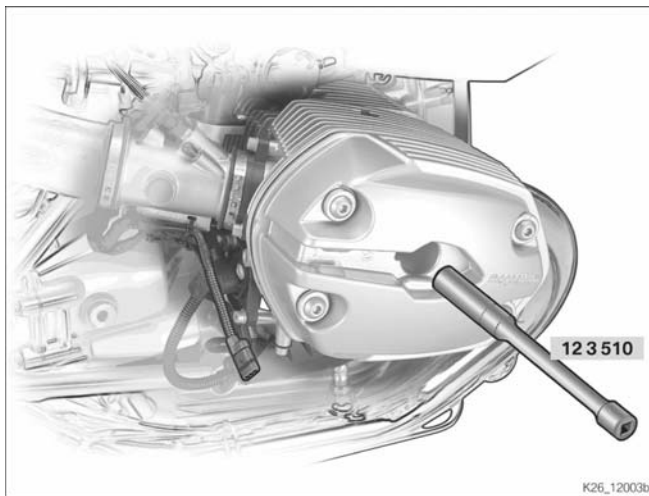


 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing primary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

--



Tightening torques

Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--



Technical data

Spark plug, manufacturer and designation	Bosch YR 5 LDE	
--	----------------	--

(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.



Tightening torques

Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--

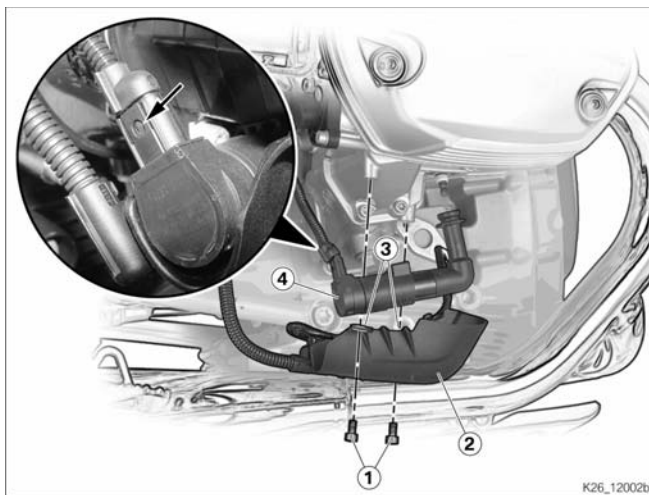


Technical data

Secondary spark plug, manufacturer and designation	Bosch YR 5 LDE	
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(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.



Consumables/lubricants

Talcum powder	Assembly aid	
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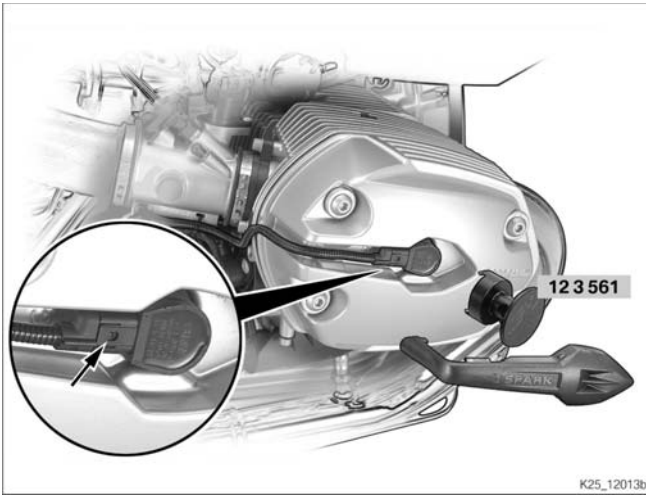
- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.



Tightening torques

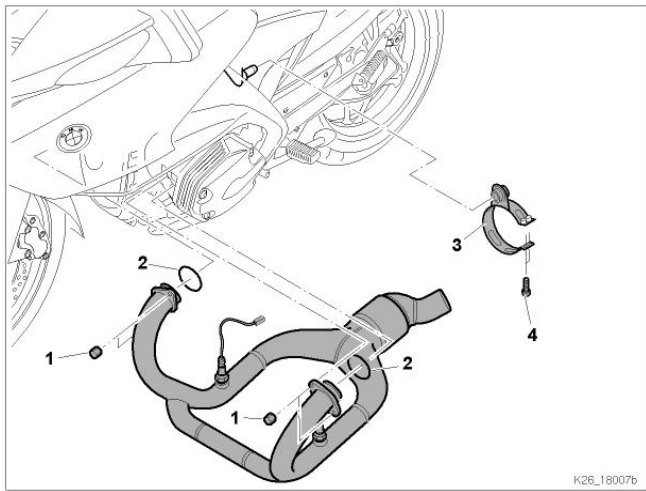
Cover, secondary spark plug coil to cylinder head,	8 Nm	
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M6 x 12




(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.




(-) Installing exhaust elbow


- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

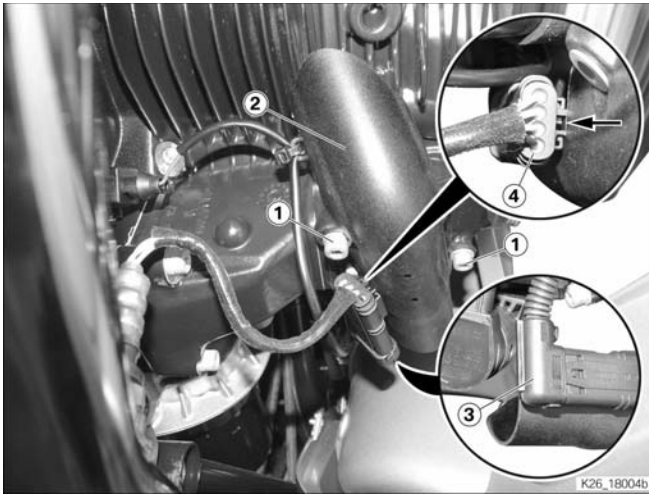
 Tightening torques		
Manifold to cylinder head, Acorn nut M8	21 Nm	

- Align the clamp (arrow) on the manifold and tighten screws (1).



Tightening torques

Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	
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► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).



Tightening torques

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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- Install front screw (1) in both bottom sections of the fairing.

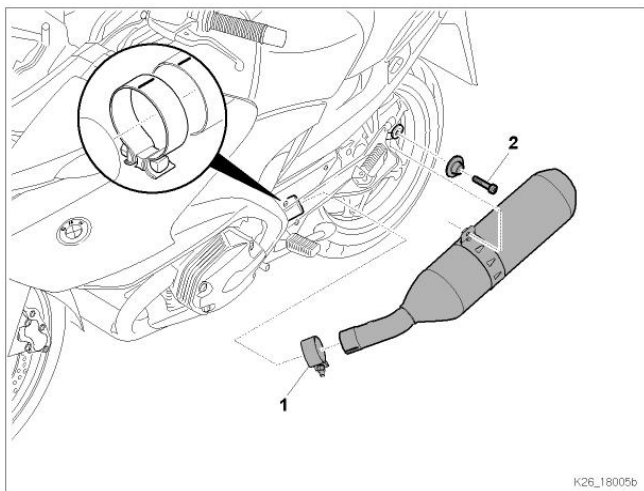


(-) Installing silencer

- Grease the inner face of Torca clamp (1).



Consumables/lubricants



K26_18005b



K28_18007d

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	--------------------

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

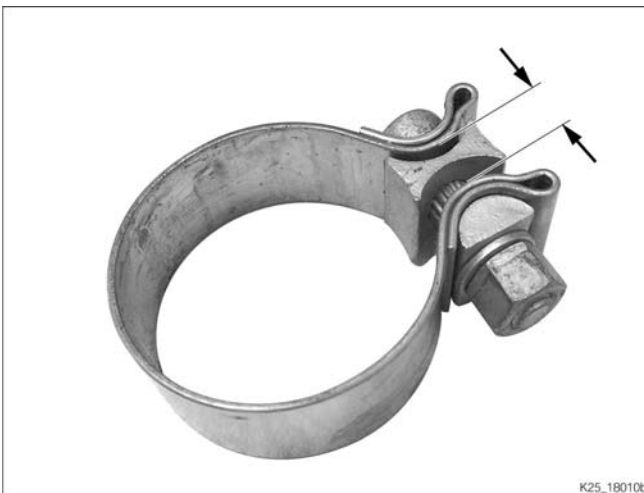
 Tightening torques		
---	--	--

End silencer to footrest support, M8	19 Nm	
--------------------------------------	-------	--

- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--



K25_18010b

► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--

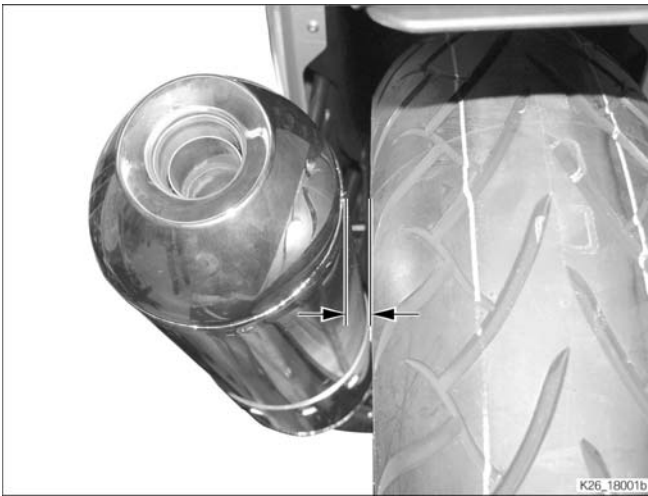
Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

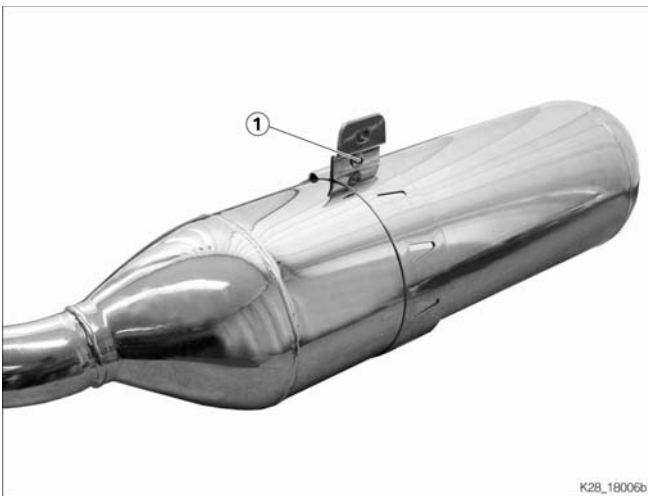
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




 **Attention**


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.


- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




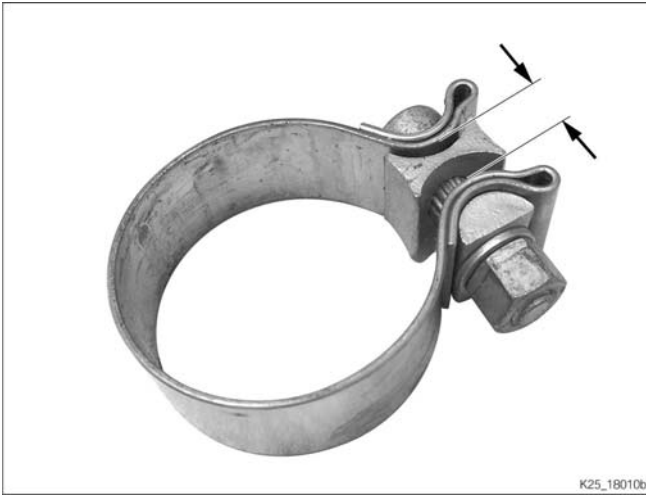
▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.

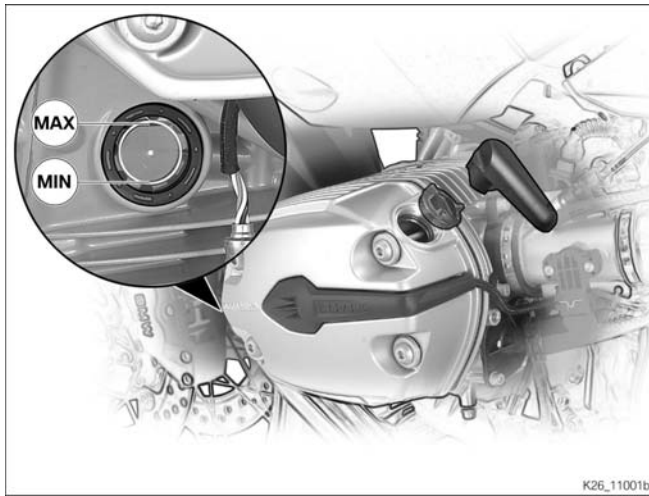
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	




(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.





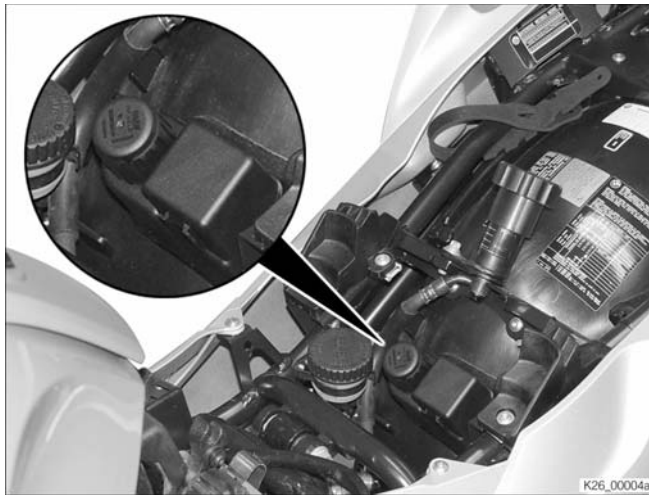
 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.

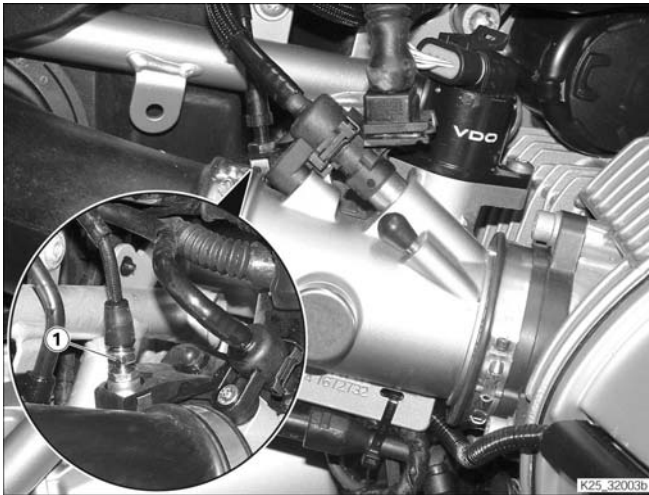


Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

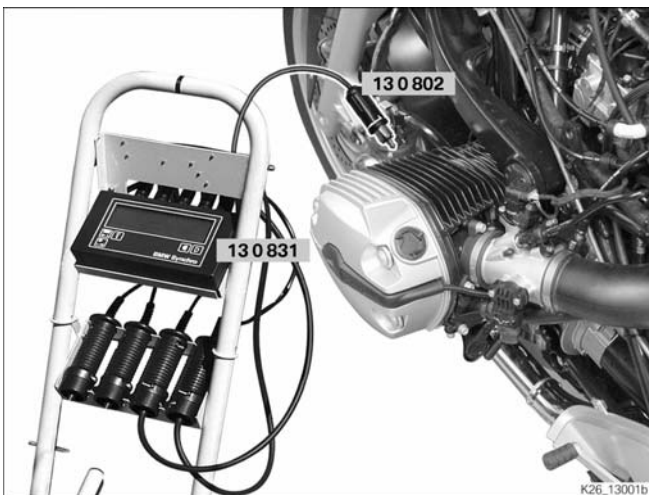
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

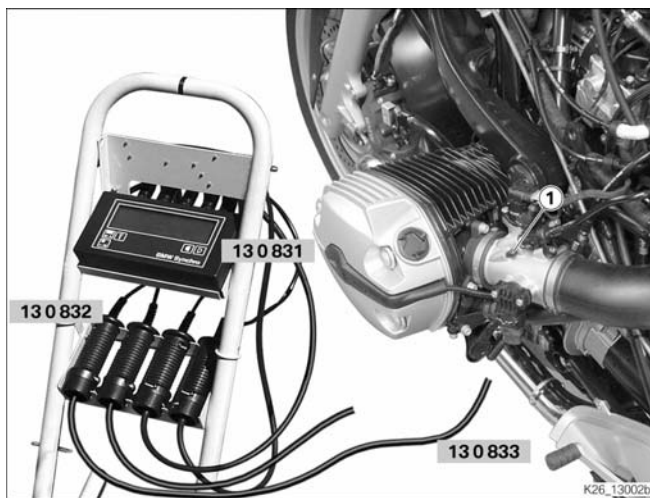


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- » The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



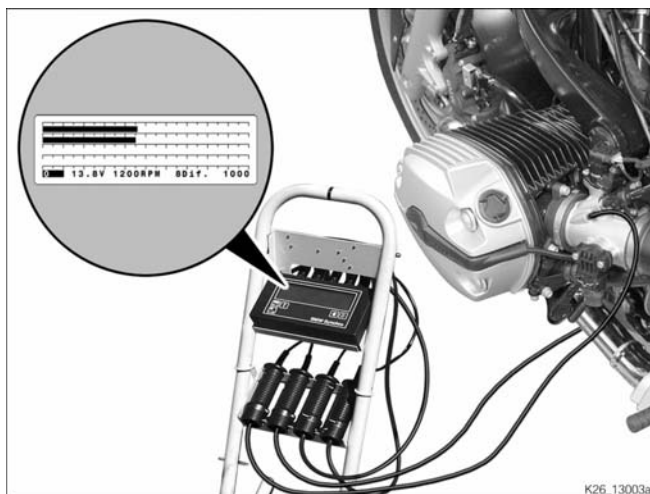
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

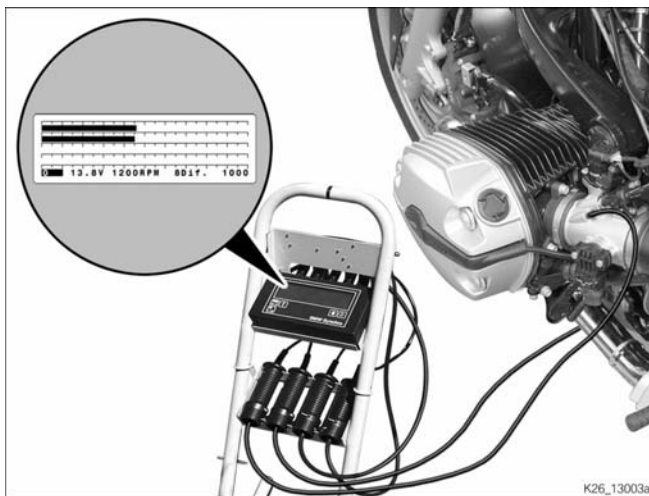
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



▶ Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

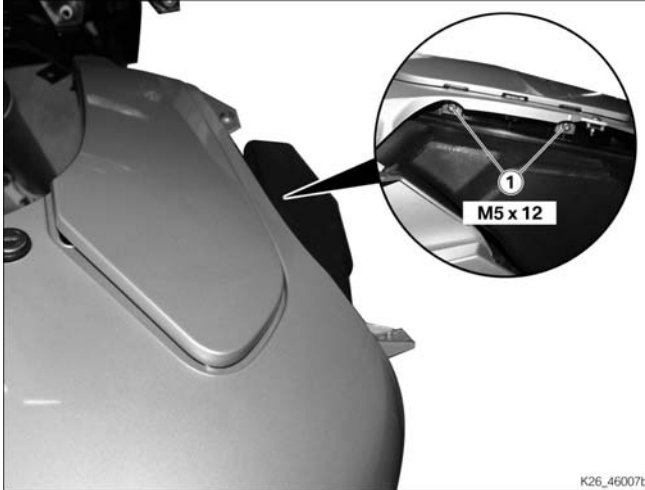
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).





(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



11 12 062 Replacing right cylinder-head gasket



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



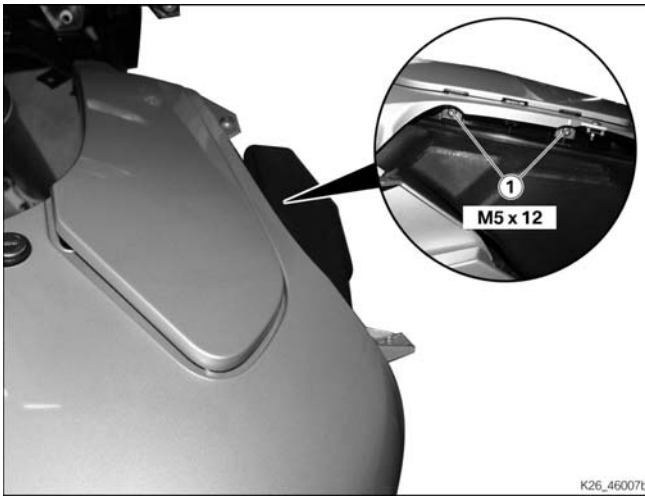
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



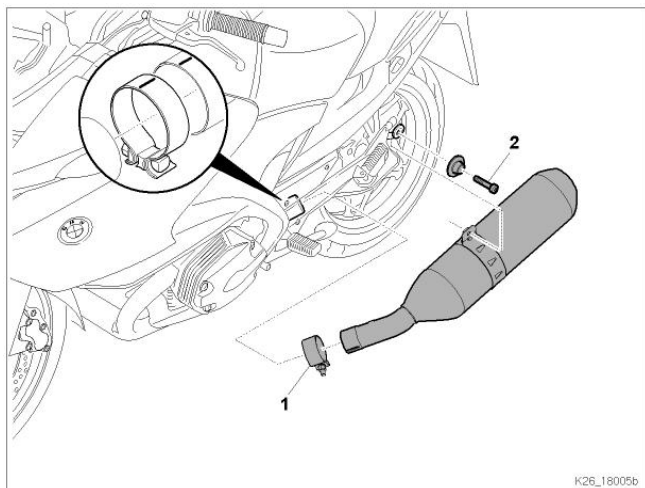
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

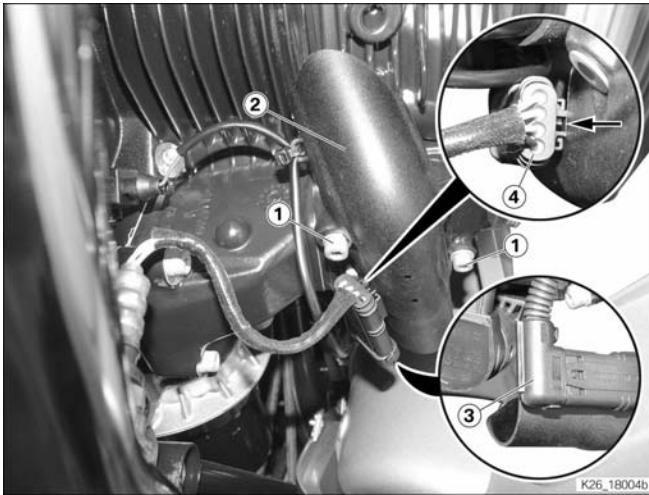
- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



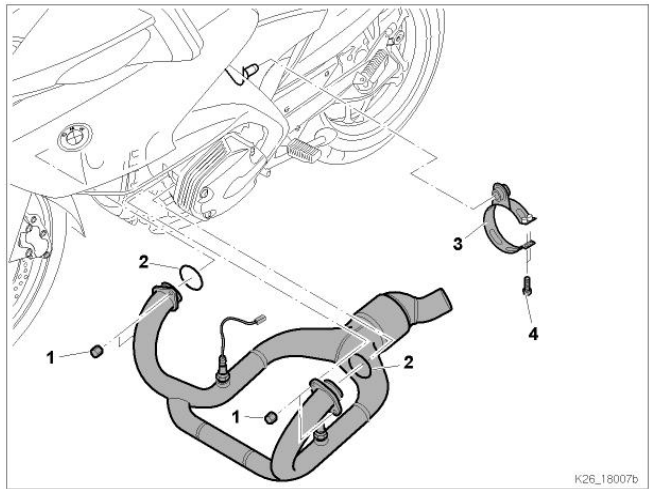
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.

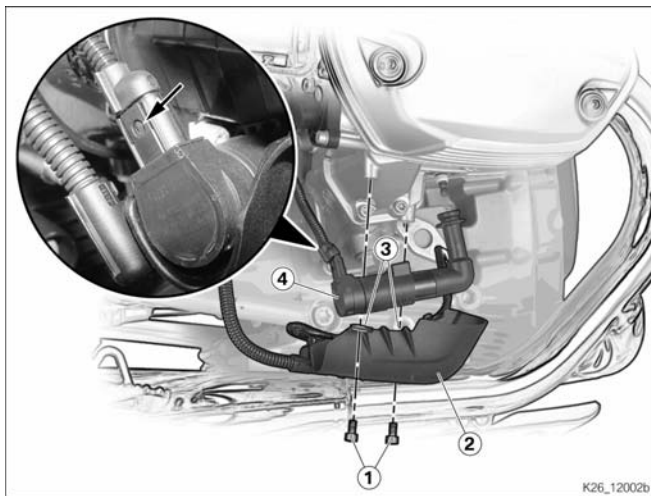
(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



- Slacken screws (1) and remove cover (2) with sleeves (3).



⚠ Attention

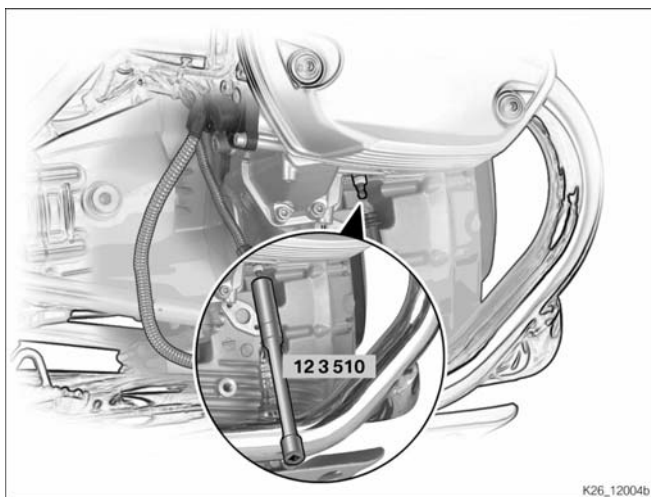
Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF



- Remove the primary spark plug cover.

⚠ Attention

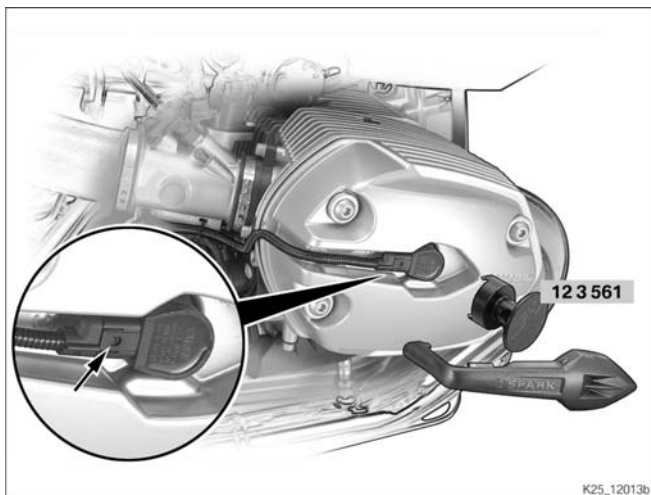
Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

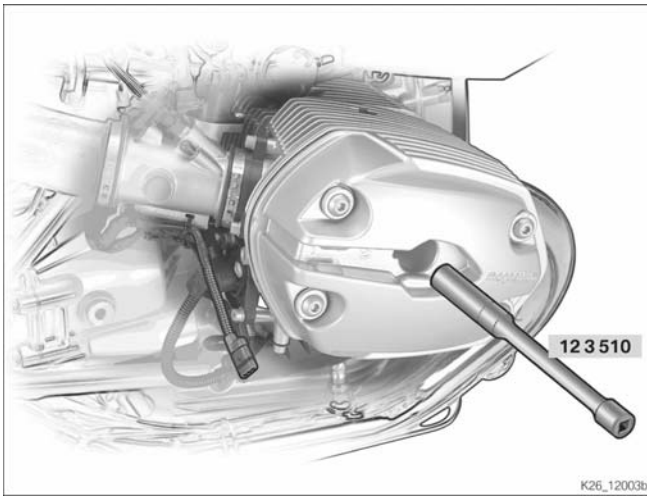
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the

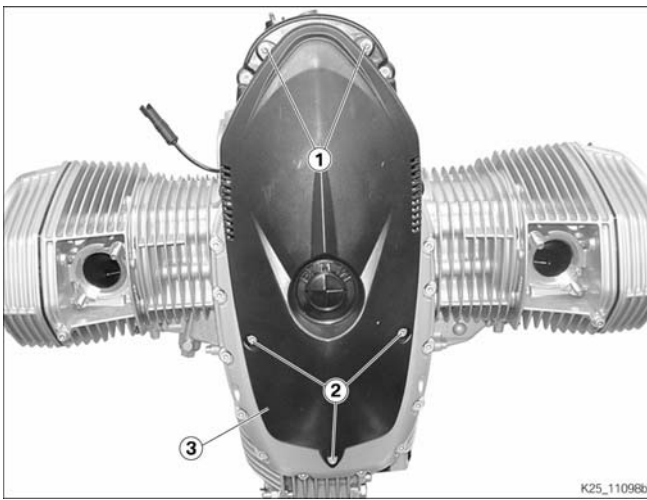




primary spark plug.

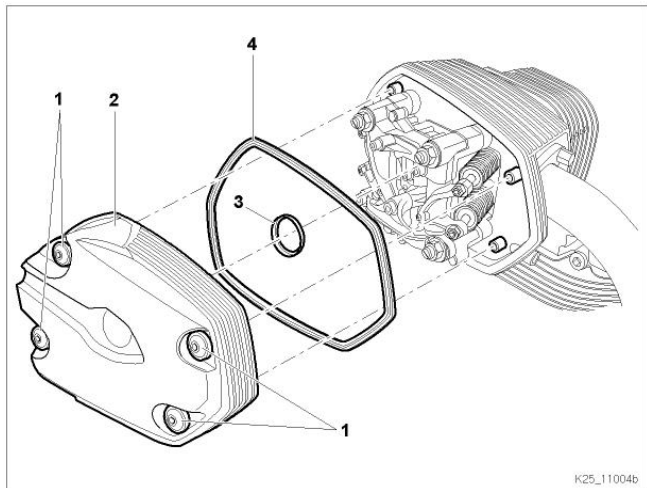
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

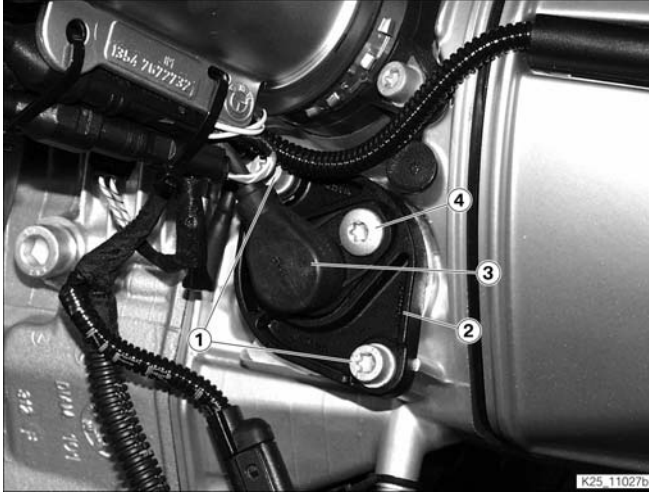
On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

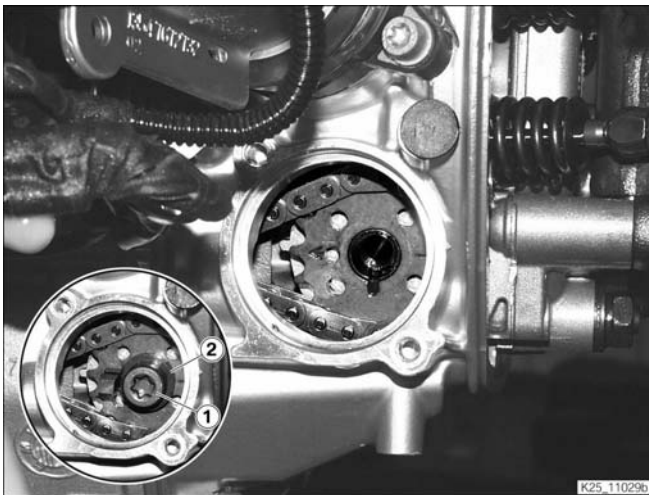
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
---	----------------------	--------------	--

- Remove gaskets (3) and (4).



(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.



- Insert locating pin (No. 11 2 650) to lock the engine in position.

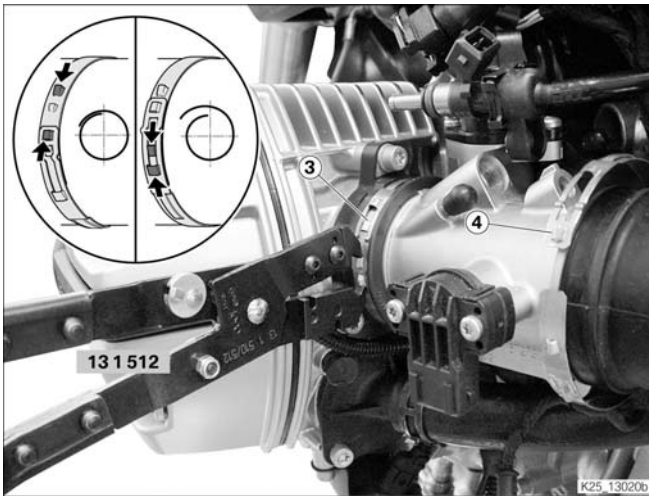
(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).



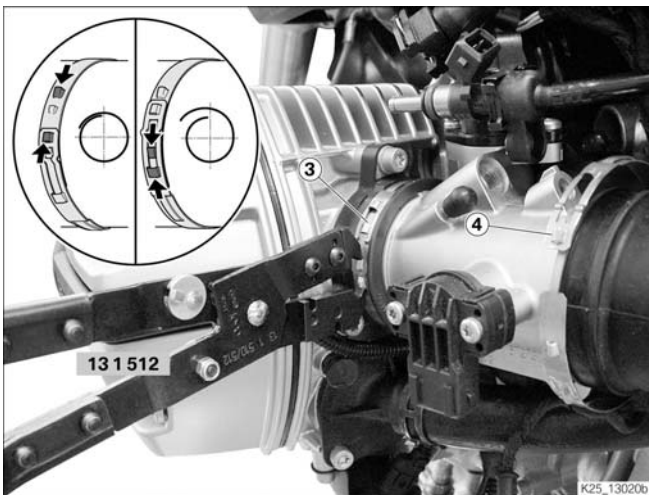
(-) Disconnecting intake air pipe from throttle-valve stub

- Open clips (4) on left and right with pliers (No. 13 1 512) .



(-) Disconnecting right throttle-valve stub

- Open hose clips (3) at the right throttle valve stub with pliers (No. 13 1 512) .



- Cut through the cable tie (arrow) on the right.
- Disconnect plug of right idle actuator (1).
- Pull off the throttle-valve stub on the right and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and



foreign matter from dropping into the engine.

(-) Removing trigger for camshaft sensor

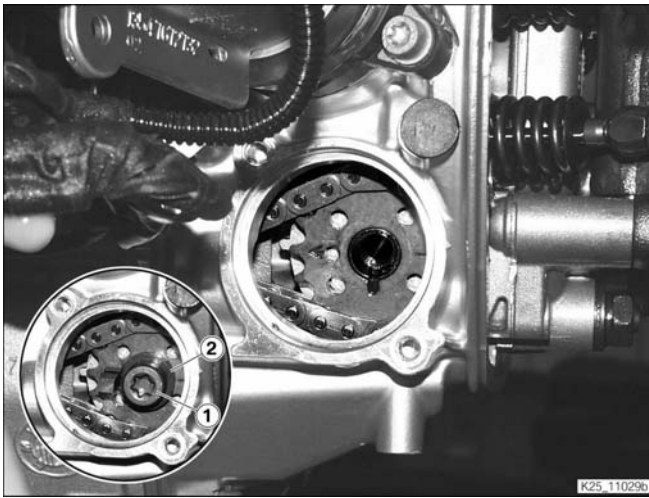
- Slacken screw (1).



Note

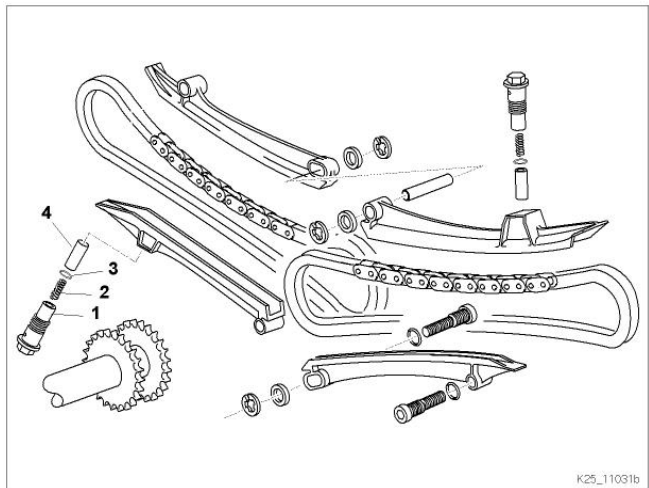
The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with trigger for camshaft sensor (2).



(-) Removing right chain tensioner

- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.



(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

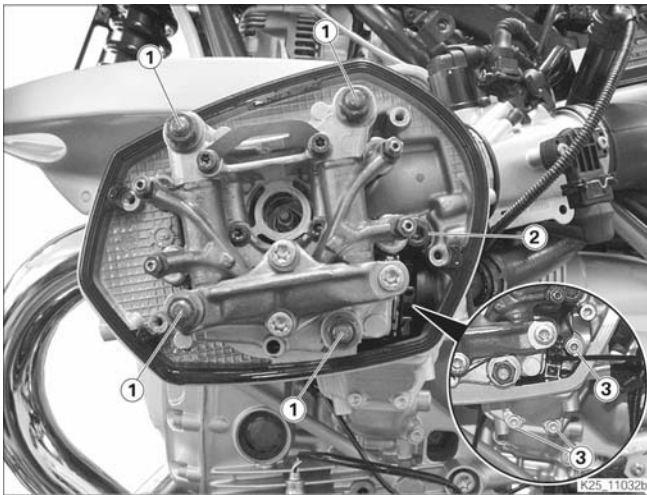
When the engine is being reassembled, it is easier to set

the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).

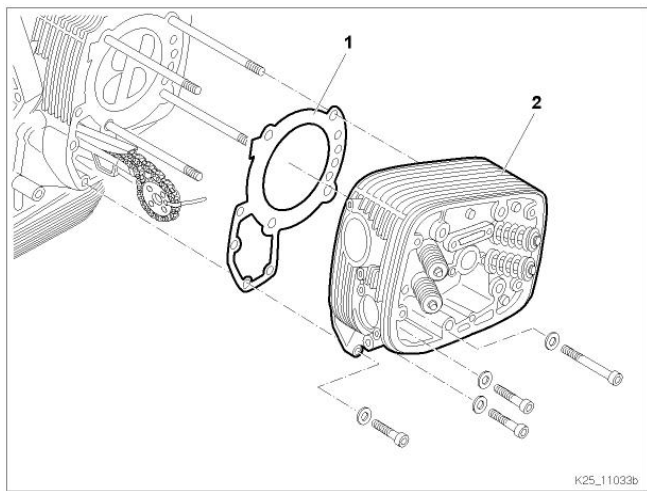


Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.

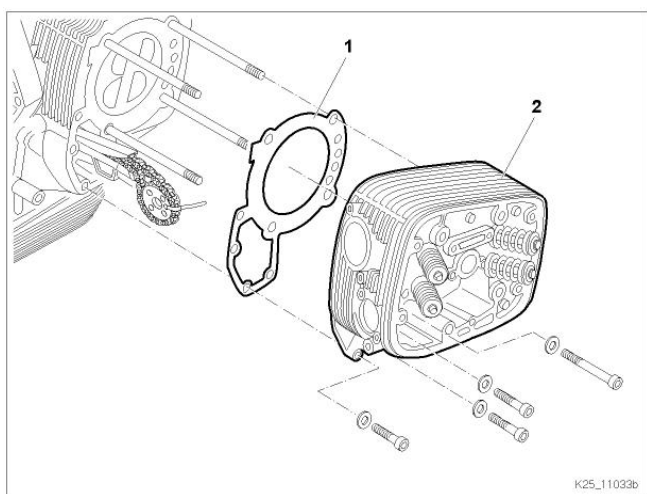


Attention

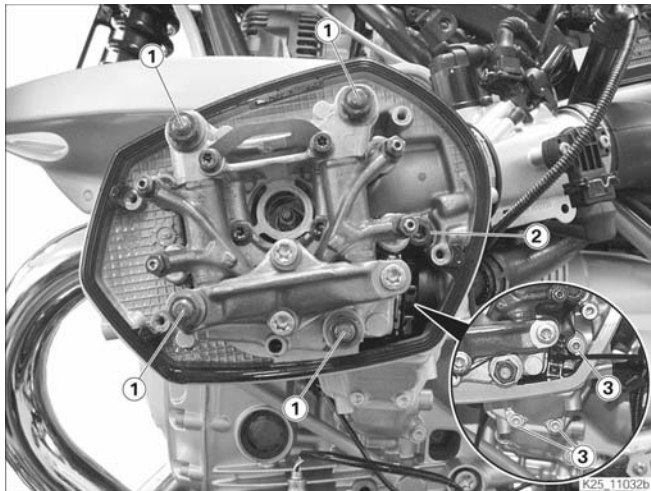
Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.



- Install cylinder head (2), simultaneously guiding timing



chain, tensioning and guide rails through the timing-chain cavity.

⚠ Attention

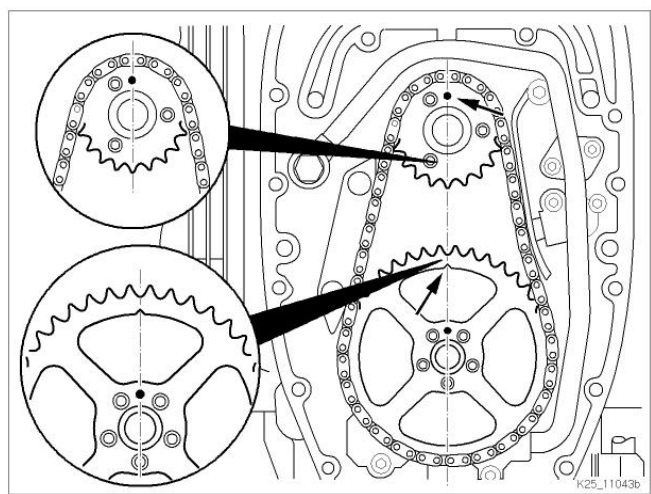
Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

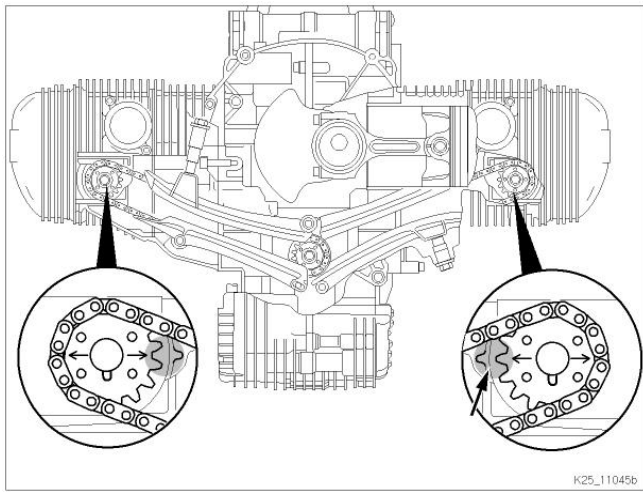
🔧 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, right (cylinder No. 1)



- Make sure that the crankshaft and countershaft are in the "**firing TDC, right cylinder**" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.

- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and



seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

» The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

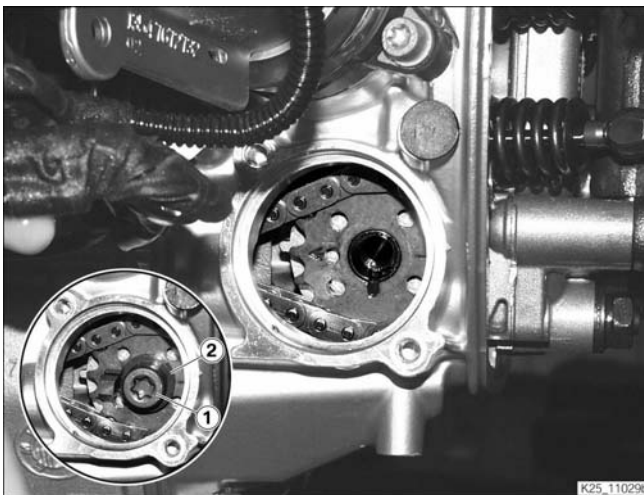


- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



► Installing right timing chain tensioner

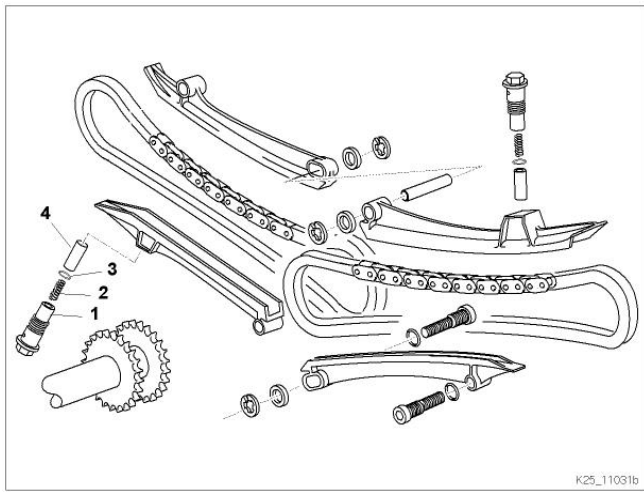
Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.



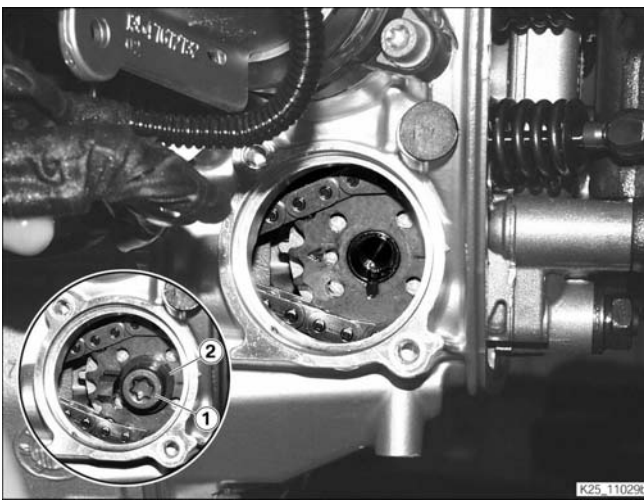


K25_11031b



Tightening torques

left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



K25_11029b



- Tighten screw (1).



Tightening torques

Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	
--	-------	--

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

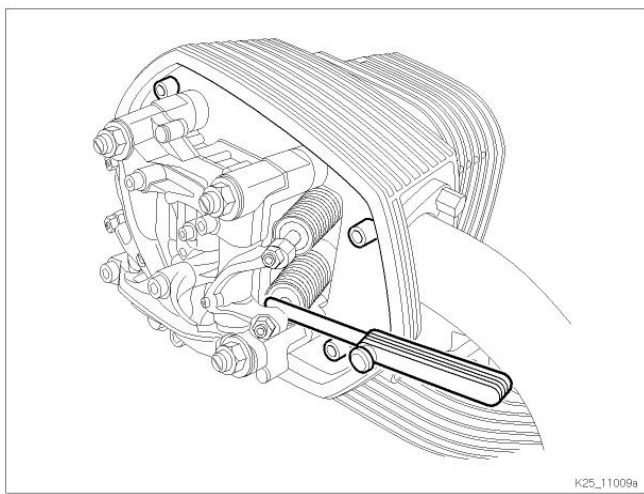
Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.



K25_11009a



Technical data


Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

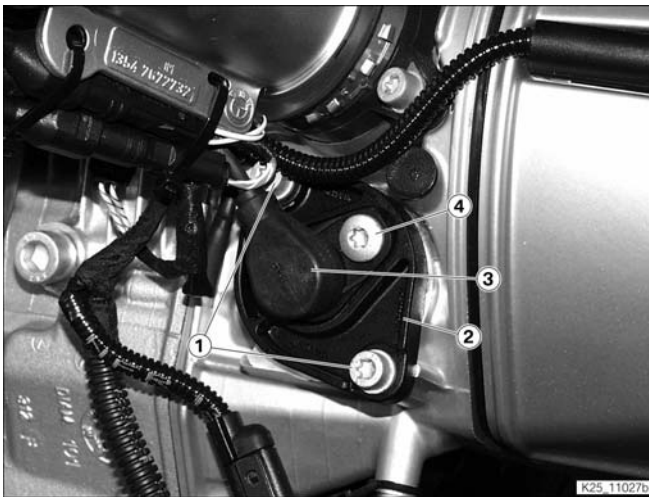
- Correct valve clearance with adjusting screw and

tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



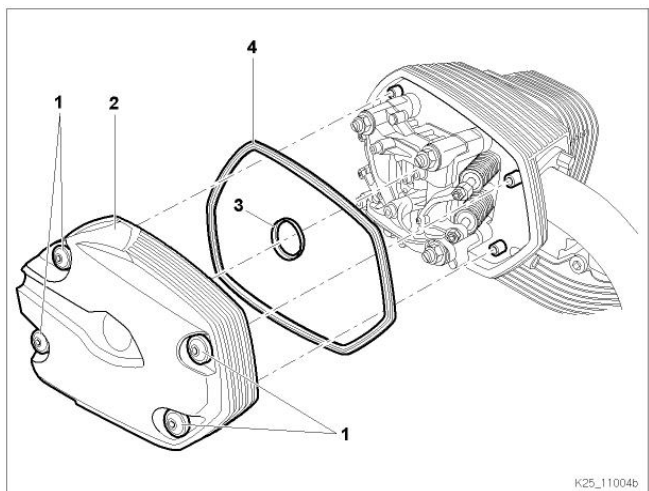
Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.


Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

(-) Installing cylinder head cover

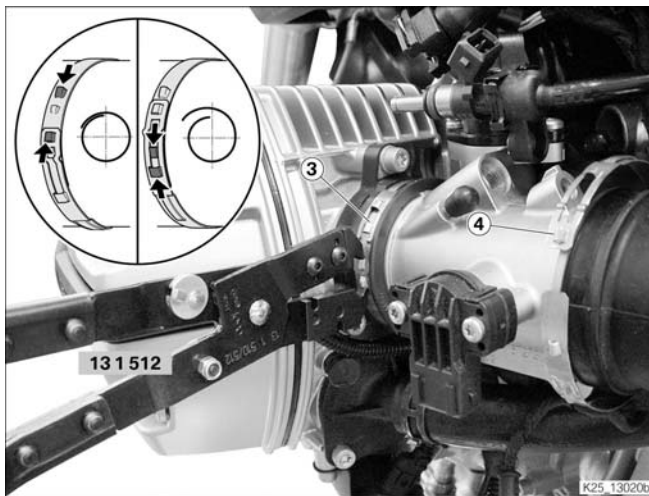


- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

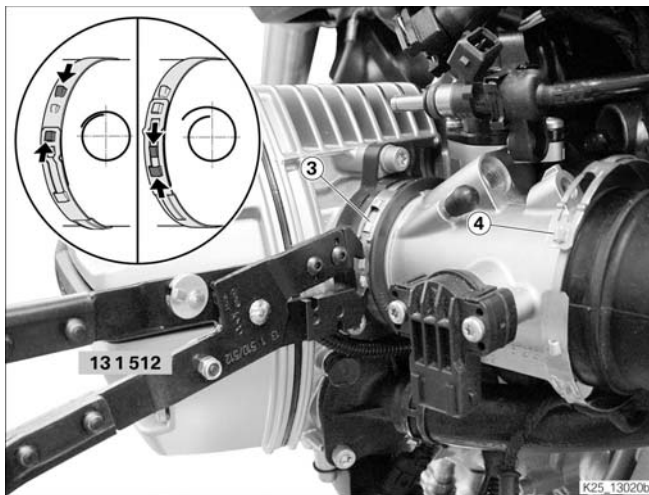
 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing right throttle-valve stub

- Remove the cover from the intake.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamp (3) and close it with pliers (No. 13 1 512).



- Connect plug of right idle actuator (1).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stub on right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.




(-) Installing air intake pipe

- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512) .

(-) Connecting plugs of engine sensors, right

- Secure earth lead (1) to the cylinder head.

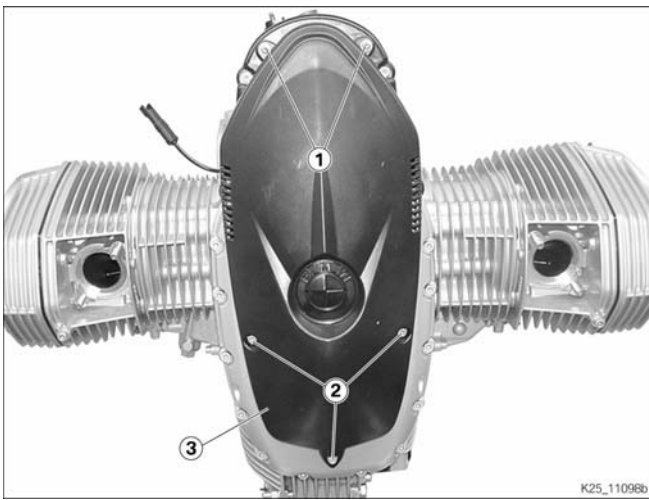
 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (2).




- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

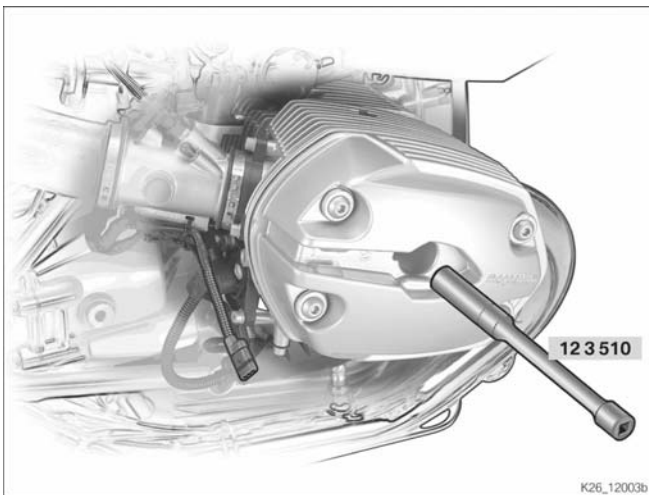
(-) Installing belt guard




- Install belt guard (3) and secure with screws (1) and (2).


 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing primary spark plug



- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

 Tightening torques		
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	

 Technical data			
Spark plug, manufacturer and designation		Bosch YR 5 LDE	

(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.



 Tightening torques		
---	--	--

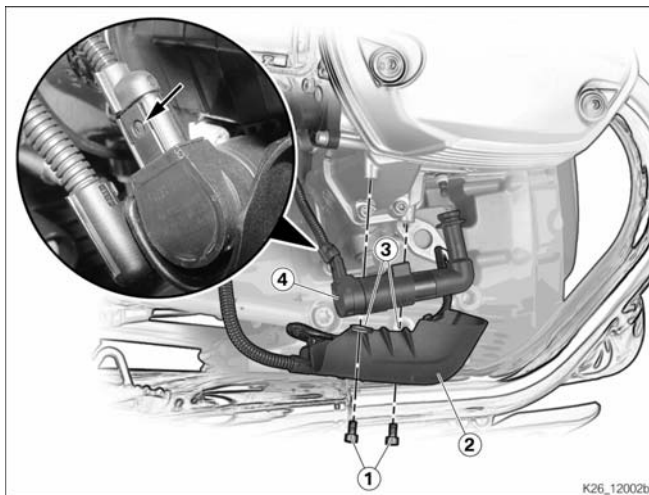
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--


 Technical data		
---	--	--

Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE
--	--	----------------

(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.



 Consumables/lubricants		
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Talcum powder	Assembly aid	
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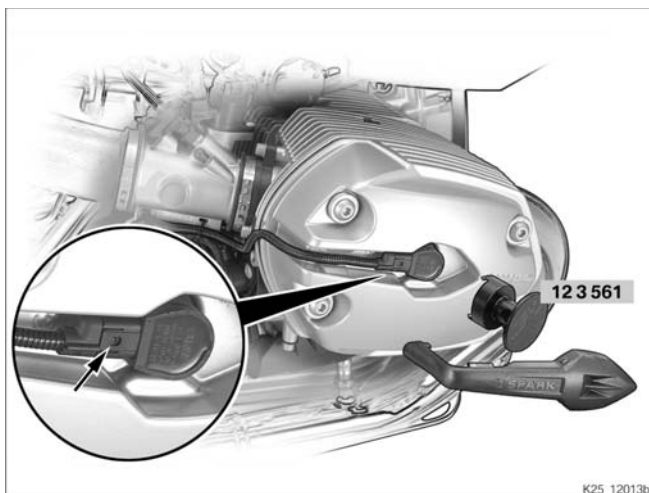
- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
---	--	--

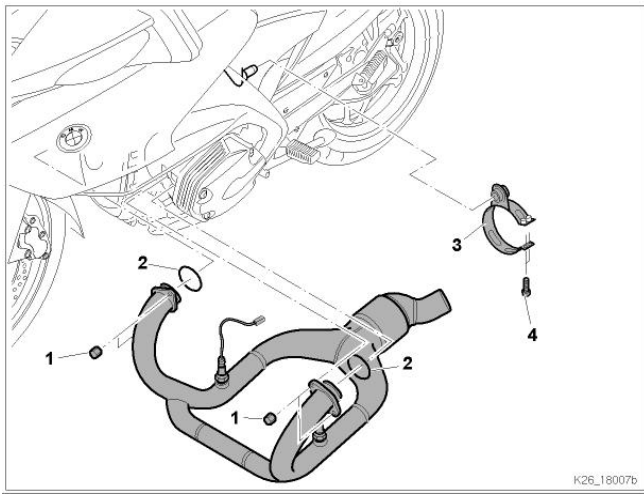
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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(-) Installing direct ignition coil


- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.




(-) Installing exhaust elbow




- Replace seals (2), apply thin layer of grease and fit in cylinder head.

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

 <p>Tightening torques</p>		
Manifold to cylinder head, Acorn nut M8	21 Nm	

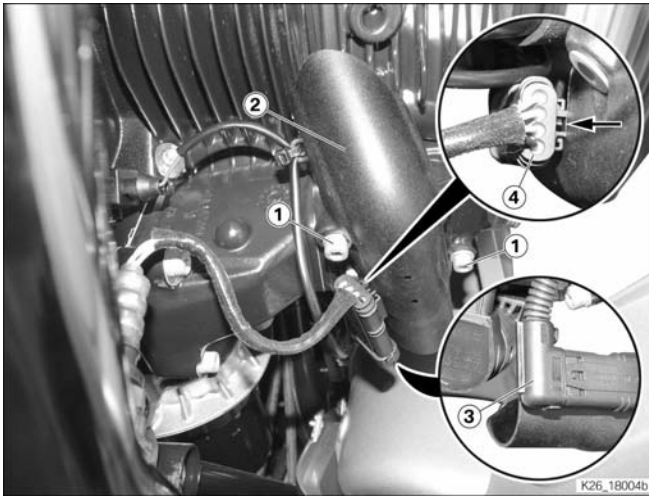
- Align the clamp (arrow) on the manifold and tighten screws (1).


 <p>Tightening torques</p>		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	



► **Securing both oxygen sensor plugs**

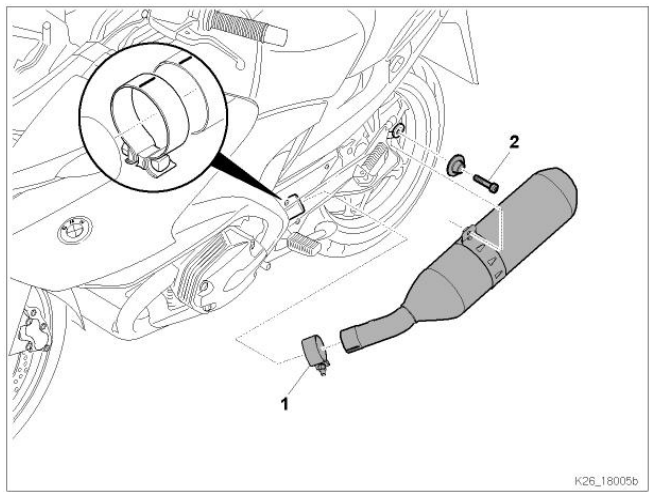
- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).



 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	




- Install front screw (1) in both bottom sections of the fairing.




(-) Installing silencer

- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

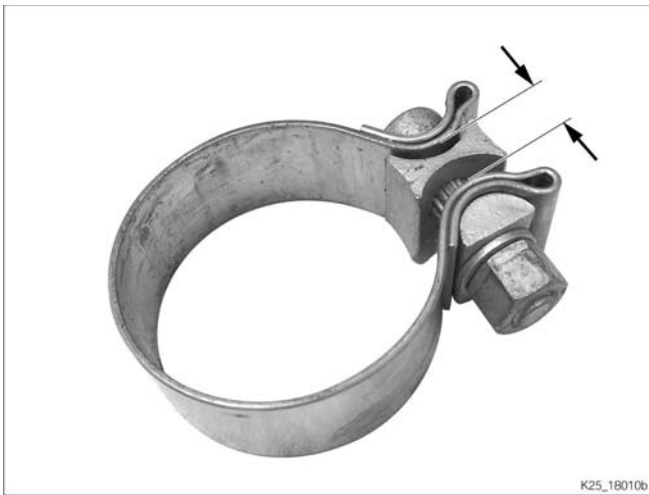
- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**

Test

- Check distance (*arrows*) between silencer and rear wheel.



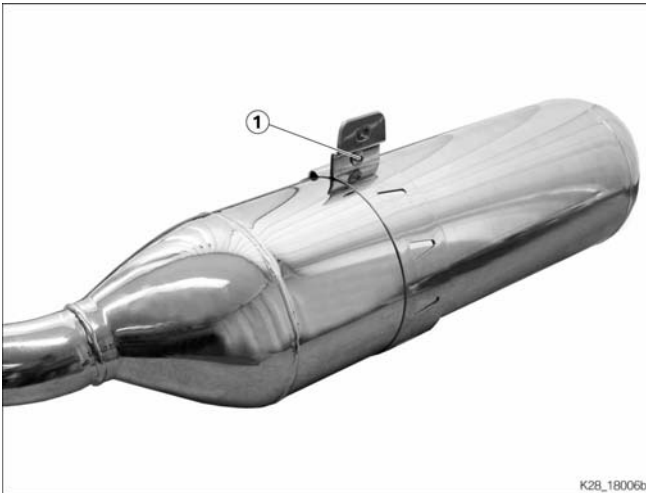
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



! Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--

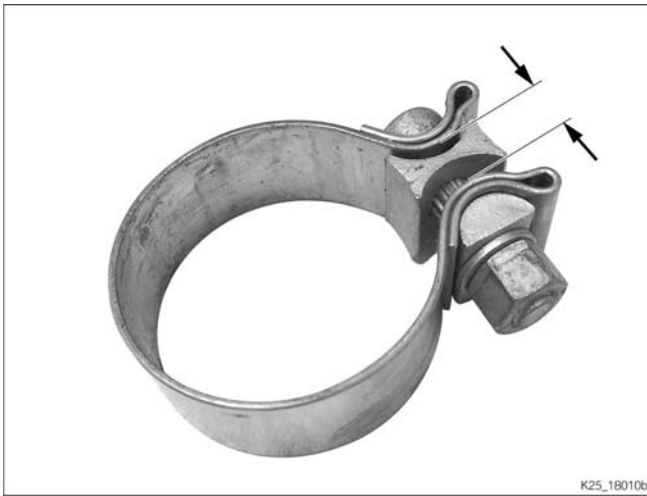


▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



K25_18010b



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.



K26_18001b



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



K26_11001b



Technical data

Oil level, engine		Maximum = top ring mark on sight glass	
Consumables/lubricants			
Engine oil, 20W-50			
		Minimum = bottom ring	

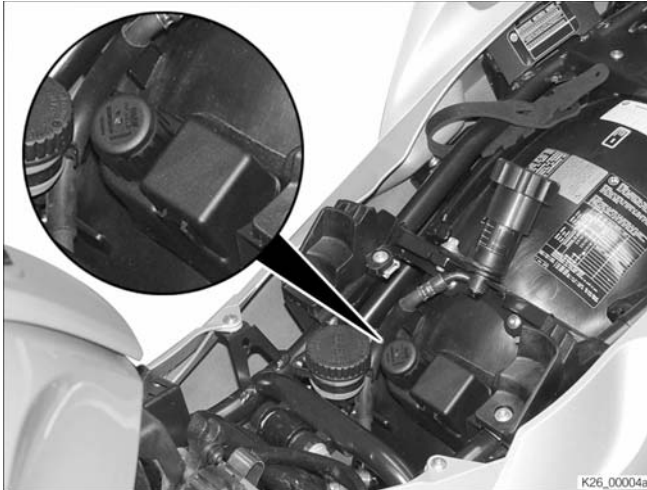
		mark on sight glass	
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(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

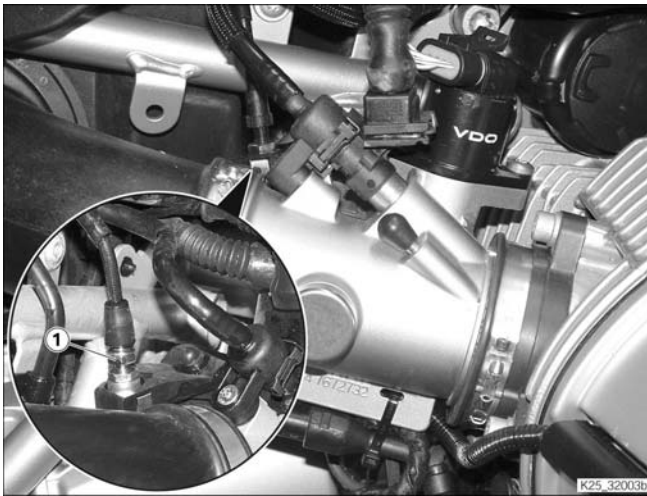
Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

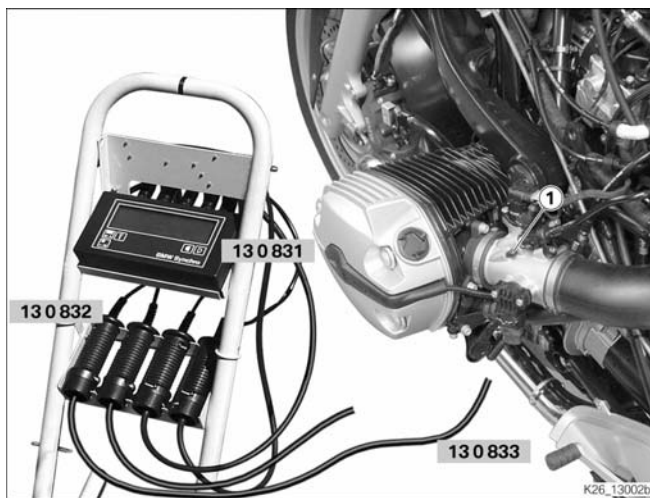


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



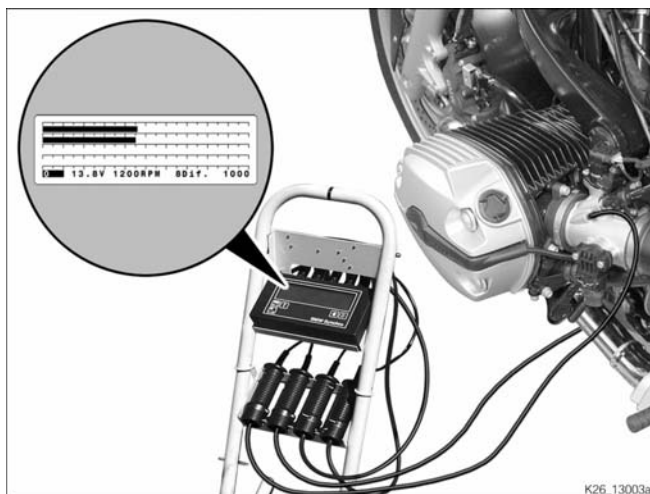
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

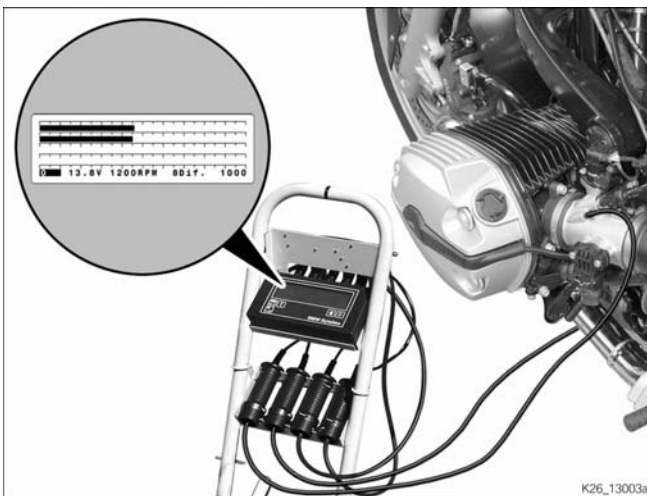
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



▶ Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

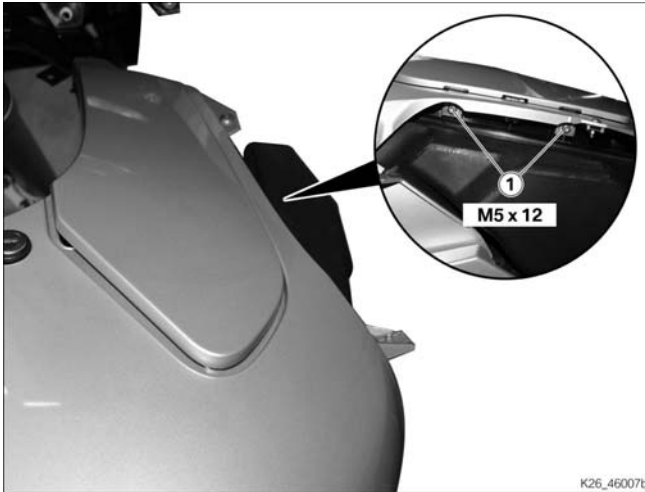
- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing tank rail



- Fit tank rail.
- Install screws (1).

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

11 12 091 Replacing all cylinder-head gaskets



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

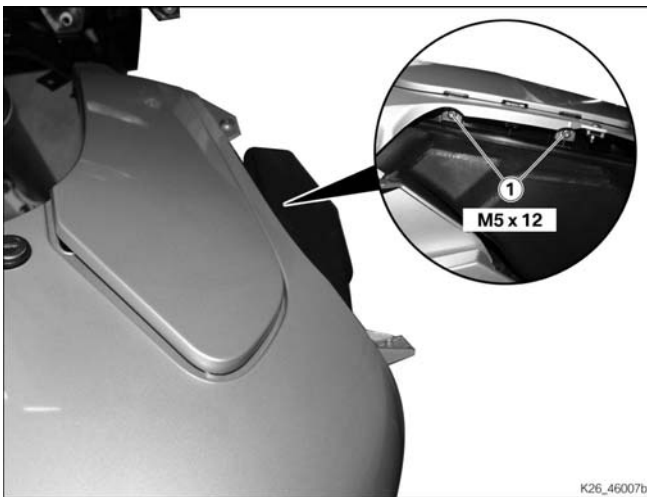
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



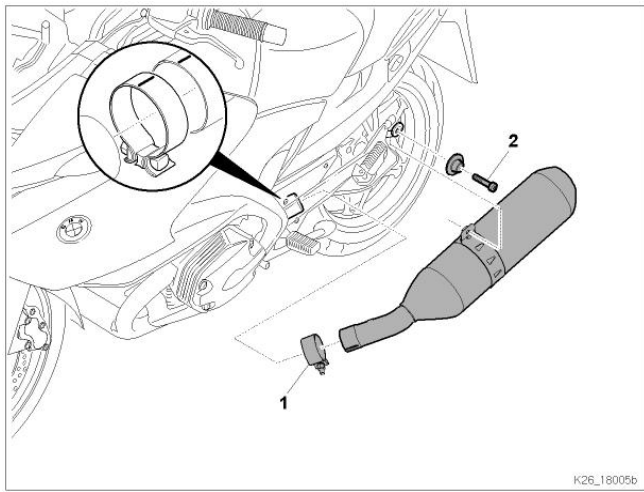
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



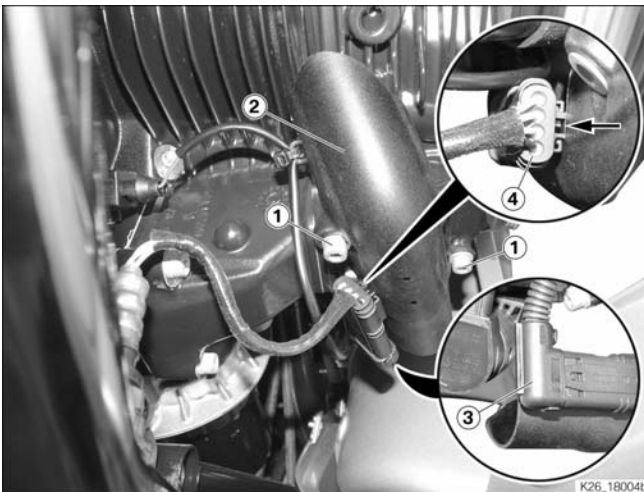
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

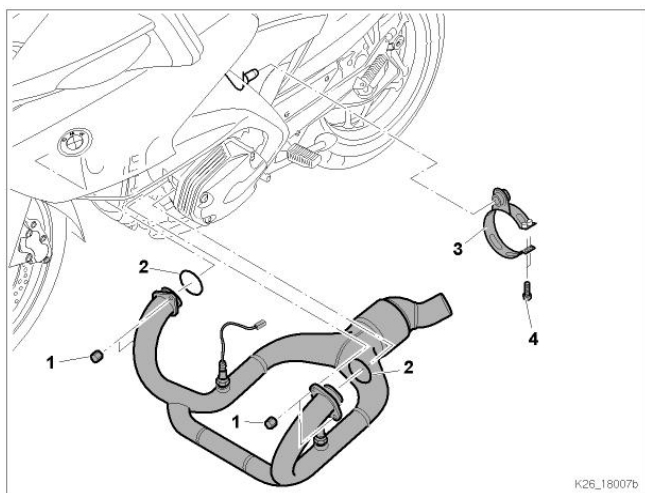
- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.



(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



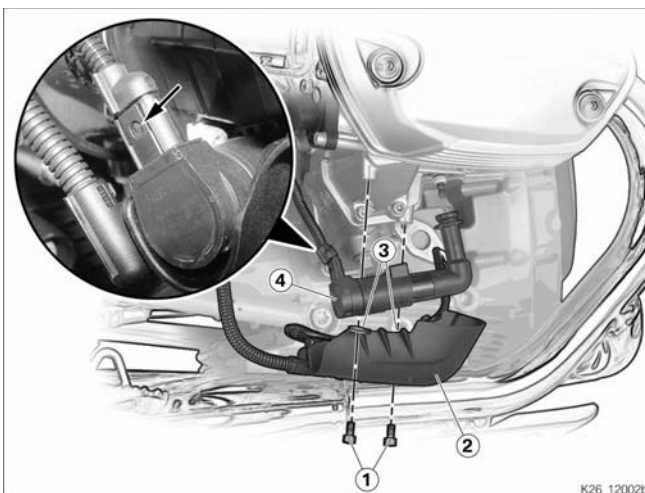
- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

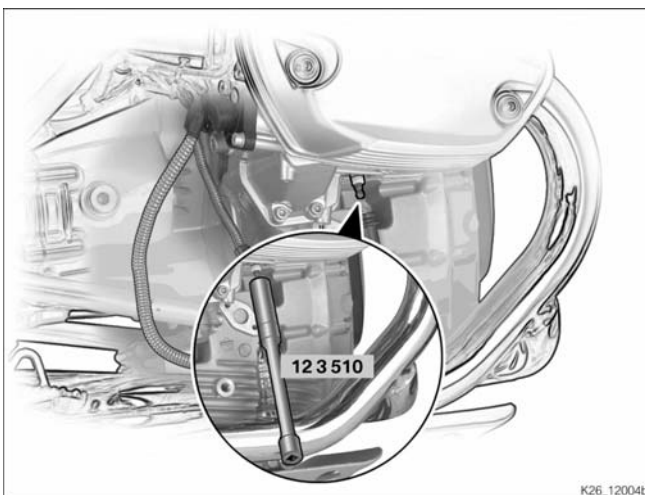
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

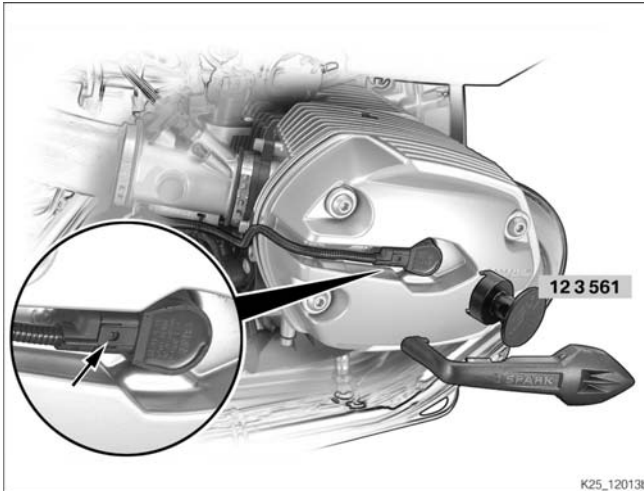


- Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

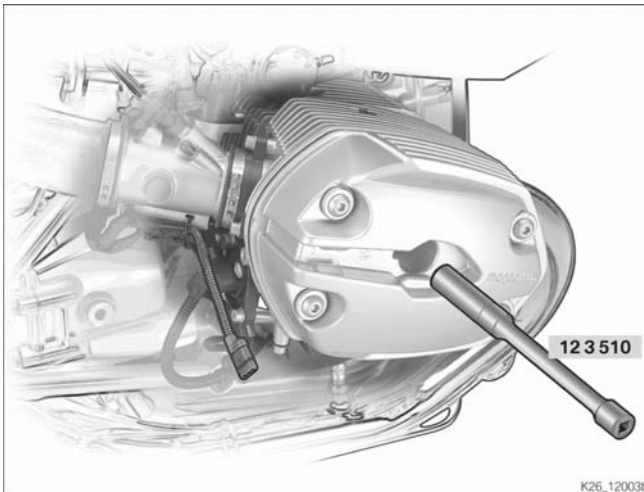
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

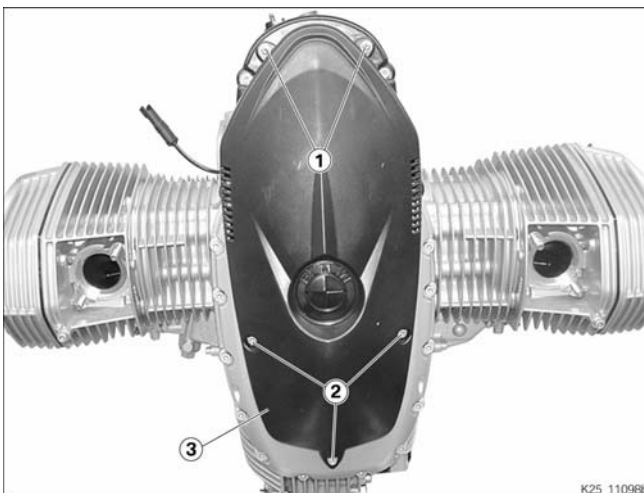
(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the primary spark plug.



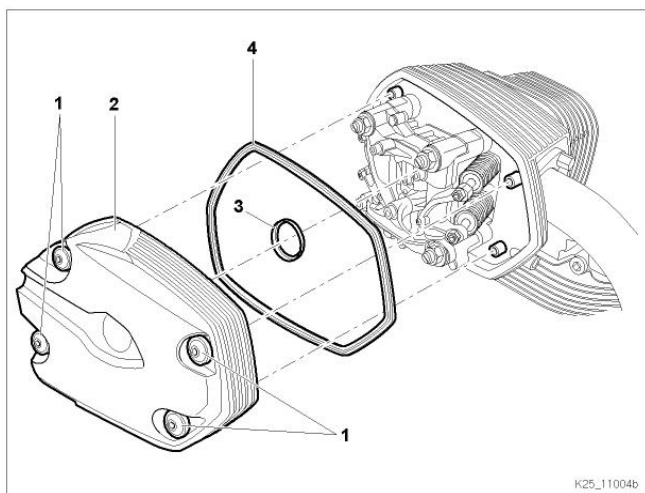
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

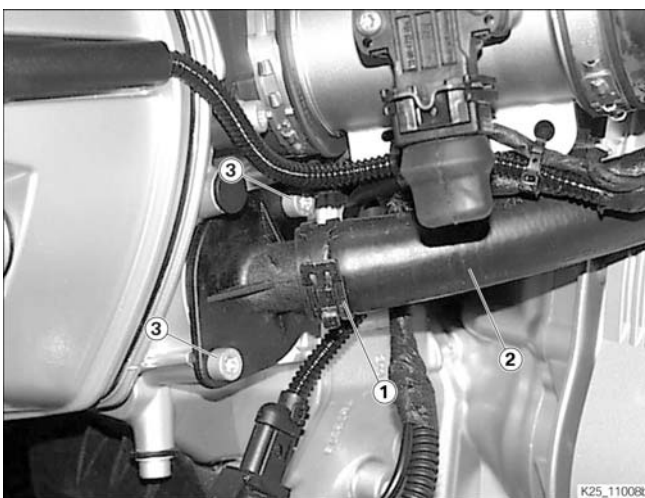


Technical data

Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

(-) Removing left camshaft cover

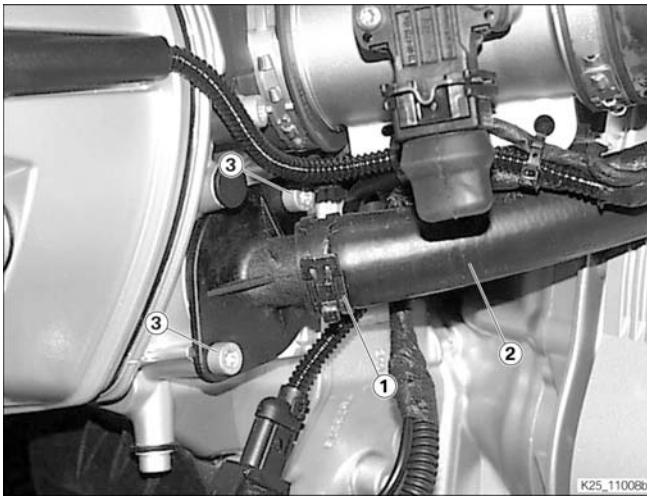


► **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.

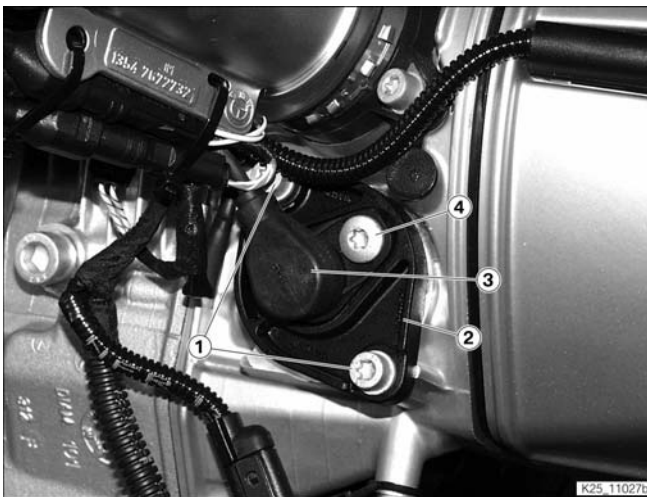


- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

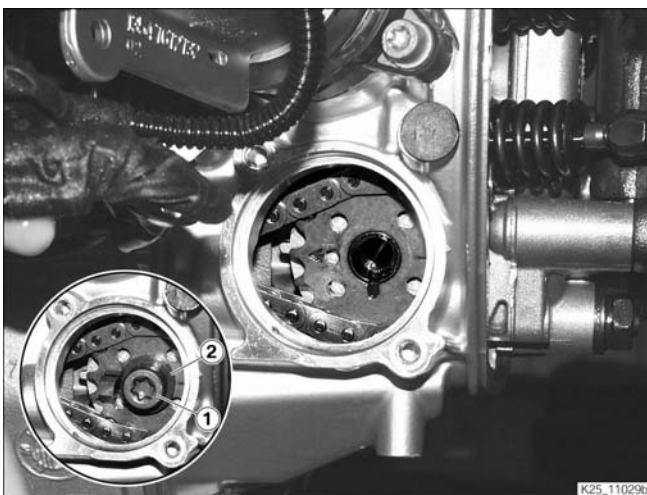
- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).



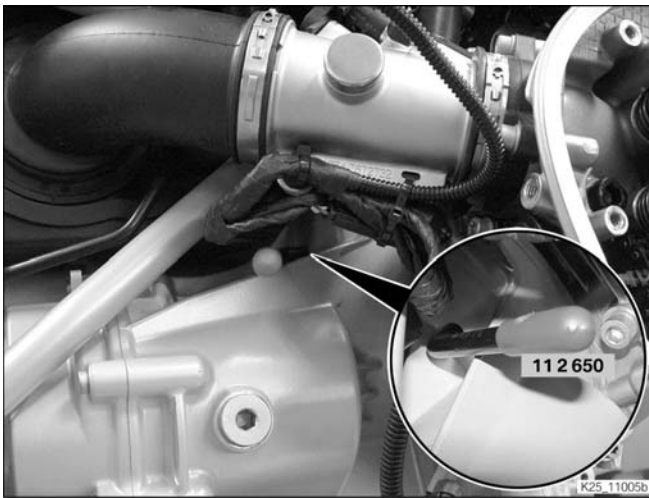
Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.



- Insert locating pin (No. 11 2 650) to lock the engine in position.



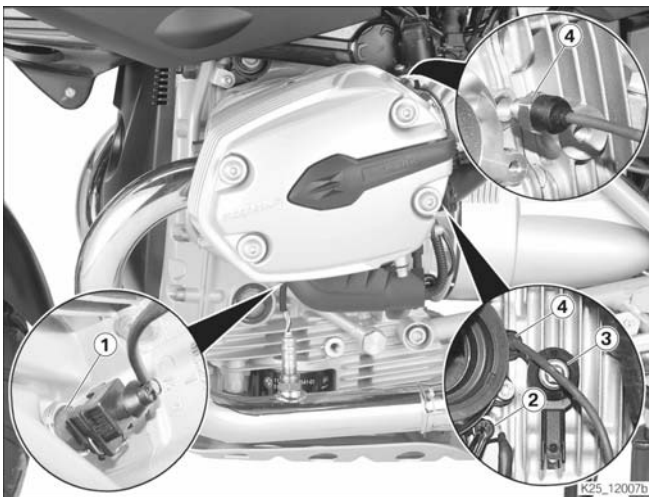
(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).



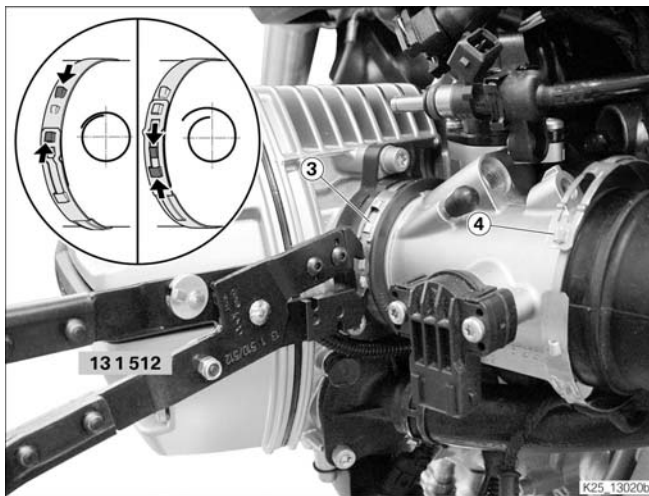
(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).



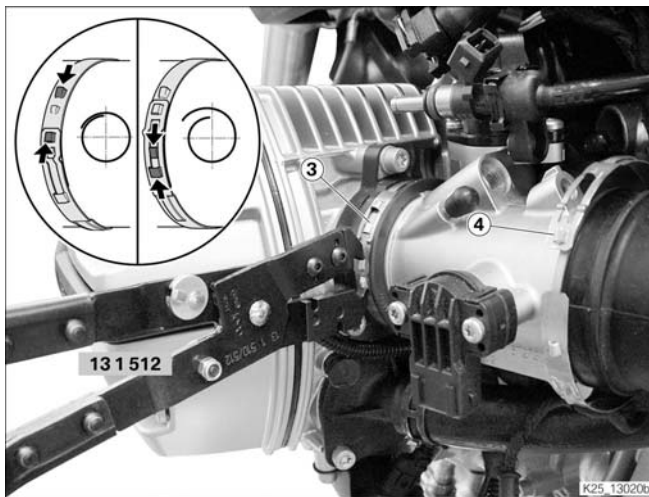
(-) Disconnecting intake air pipes from throttle-valve stubs

- Open clips (4) on left and right with pliers (No. 13 1 512).

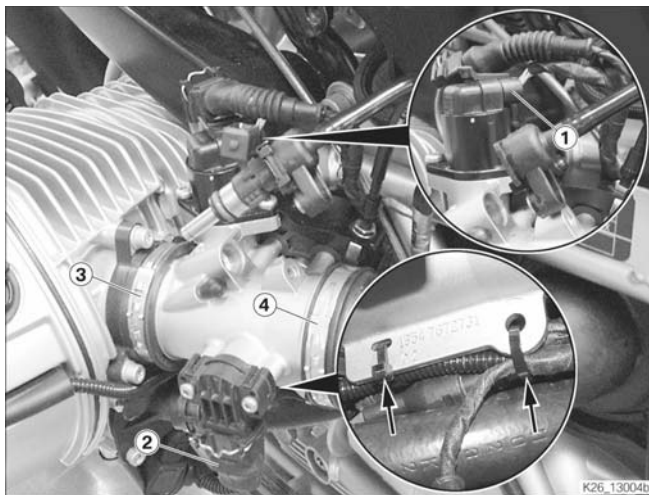


(-) Disconnecting both throttle-valve stubs

- Open hose clips (3) at right and left throttle valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrow) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Pull off the throttle-valve stub on the right and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the throttle-valve stub on the left and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.



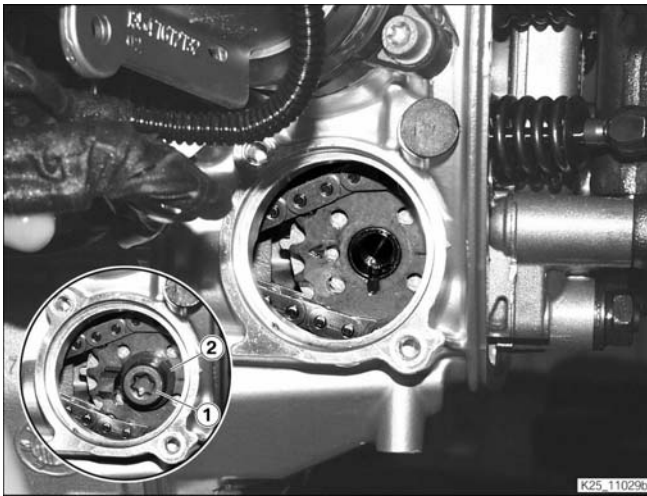
(-) Removing trigger for camshaft sensor

- Slacken screw (1).



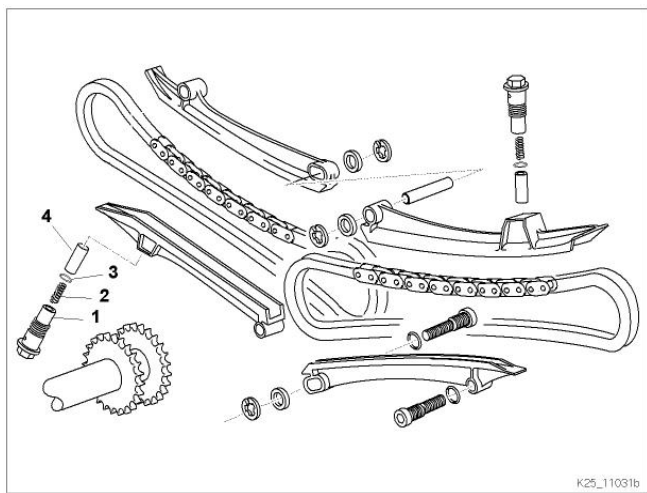
Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



- Remove screw (1) with trigger for camshaft sensor (2).

(-) Removing right chain tensioner



- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

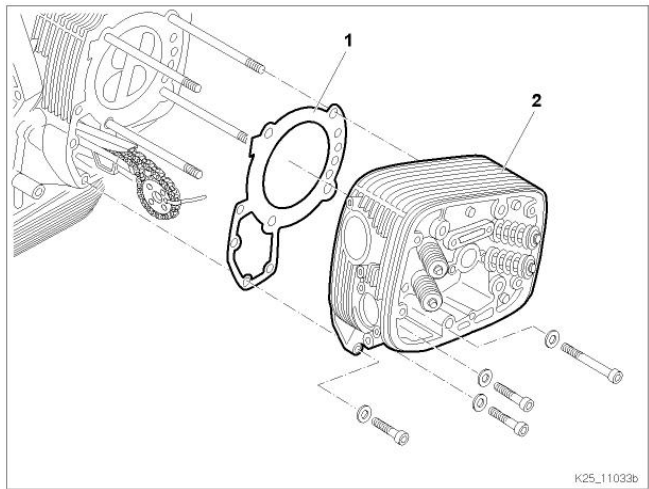
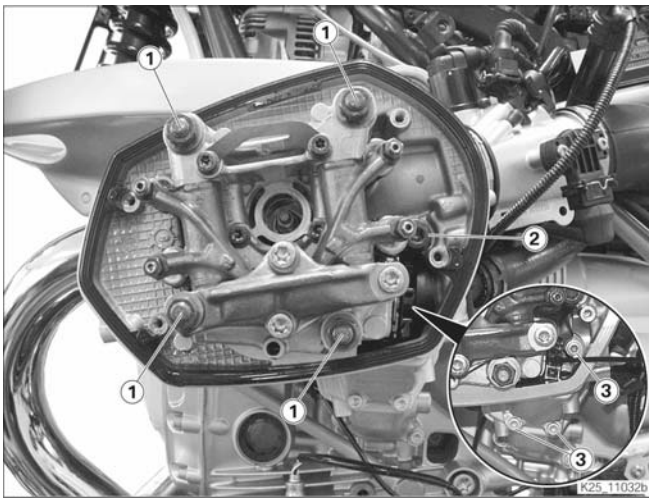
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

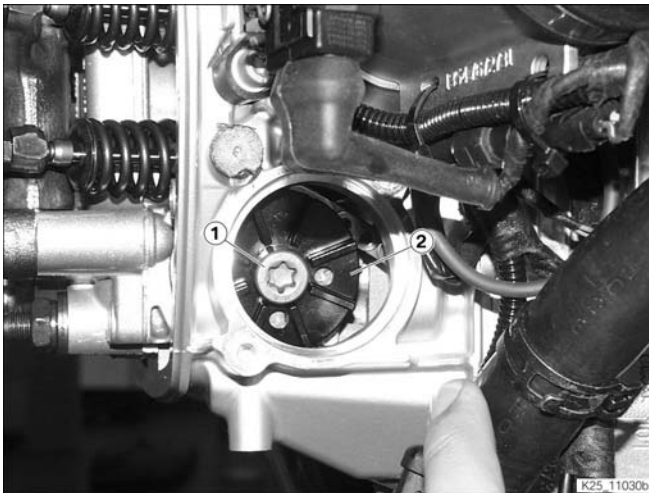
When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with



washers.

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing breather plate

- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).

(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing

chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



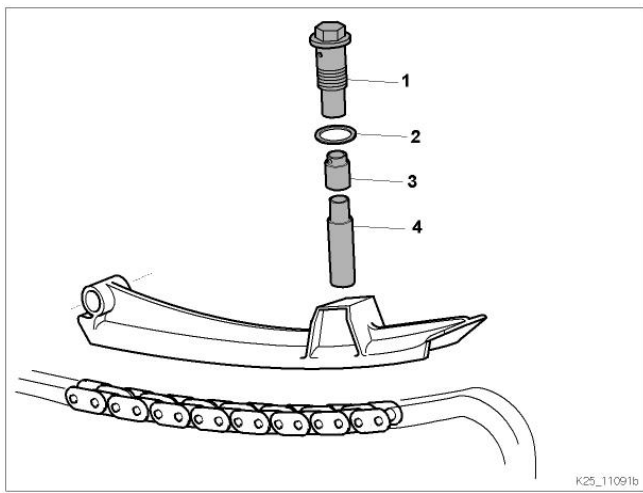
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



(-) Removing left cylinder head

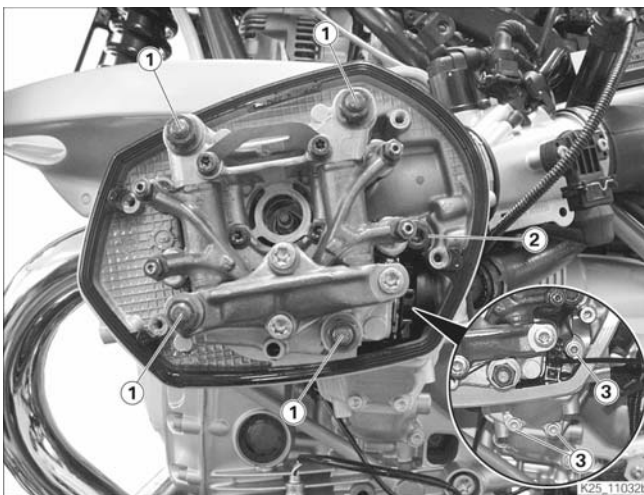
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



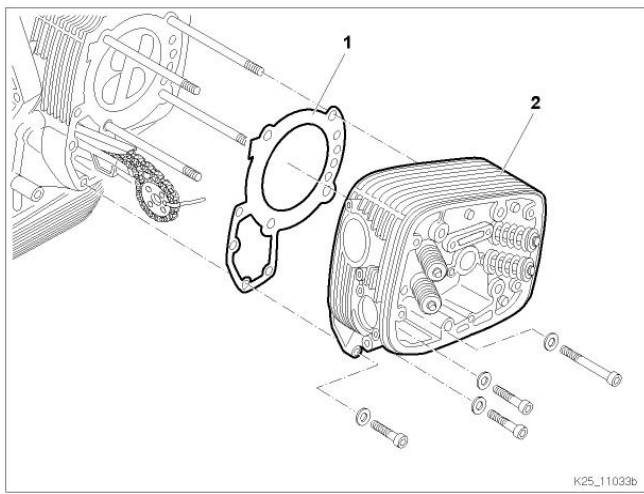
Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



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(-) Installing right cylinder head

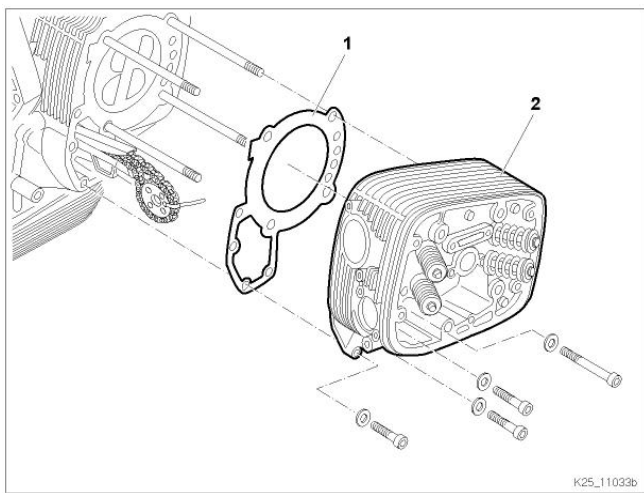
- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.

Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.



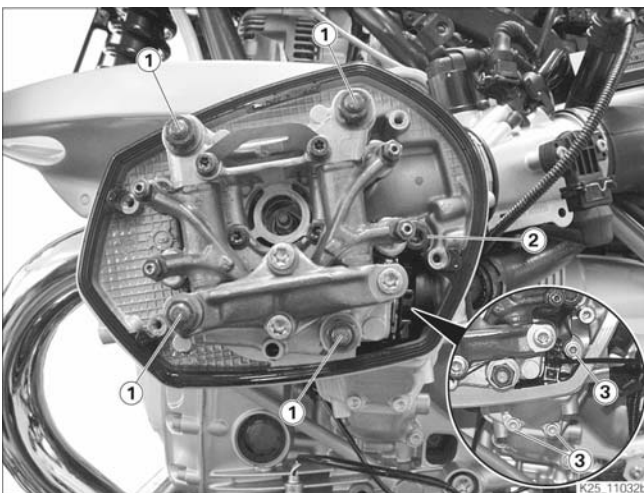
K25_11032b

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

Attention


Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



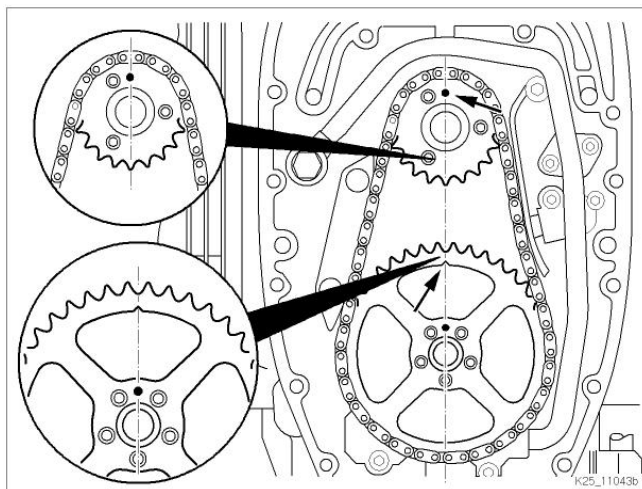
K25_11032b

- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

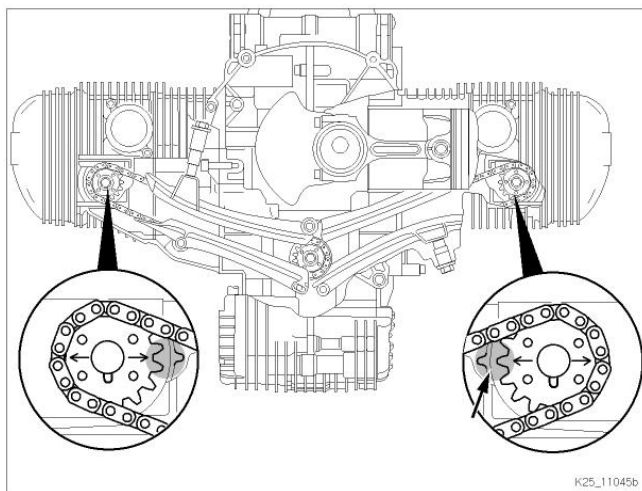
 Tightening torques		
Nuts of tie bolts, M10,	Oil screw	

tighten in diagonally opposite sequence	threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, right (cylinder No. 1)



- Make sure that the crankshaft and countershaft are in the "**firing TDC, right cylinder**" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

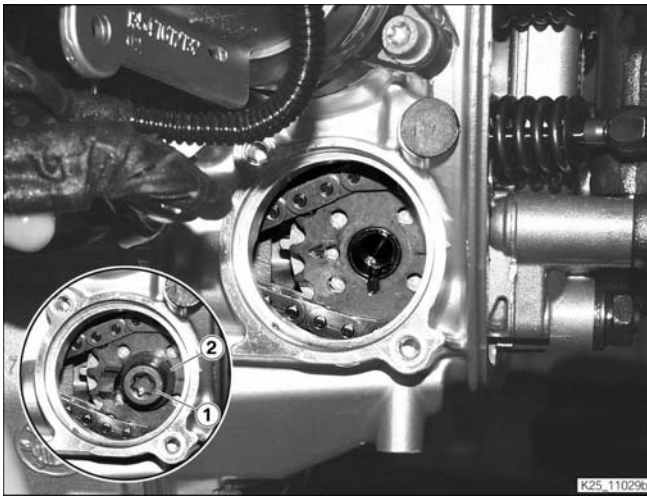
(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



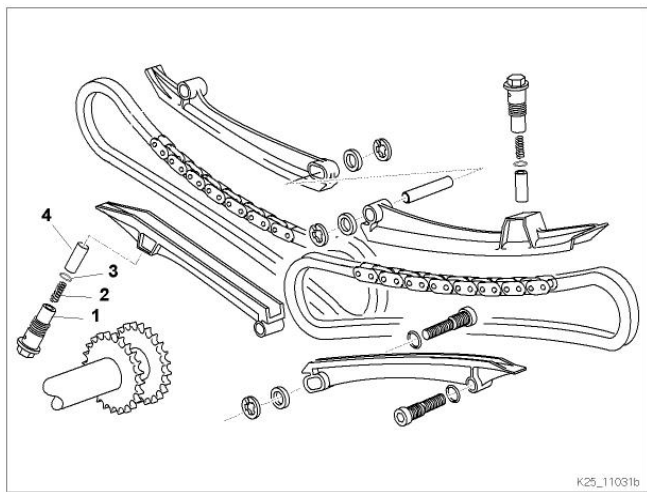
▶ Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.




- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.



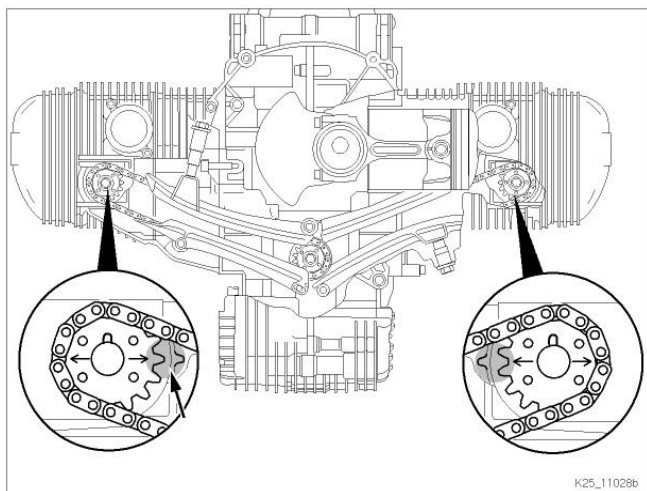
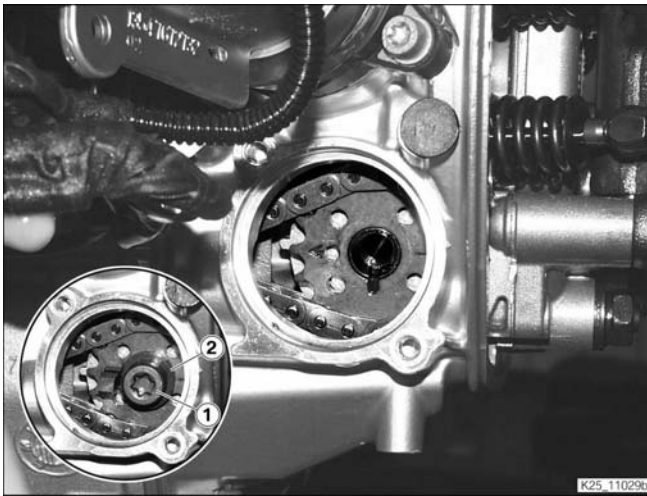
 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.

(-) Installing left cylinder head

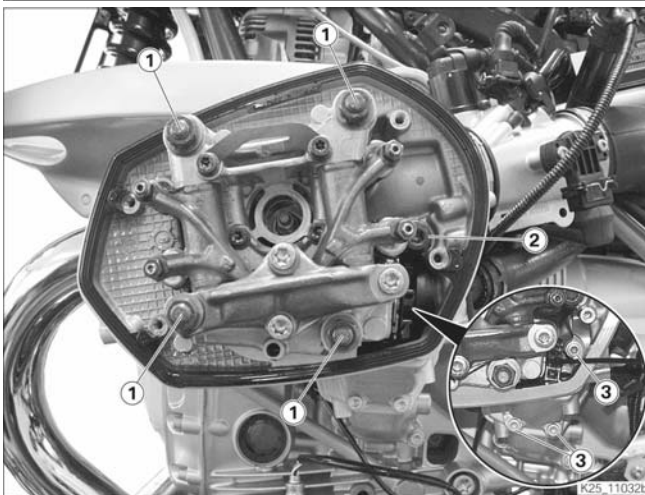
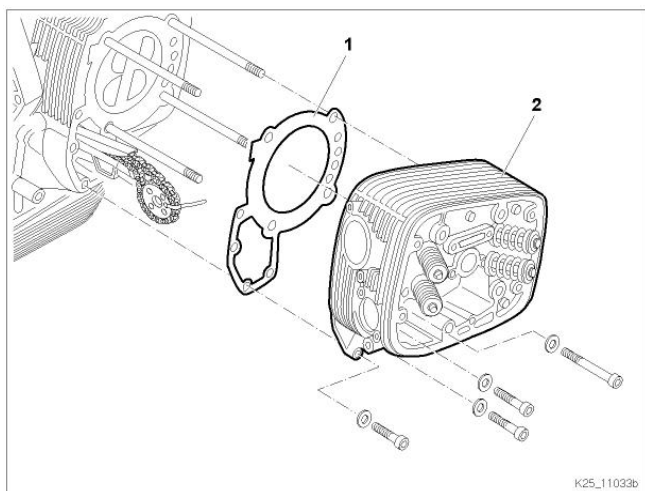
- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature:

If the cylinder head is installed with the



timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

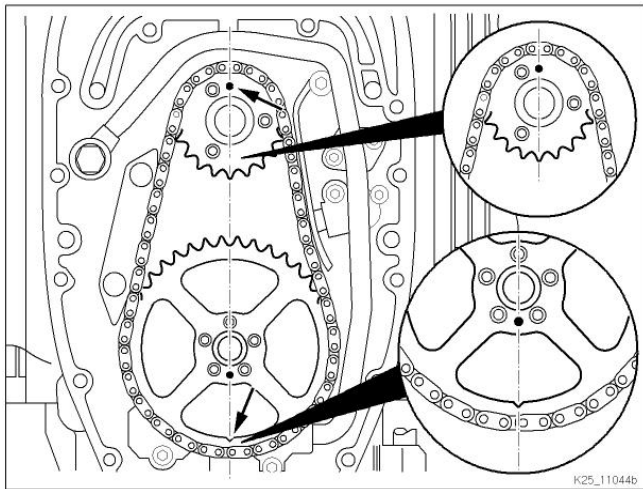
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

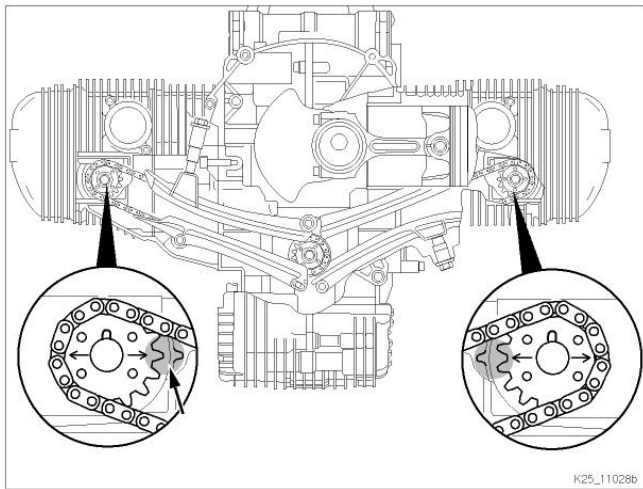
(-) Adjusting timing, left (cylinder No. 2)

- Make sure that the crankshaft and countershaft are in the "firing TDC, left cylinder" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the sprocket for the timing chain of the



K25_11044b

countershaft is **down** and at the top the split line between the two halves of the crankcase is between two teeth.



K25_11028b

- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **up**.
- » The valves in the left-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

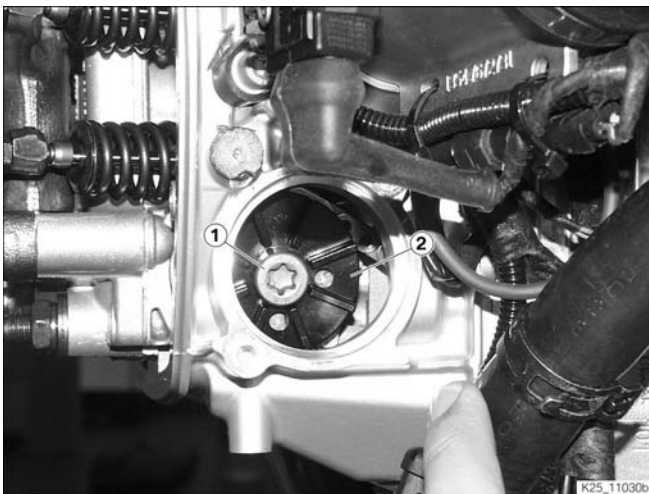


- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.



Note

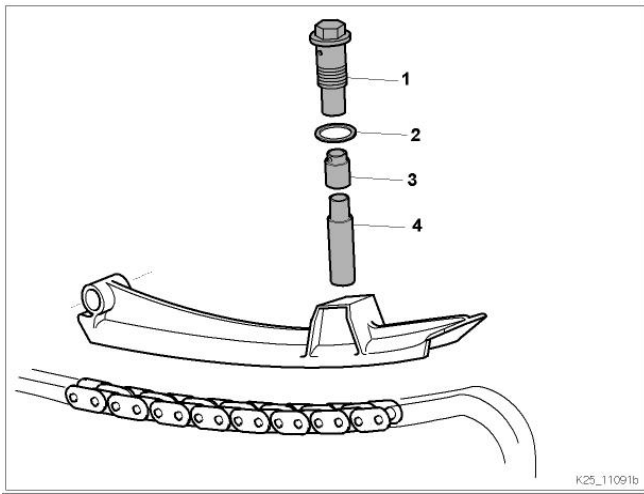
The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



K25_11030b


(-) Installing left timing chain tensioner

- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore



up in the chain tensioner.

- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.
- » The chain tensioner must slide onto the piston without tilting.
- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	

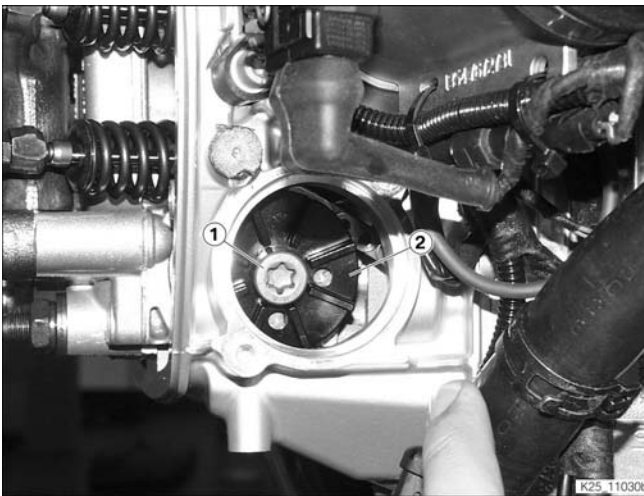
(-) Securing left camshaft sprocket


Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).



 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

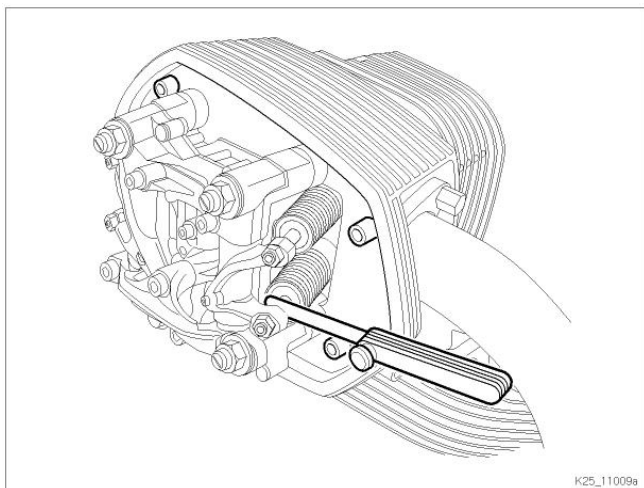
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	

Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	
--------------------------------	------------------------	--------	--

Result: Valve clearance is out of tolerance.

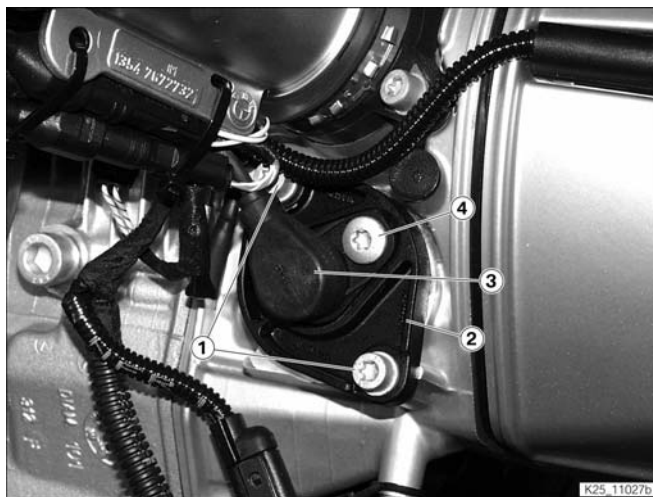
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



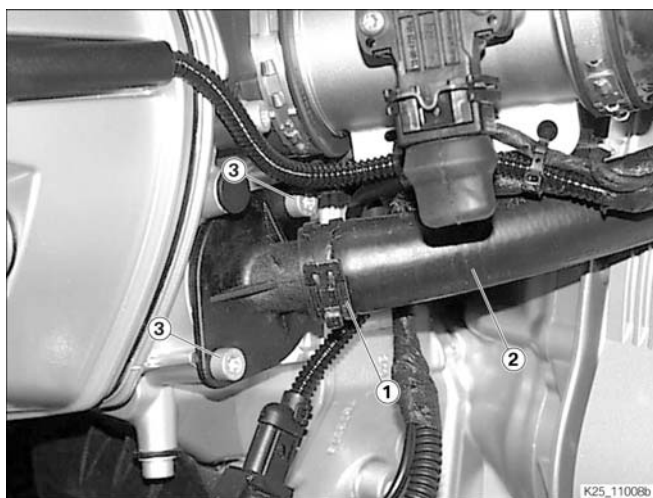
! Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

(-) Installing left camshaft cover



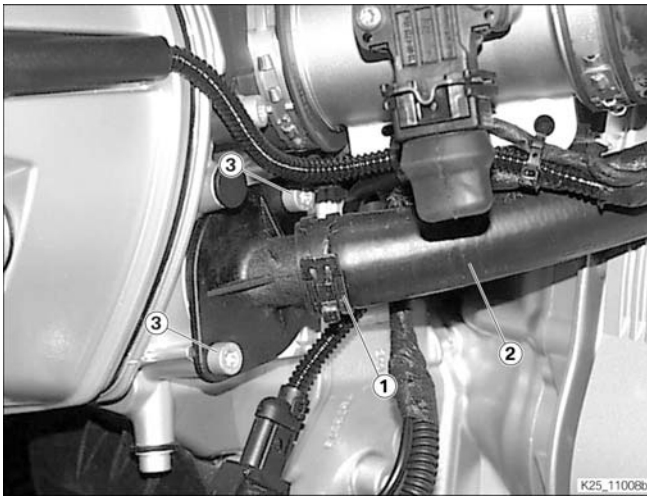
! Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

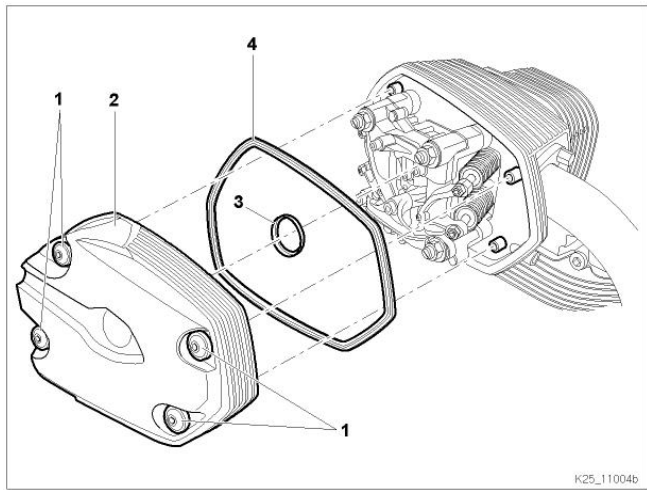
► Connecting hose for crankcase breather




- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



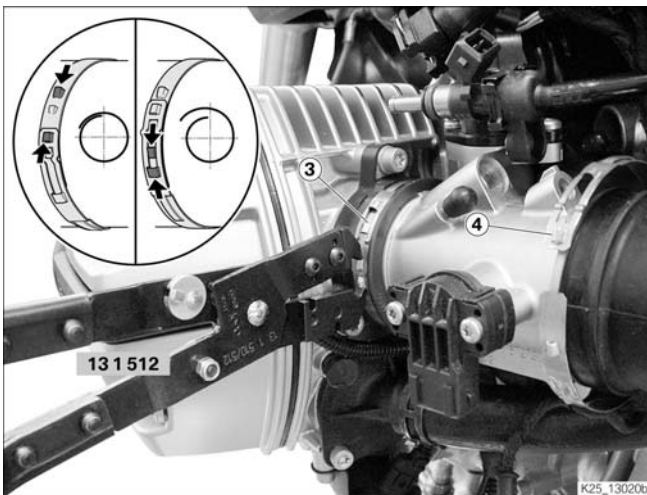
(-) Installing cylinder head cover



- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

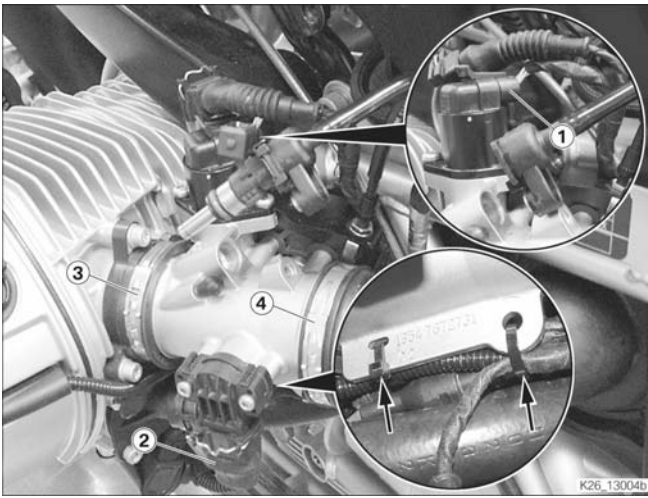
 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing both throttle-valve stubs



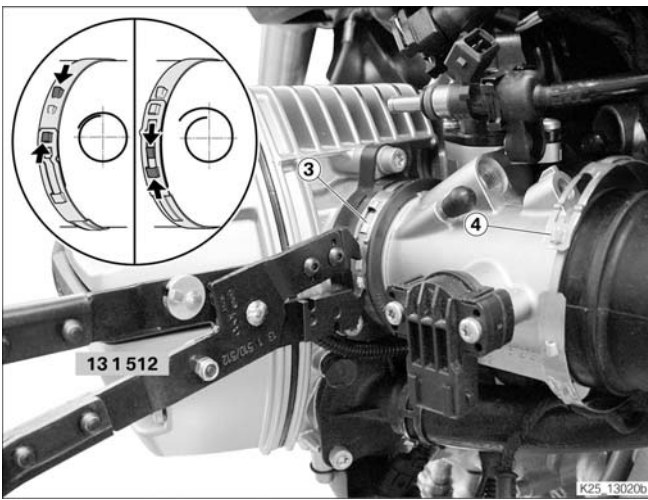
- Remove the covers from the intakes.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamps (3) and close them with pliers (No. 13 1 512).

- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and



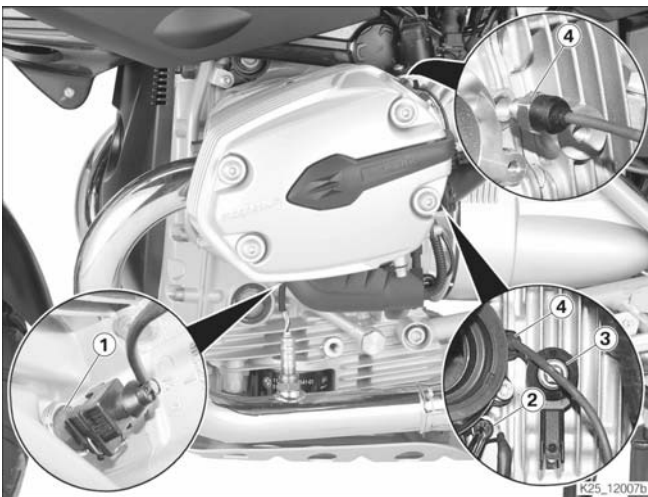
secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing air intake pipe




- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512) .

(-) Connecting plugs of engine sensors and switches, left




- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.

 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (3).
- Connect temperature sensor (4).

(-) Connecting plugs of engine sensors, right

- Secure earth lead (1) to the cylinder head.

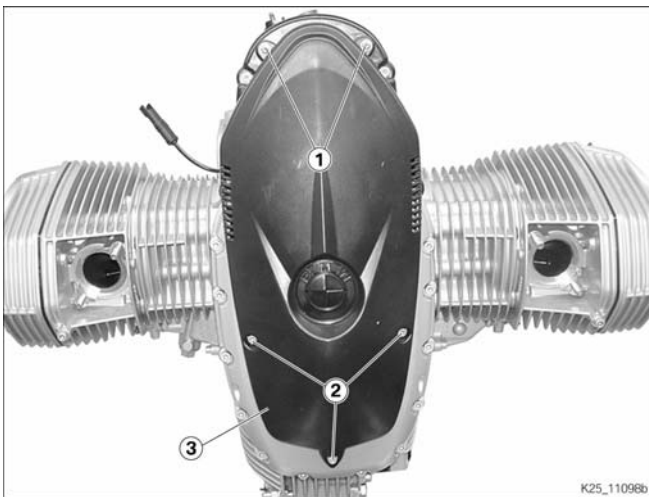
 Tightening torques		




left and right, M6 x 10	8 Nm	
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- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

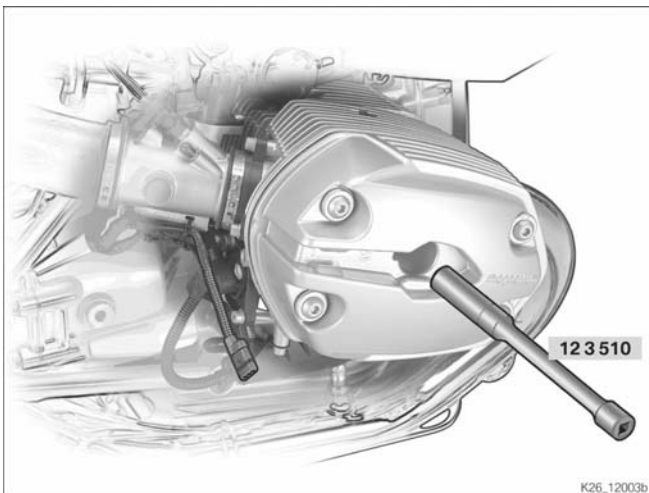
(-) Installing belt guard




- Install belt guard (3) and secure with screws (1) and (2).


 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing primary spark plug



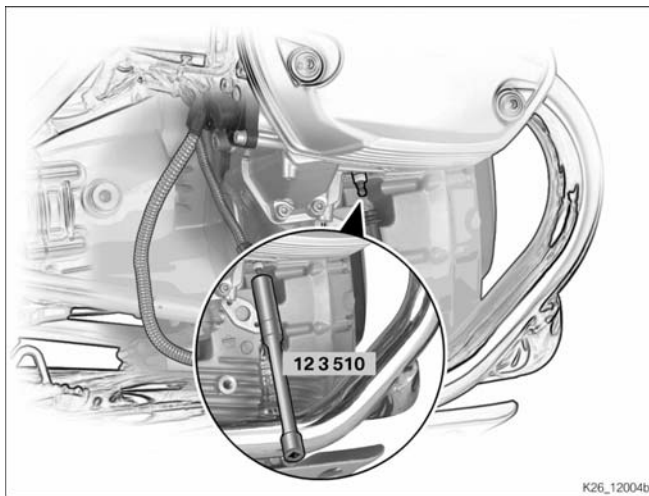
- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

 Tightening torques		
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	

 Technical data			
Spark plug, manufacturer and designation		Bosch YR 5 LDE	

(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.



 Tightening torques		
---	--	--

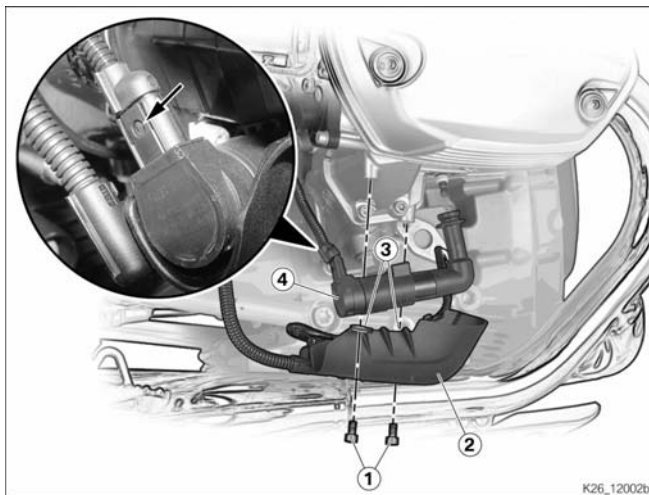
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
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 Technical data		
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Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE
--	--	----------------

(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.



 Consumables/lubricants		
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Talcum powder	Assembly aid	
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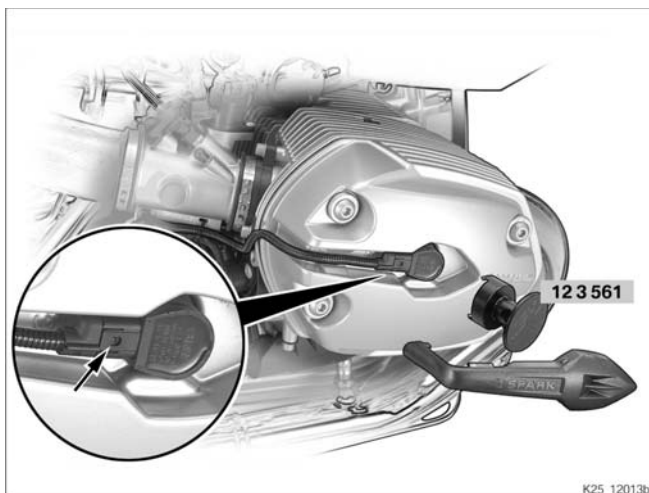
- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
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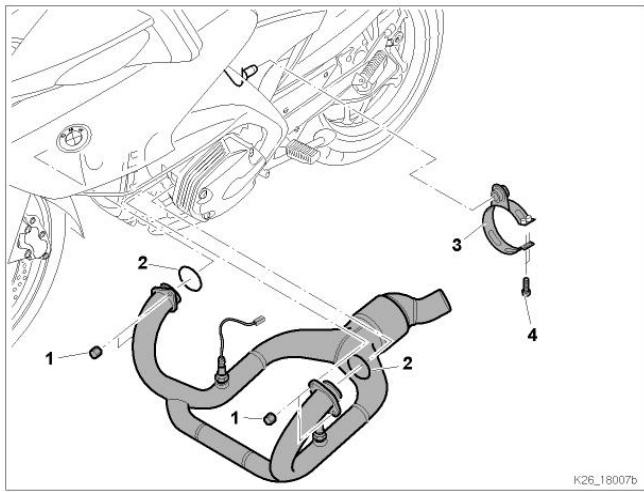
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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(-) Installing direct ignition coil


- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.




(-) Installing exhaust elbow




- Replace seals (2), apply thin layer of grease and fit in cylinder head.

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

 <p>Tightening torques</p>		
Manifold to cylinder head, Acorn nut M8	21 Nm	

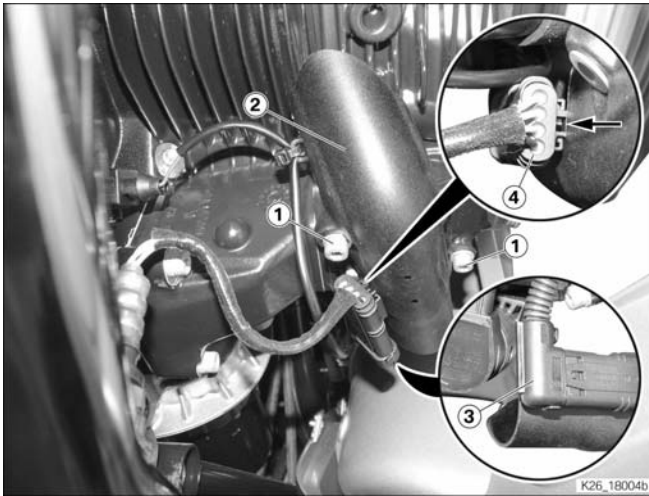
- Align the clamp (arrow) on the manifold and tighten screws (1).

 <p>Tightening torques</p>		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	



► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).

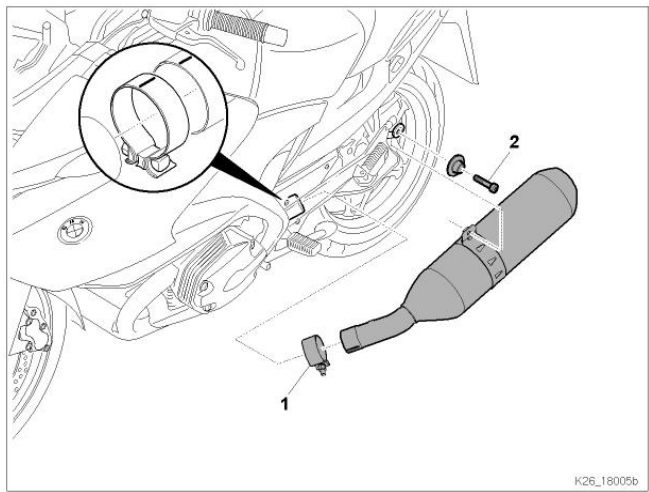


Tightening torques

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
--	------	--



- Install front screw (1) in both bottom sections of the fairing.



(-) Installing silencer

- Grease the inner face of Torca clamp (1).



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).




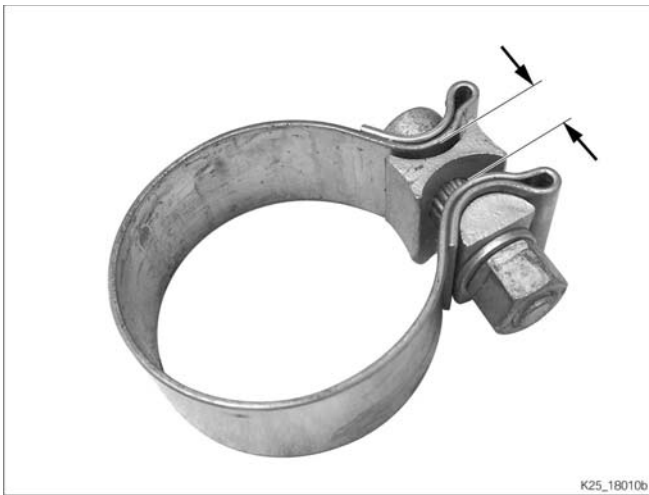
Tightening torques

End silencer to footrest support, M8	19 Nm	
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- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**

Test

- Check distance (*arrows*) between silencer and rear wheel.



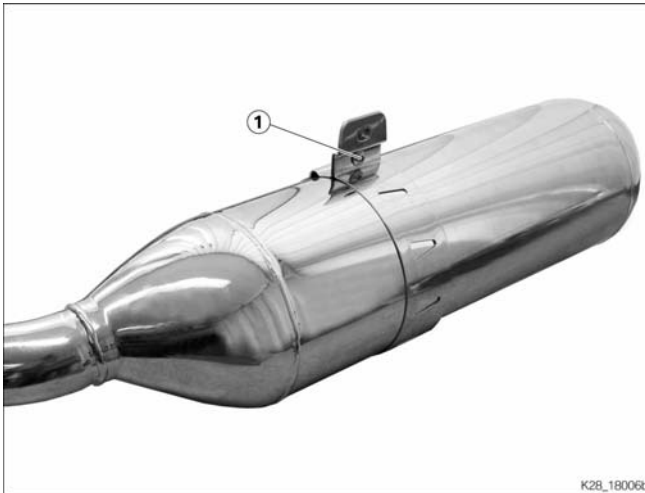
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



! Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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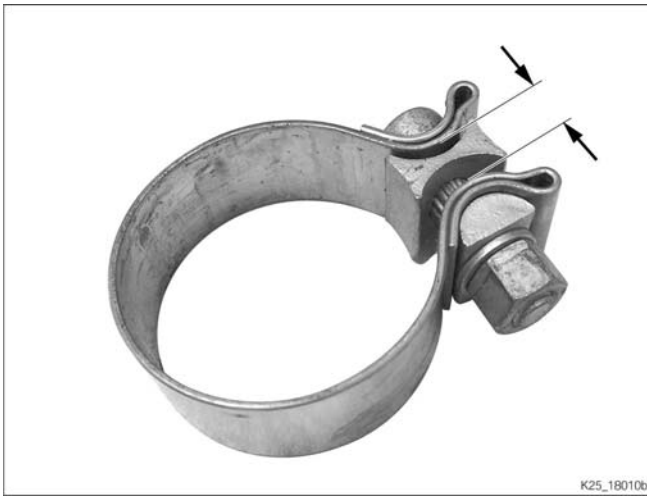



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.


Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.




 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
Consumables/lubricants			
Engine oil, 20W-50			
		Minimum = bottom ring	

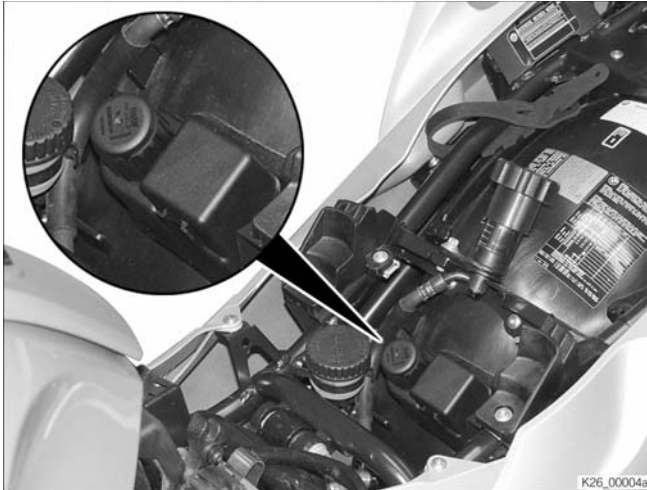
		mark on sight glass	
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(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

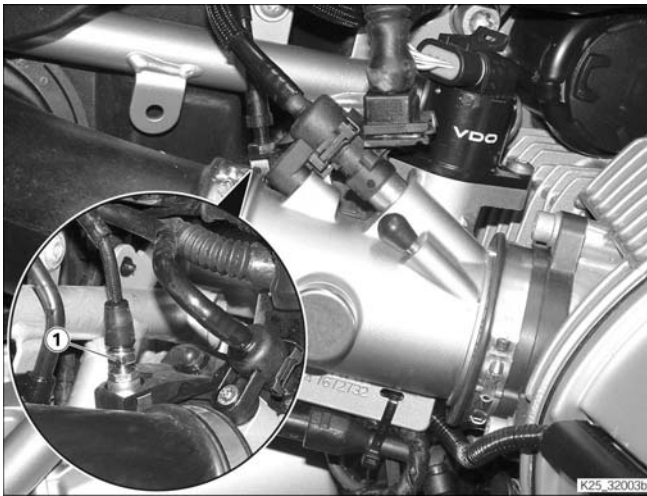
Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

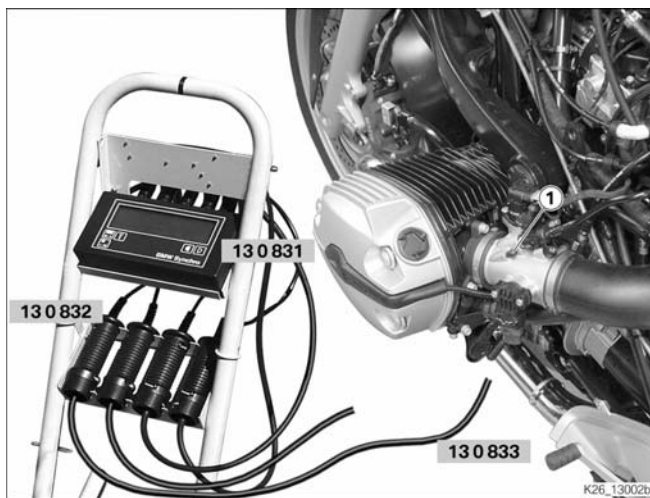


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



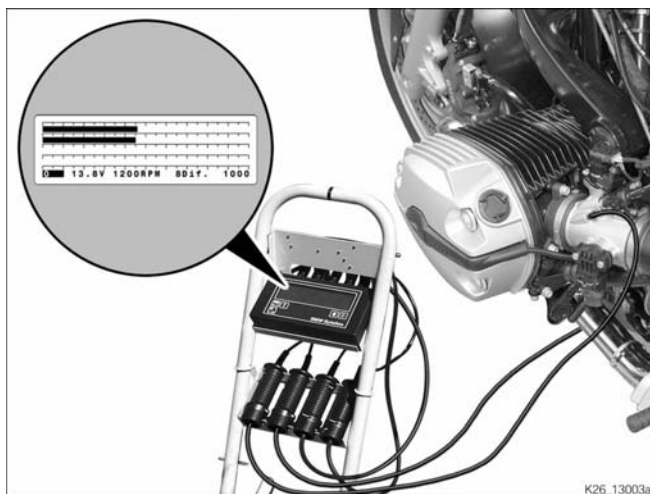
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
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Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

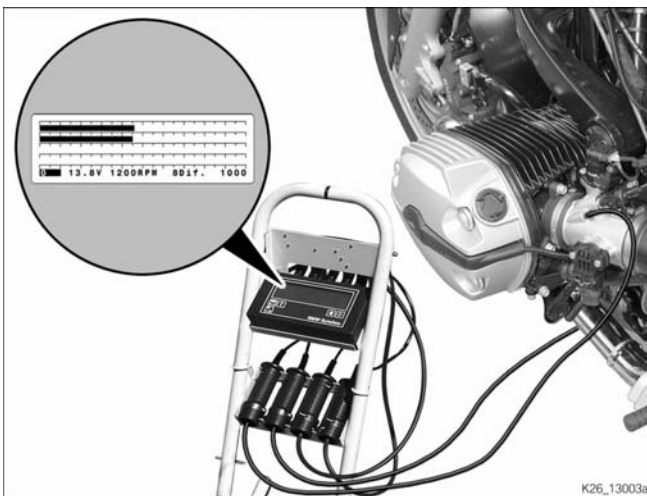
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

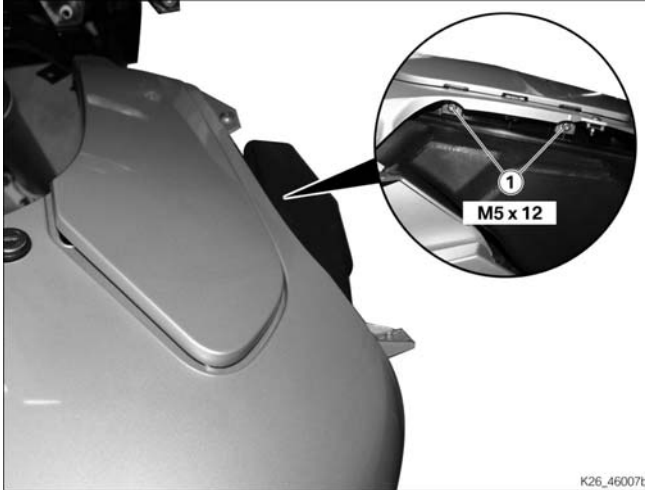
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).





(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



11 12 201 Replacing all cylinder heads



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

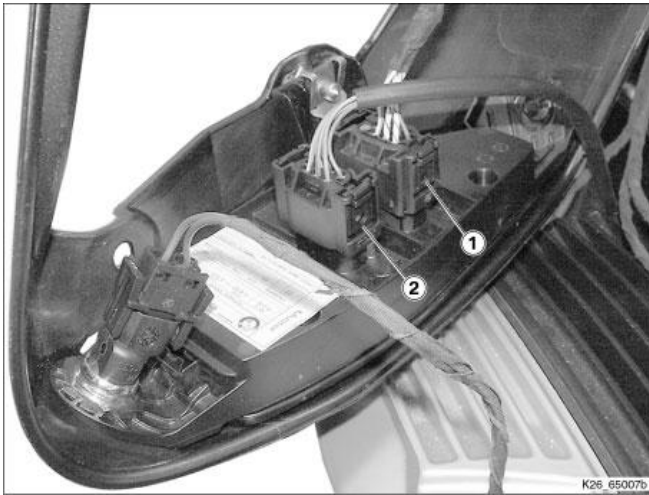
- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

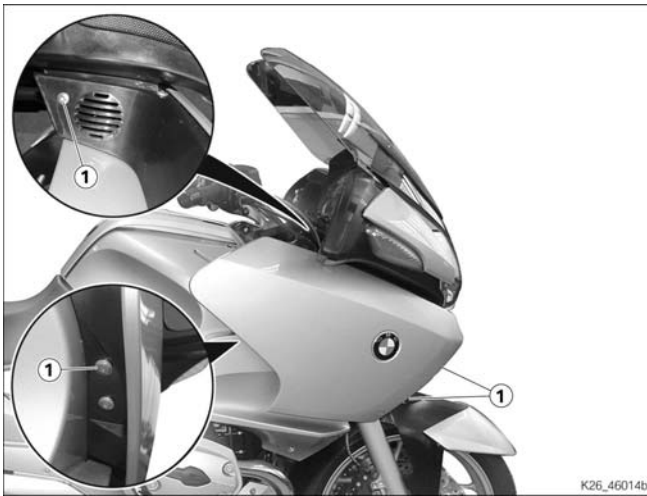
- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

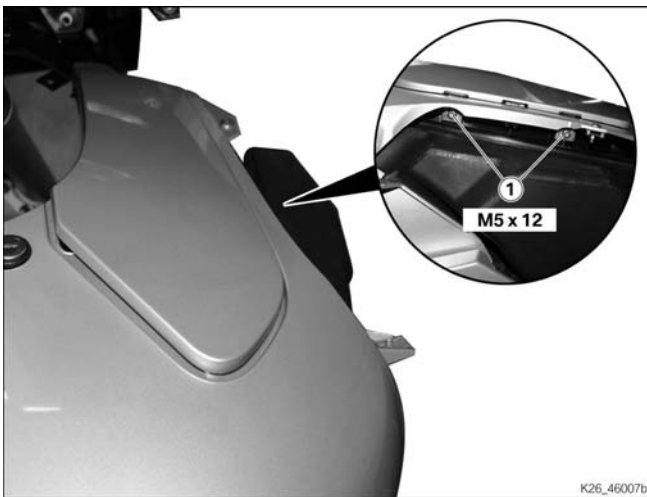
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



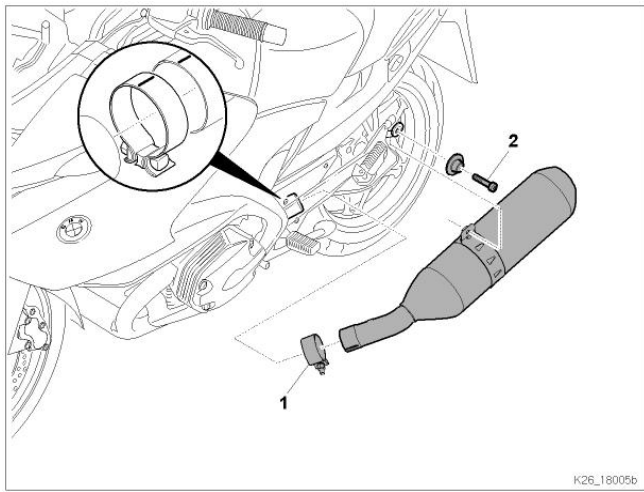
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



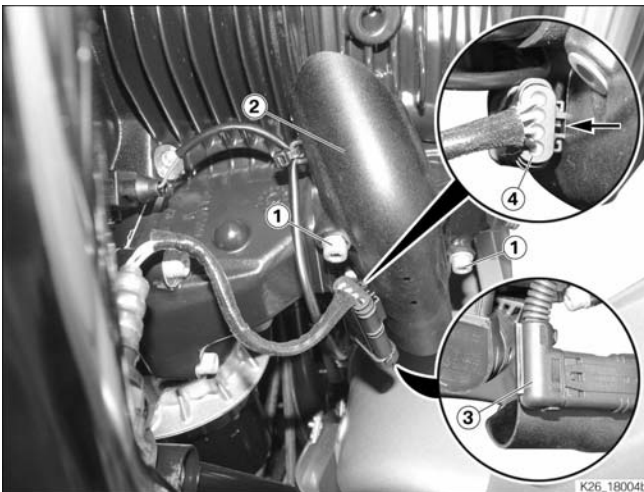
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

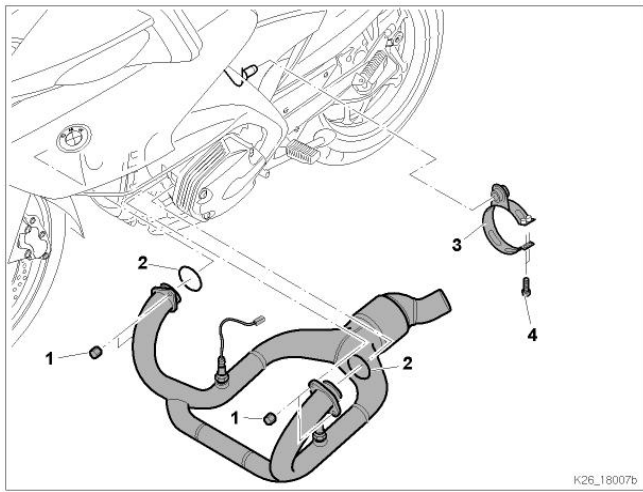
- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.



(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



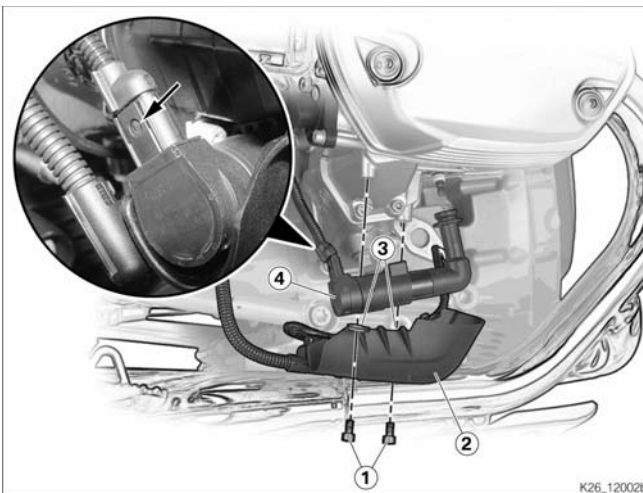
- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF



- Remove the primary spark plug cover.

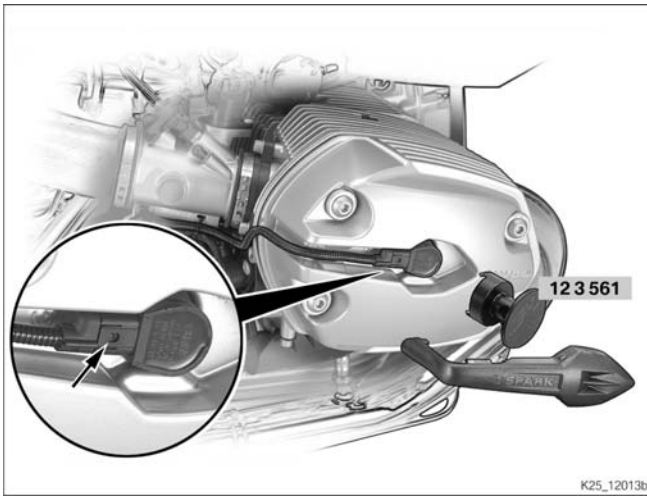


Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

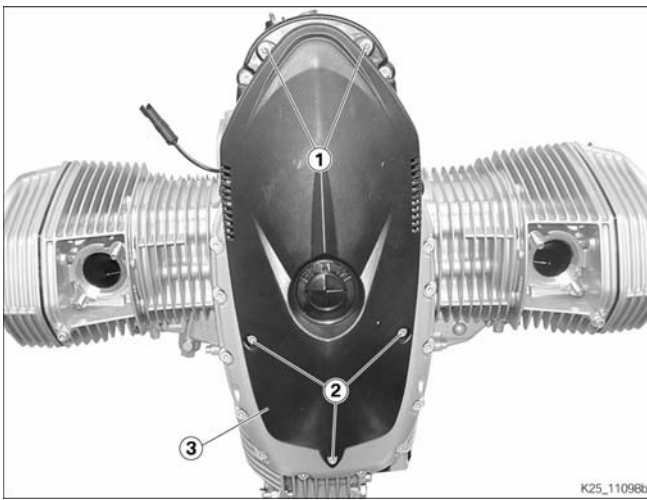
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.



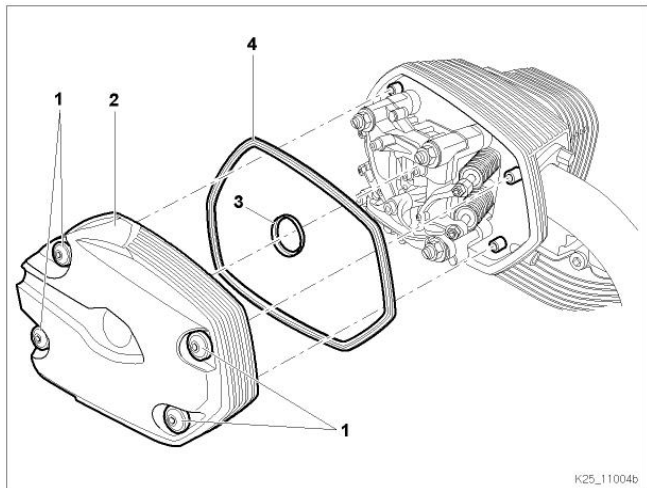
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing belt guard



- Remove screws (1) and (2).
- Remove belt guard (3).

(-) Removing cylinder head cover



- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

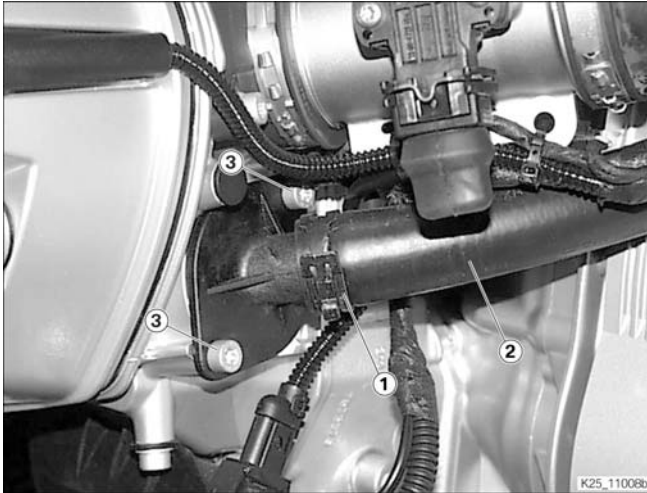
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

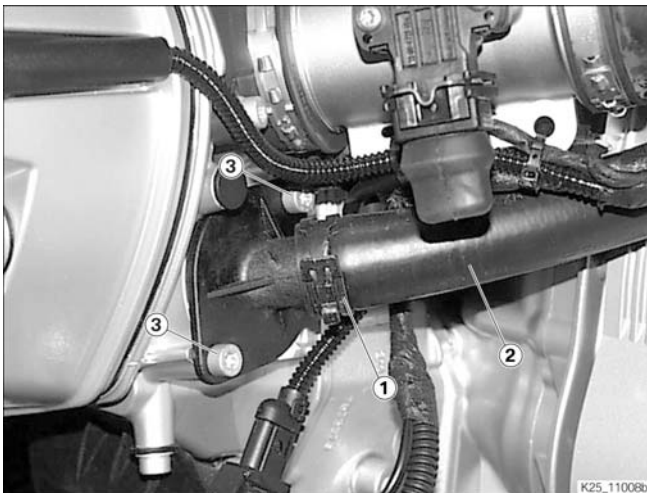
(-) Removing left camshaft cover

► Disconnecting hose for crankcase breather

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.

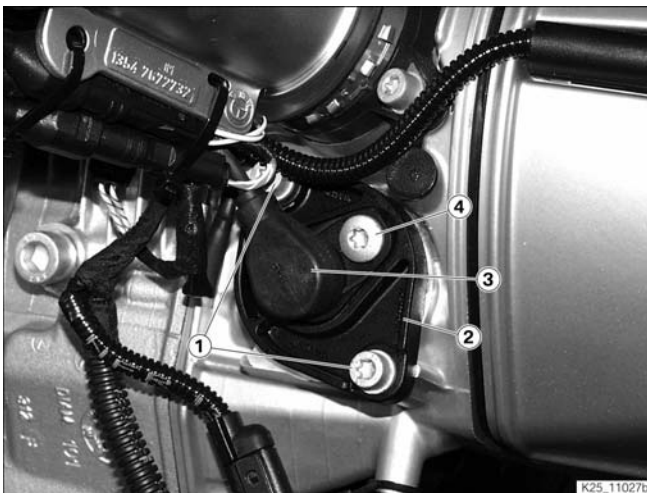


- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



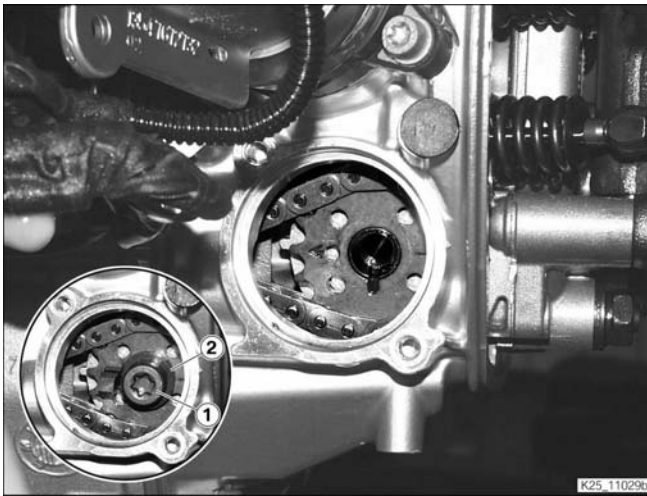
(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is



at firing TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.



- Insert locating pin (No. 11 2 650) to lock the engine in position.

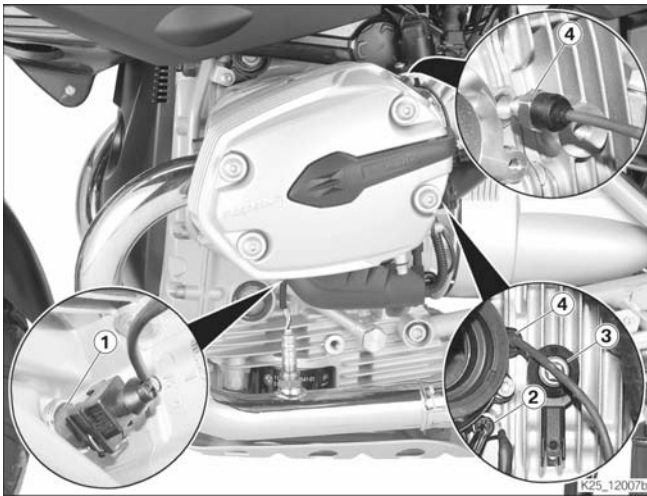


(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).

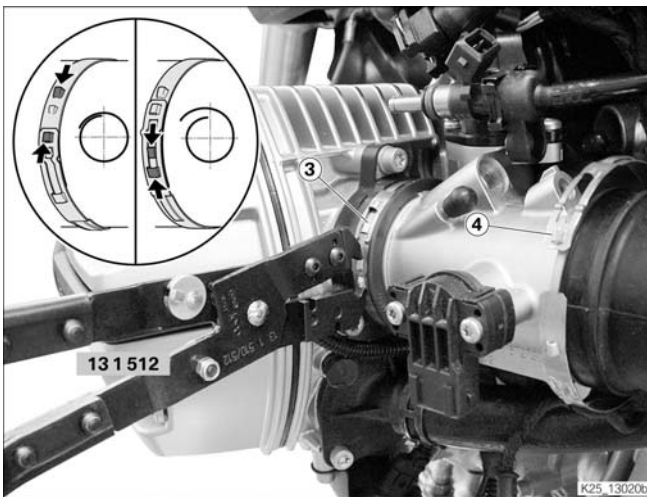
(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).

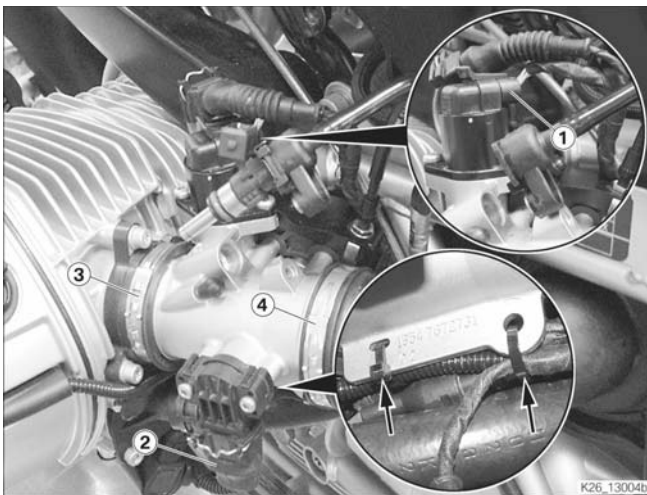


(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.



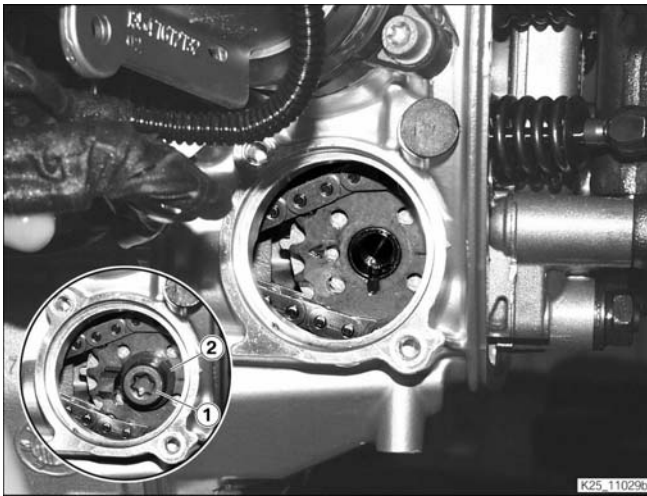
(-) Removing trigger for camshaft sensor

- Slacken screw (1).



Note

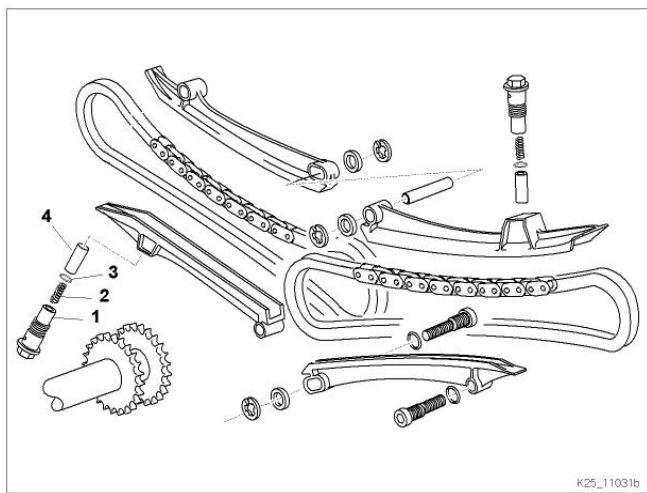
The timing-chain tensioners have to be installed when



the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with trigger for camshaft sensor (2).

(-) Removing right chain tensioner



- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

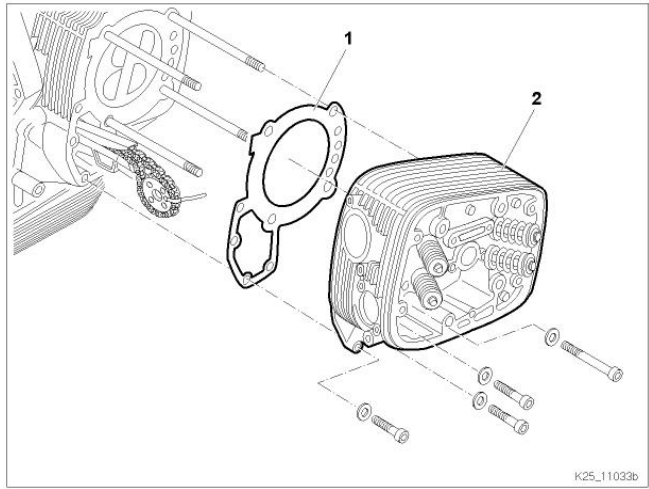
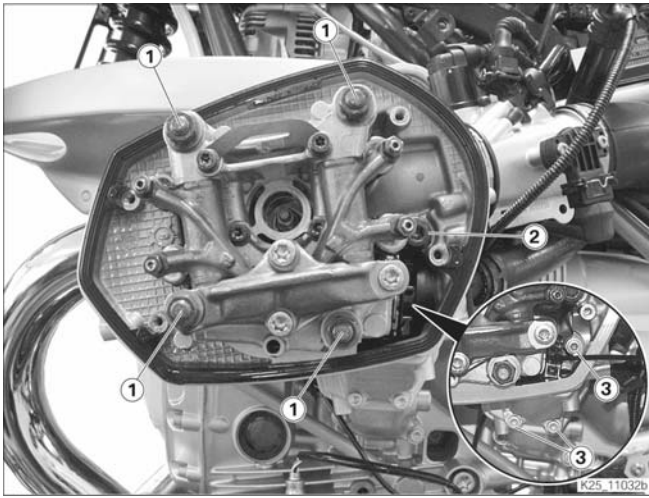
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

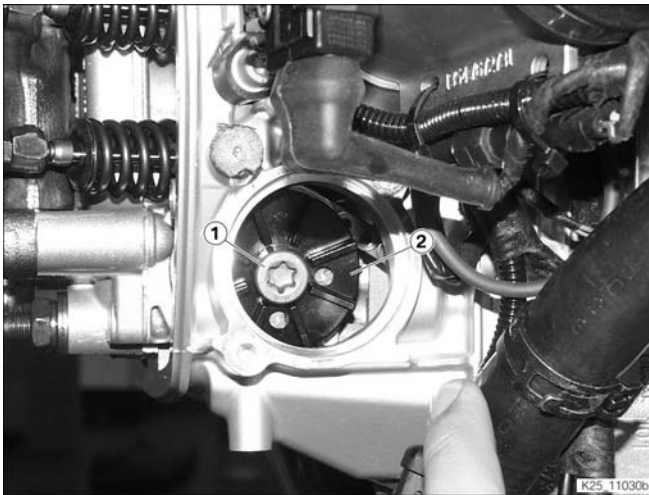
When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with



washers.

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing breather plate

- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).

(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing

chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



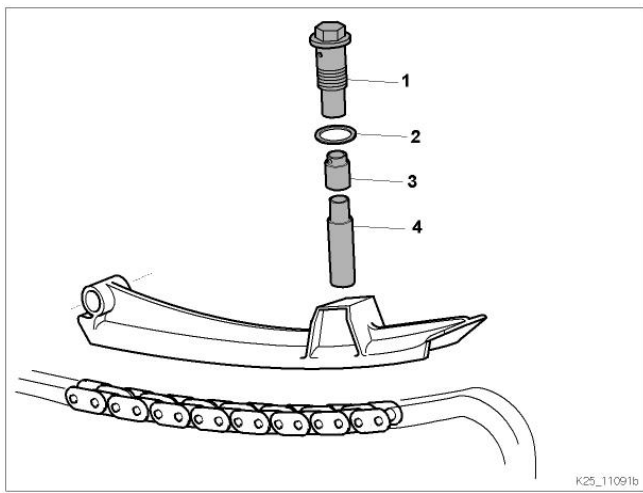
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



(-) Removing left cylinder head

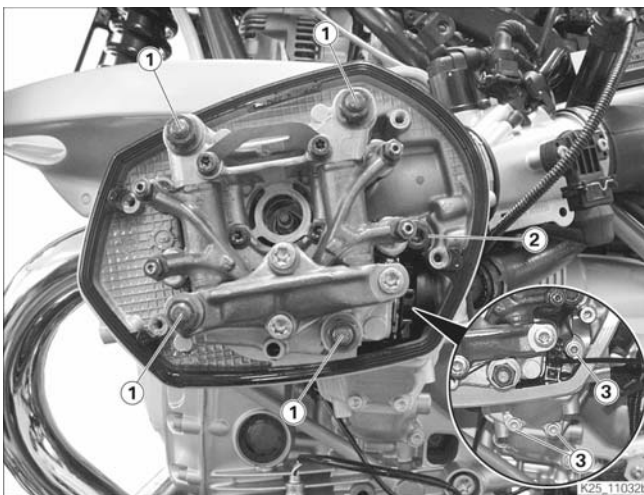
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



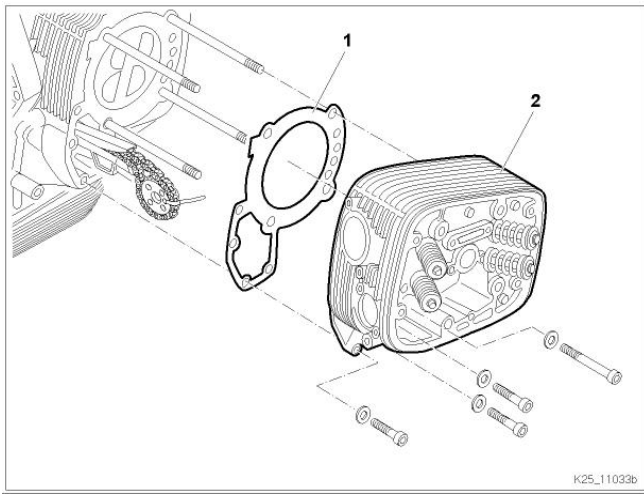
Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



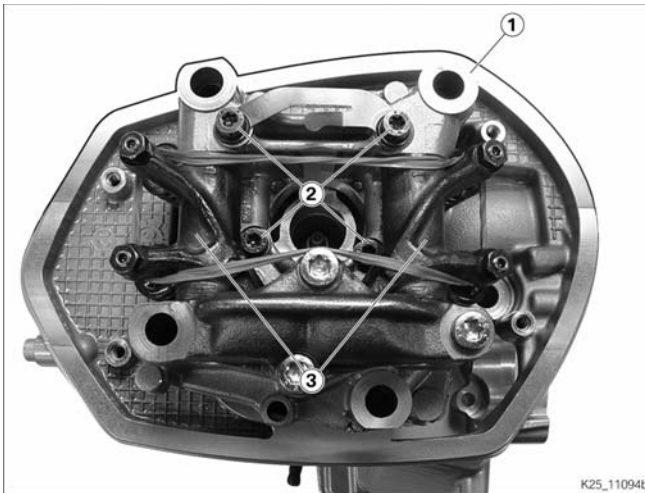
- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Replacing cylinder head

► Removing timing-gear carrier

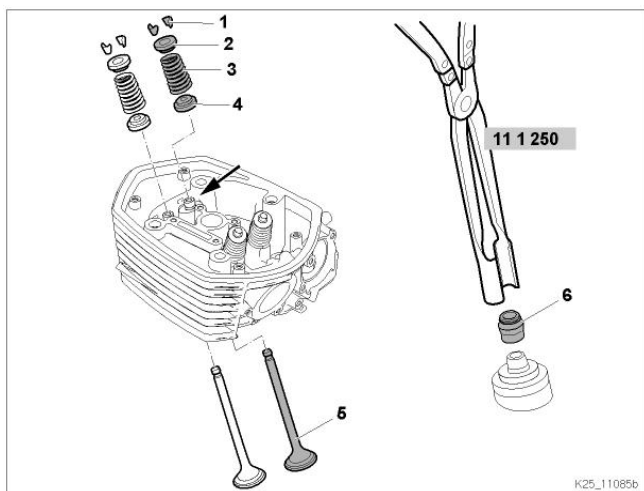
- Use a rubber band to hold rocker arm (3).
- Remove screws (2).
- Release timing-gear carrier (1) by tapping it lightly with a plastic-faced hammer and remove.



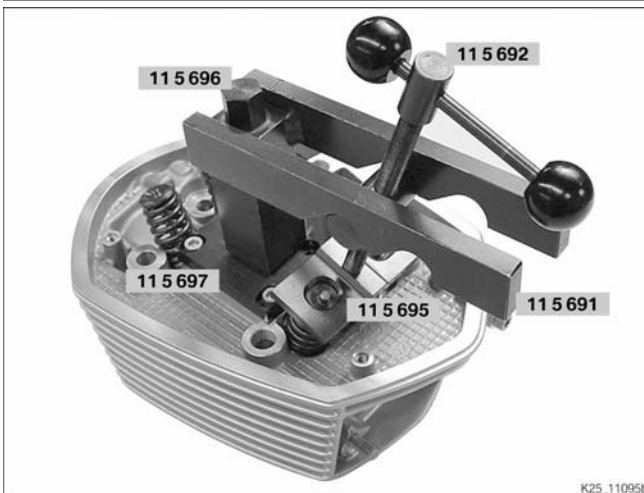
- Lay the cylinder head on a clean, non-abrasive surface; take care not to damage the sealing faces.
- Install valve spring compressor (No. 11 5 697), (No. 11 5 691), (No. 11 5 696), (No. 11 5 695) and (No. 11 5 692).
- Compress the valve springs.



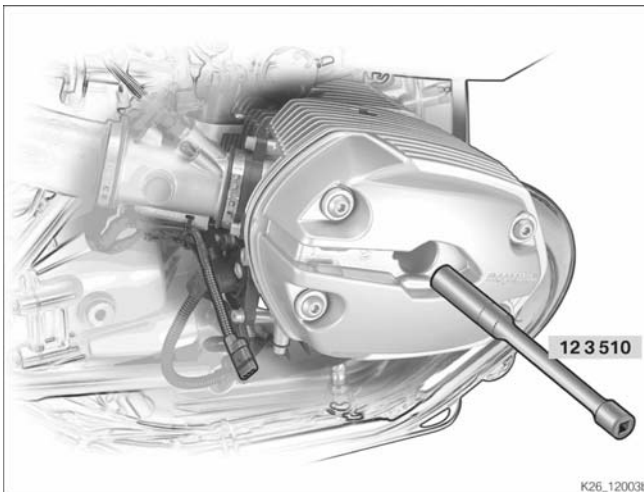
- Separate valve collets (1) from the valve spring retainers by tapping **lightly** on the bottoms of the valves (valve heads) and remove the valve collets.



- Remove upper spring retainer (2), Valve spring (3) and lower spring retainer (4).
- Release the valve springs.
- Remove valve (5).
- Adopt the same procedure for the valves on the other side.

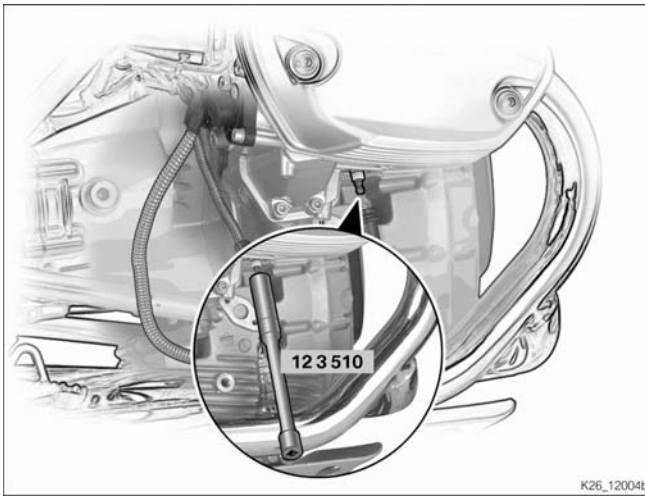


- Remove valve spring compressor (No. 11 5 697) , (No. 11 5 691) , (No. 11 5 696) , (No. 11 5 695) and (No. 11 5 692) .



- Use spark plug socket (No. 12 3 510) to remove the primary spark plug.

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



K26_12004b



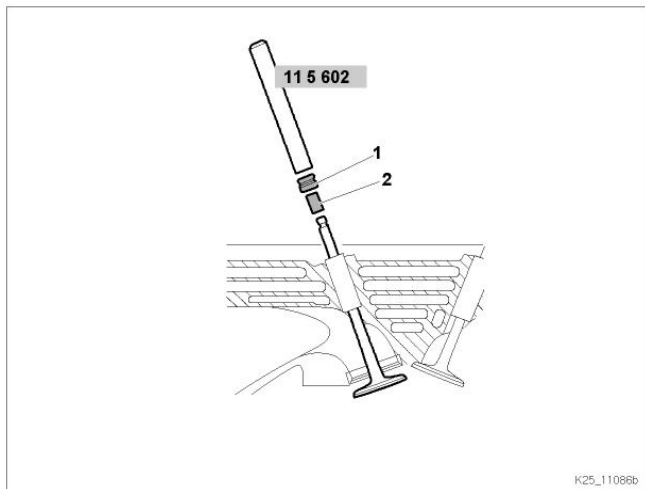
K25_11095b

- Install valve spring compressor (No. 11 5 697) , (No. 11 5 691) , (No. 11 5 696) , (No. 11 5 695) and (No. 11 5 692) on the new cylinder head.
- Install the new valve with the stem oiled.



Note

The valve stem seal must always be replaced whenever a valve is removed.



K25_11086b

► **Installing valve stem seal**

- Shrink a short length of shrink-down plastic tubing (2) onto the end of the valve stem.
- Install valve stem seal (1) with drift (No. 11 5 602) .
- Remove shrink-down plastic tubing (2).



- Install lower valve spring retainer (4), Valve spring (3) and upper valve spring retainer (2), making sure that the valve spring is installed with the coloured mark down.
- Compress the valve springs.



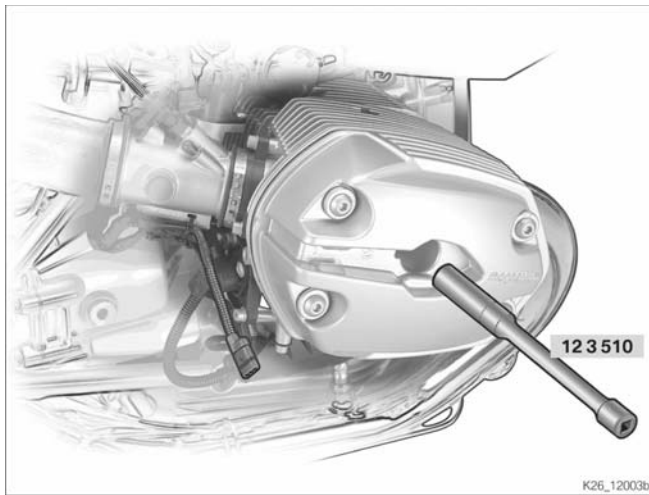
Attention



Nature: If they are not correctly installed, the valve collets can drop out of their seats when the valve moves. If this happens the valve is no longer secured and can drop into the combustion chamber.

Avoidance: Make sure that valve collets are correctly seated in the valve stem grooves.

- Install valve collets (1) with a blob of grease (to facilitate assembly).
- Slowly release the valve springs.
- Adopt the same procedure for the valves on the other side.
- Remove the valve spring compressor.



► **Installing primary spark plug**

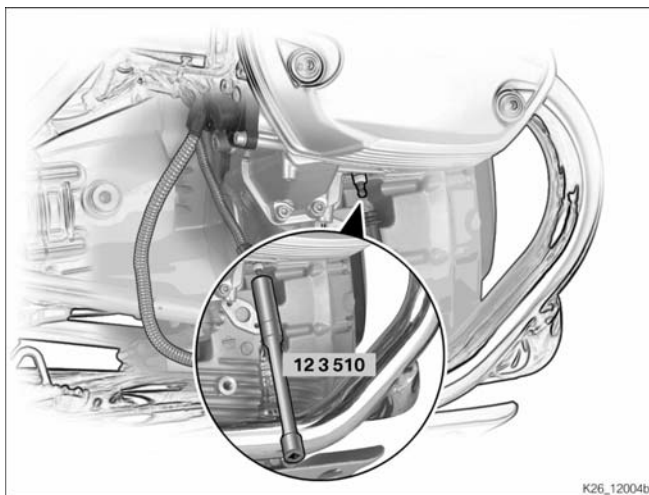
- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.



Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--



Spark plug, manufacturer and designation		Bosch YR 5 LDE
--	--	----------------



► **Installing secondary spark plug**

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.



Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	
--	---	--



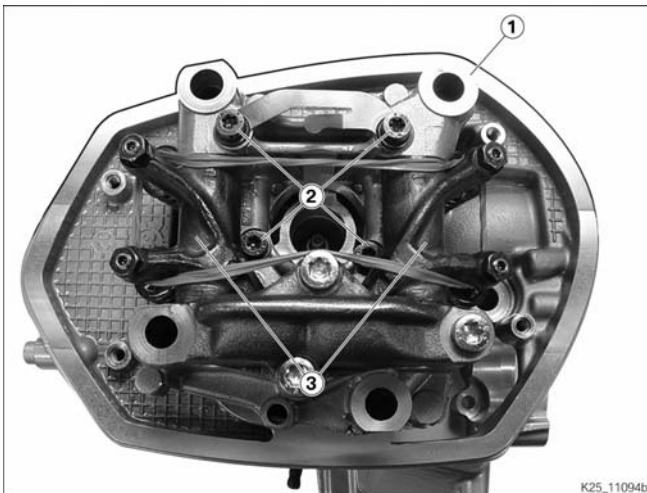
Secondary spark plug, manufacturer		Bosch YR 5 LDE
------------------------------------	--	----------------

and designation			
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► **Installing timing-gear carrier**

- Install timing-gear carrier (1), making sure that the reamed sleeves of the timing-gear carrier are perfectly aligned with the holes in the cylinder head.
- Install screws (2), noting the different lengths of the screws.



Tightening torques		
Timing-gear carrier to cylinder head left/right, M6 x30	8 Nm	
Timing-gear carrier to cylinder head left/right, M6 x 60	8 Nm	

- Remove the rubber bands securing the rocker arms.

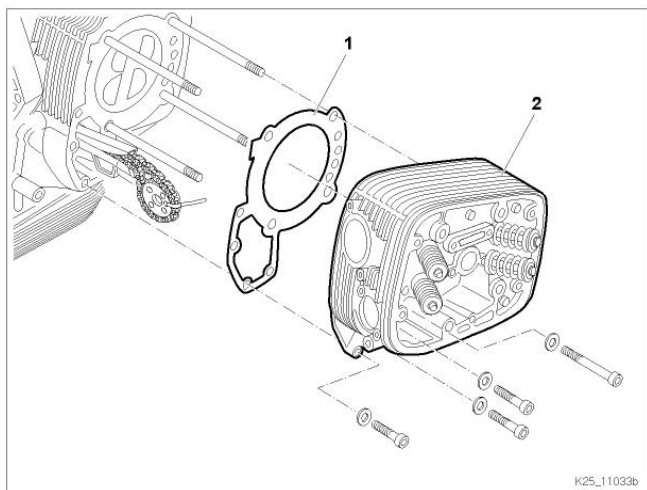


(-) **Replacing second cylinder head**

- Adopt the same procedure as for the first cylinder.

(-) **Installing right cylinder head**

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

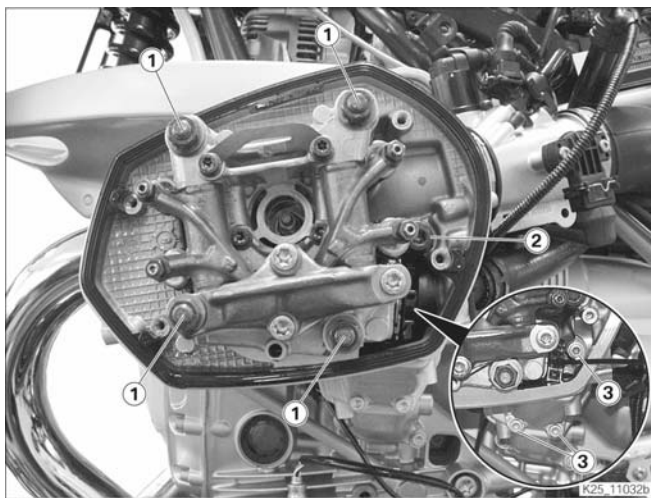
- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.



Attention


Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after

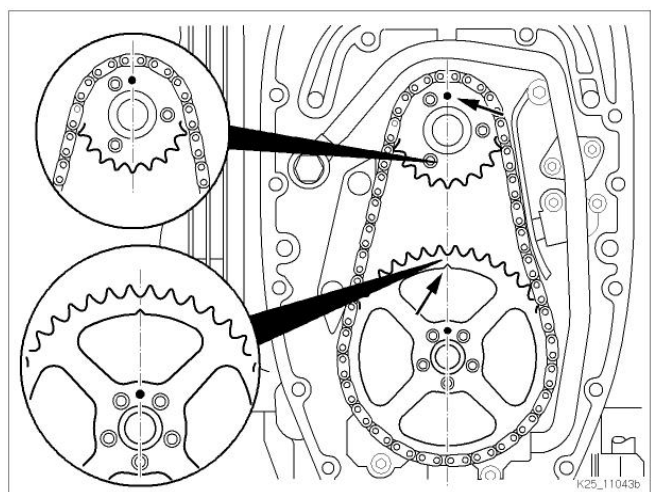


1000km / 600mls at the latest.

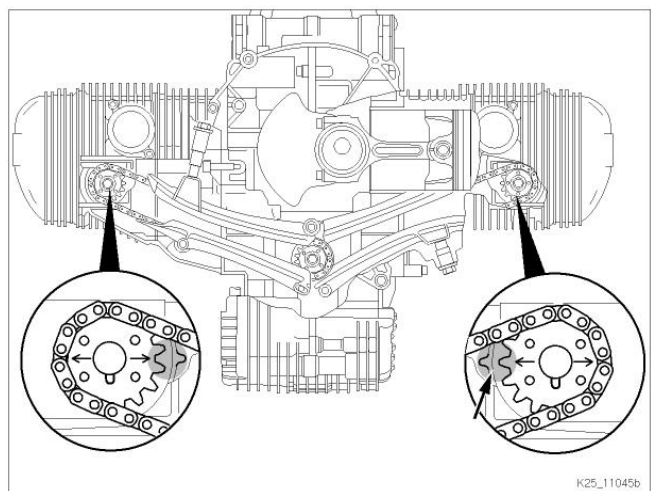
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, right (cylinder No. 1)



- Make sure that the crankshaft and countershaft are in the "**firing TDC, right cylinder**" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

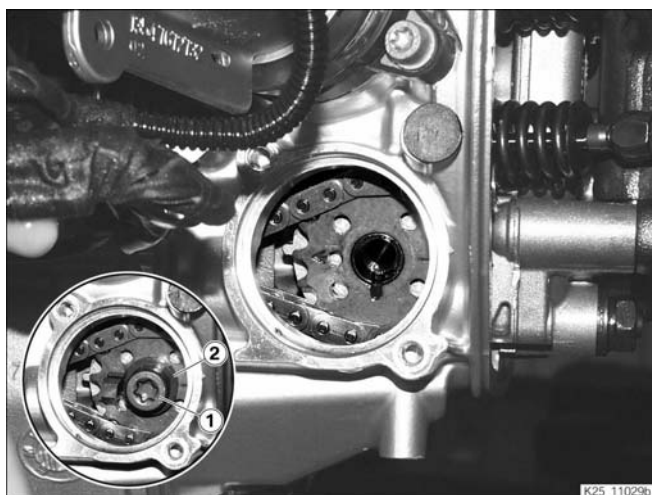


- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



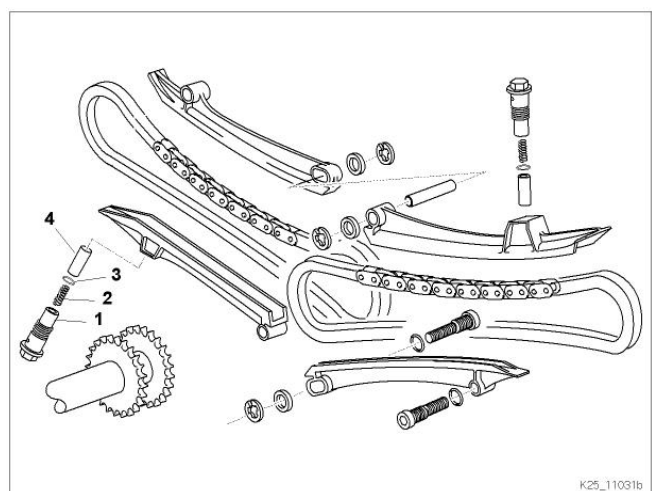
► Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



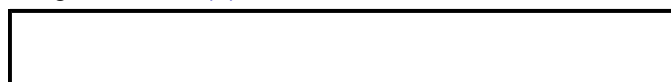
- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.

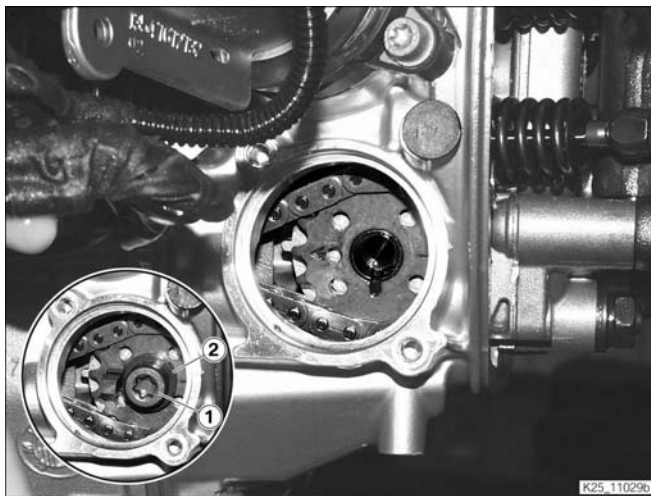


 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).





Tightening torques

Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	
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- Remove TDC locating pin (No. 11 2 650) .

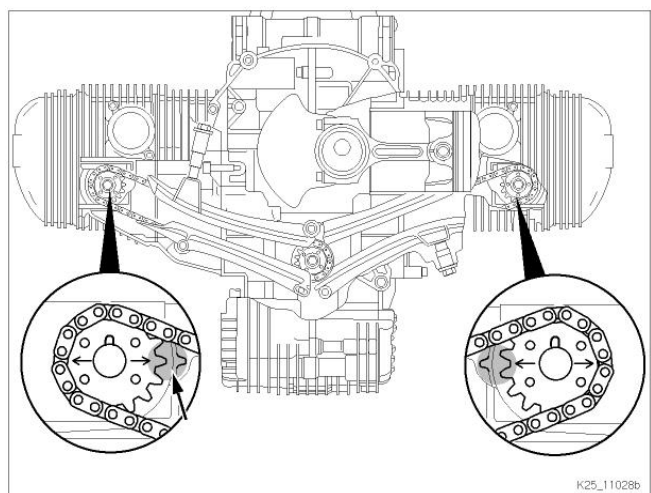
(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.



- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



(-) Installing left cylinder head

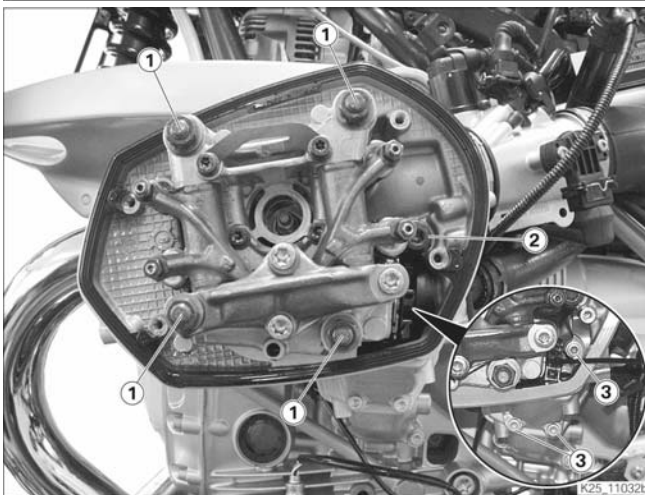
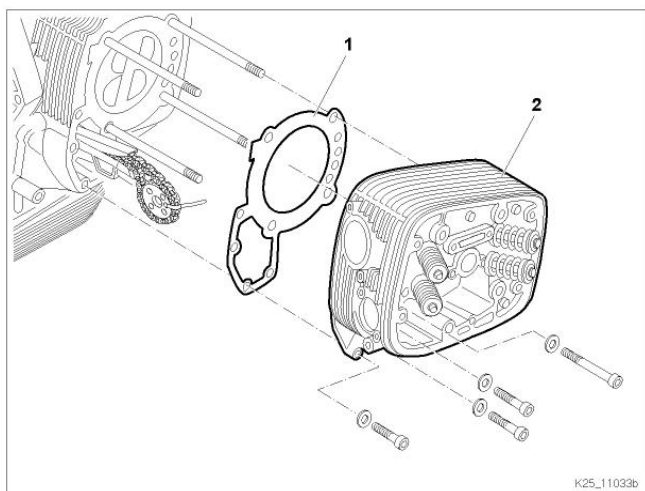
- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature:

If the cylinder head is installed with the



timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.


- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

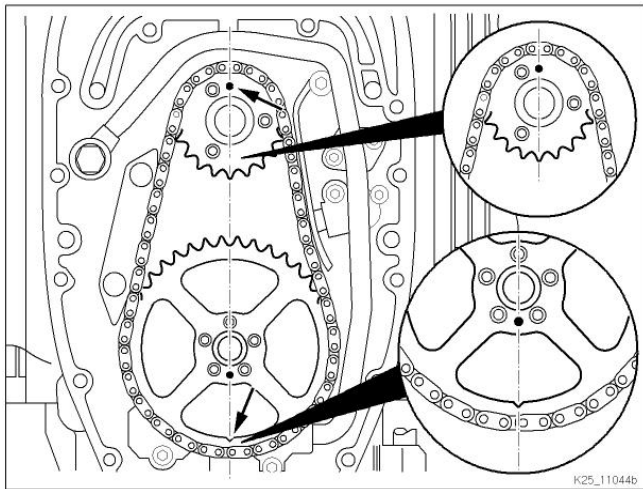
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

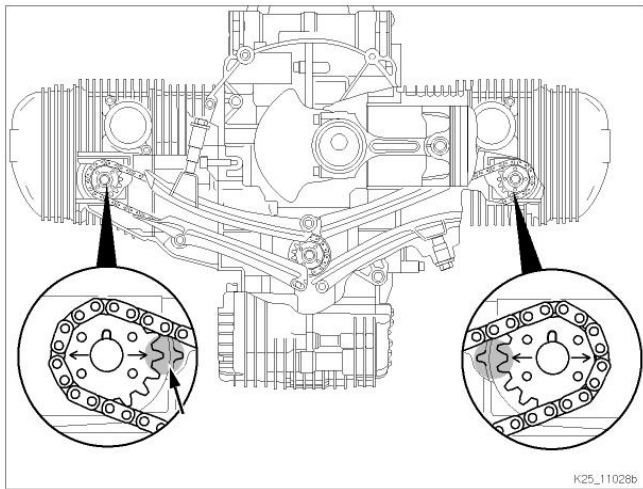
 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, left (cylinder No. 2)

- Make sure that the crankshaft and countershaft are in the "firing TDC, left cylinder" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the sprocket for the timing chain of the



countershaft is **down** and at the top the split line between the two halves of the crankcase is between two teeth.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **up**.
- » The valves in the left-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

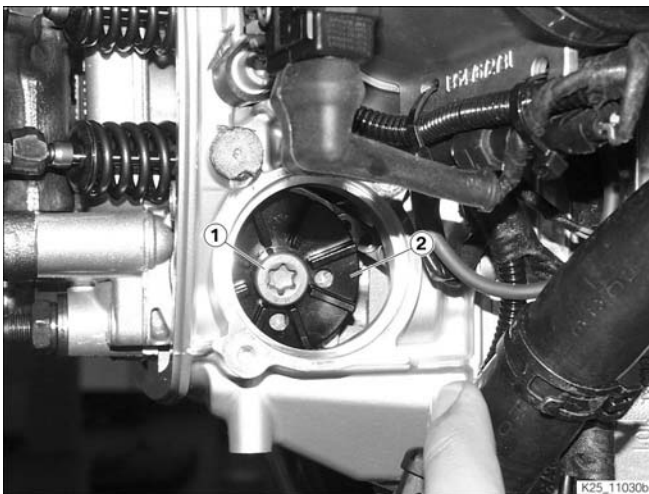


- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.



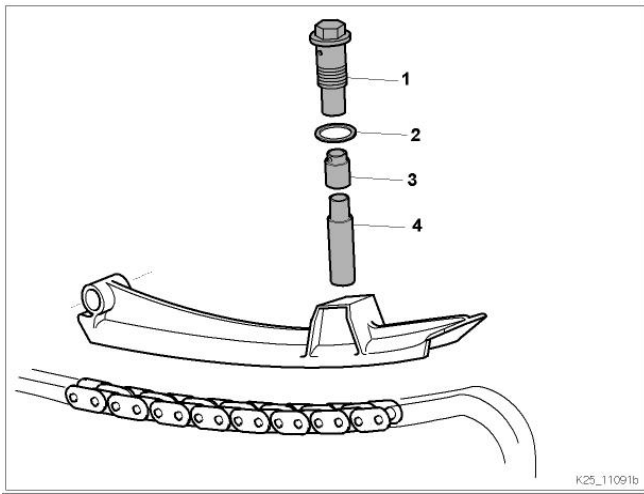
Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.




(-) Installing left timing chain tensioner

- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore



up in the chain tensioner.

- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.
- » The chain tensioner must slide onto the piston without tilting.
- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	

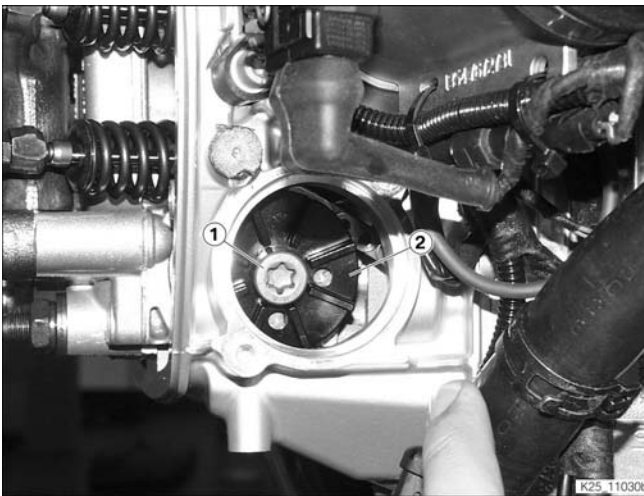
(-) Securing left camshaft sprocket


Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).



 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

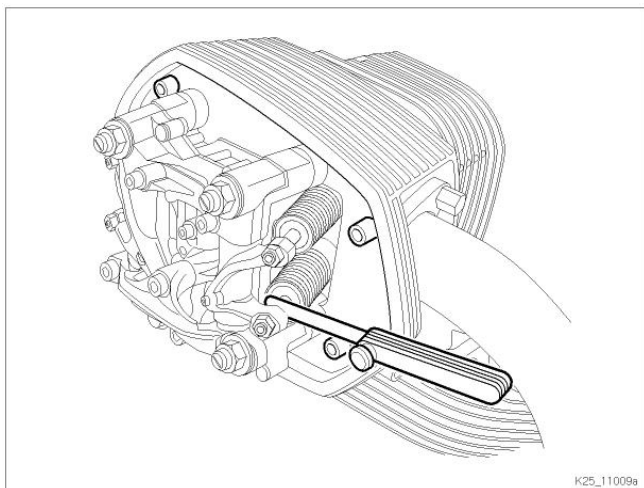
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	

Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	
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Result: Valve clearance is out of tolerance.

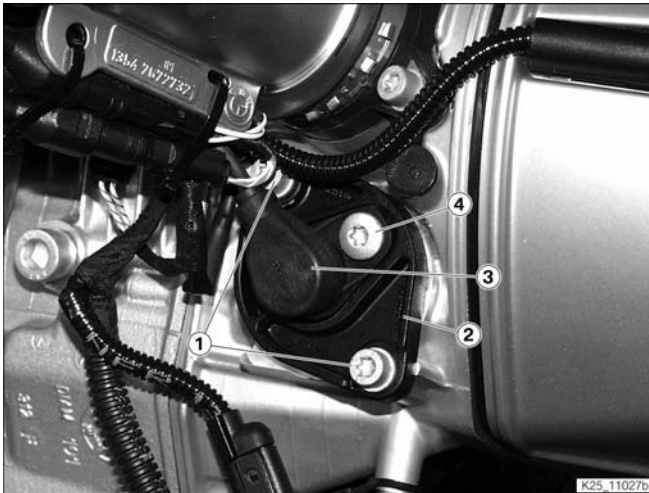
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



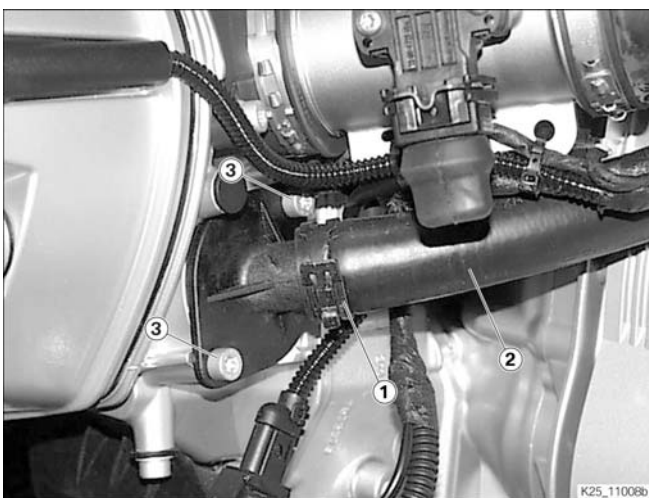
⚠ Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

(-) Installing left camshaft cover



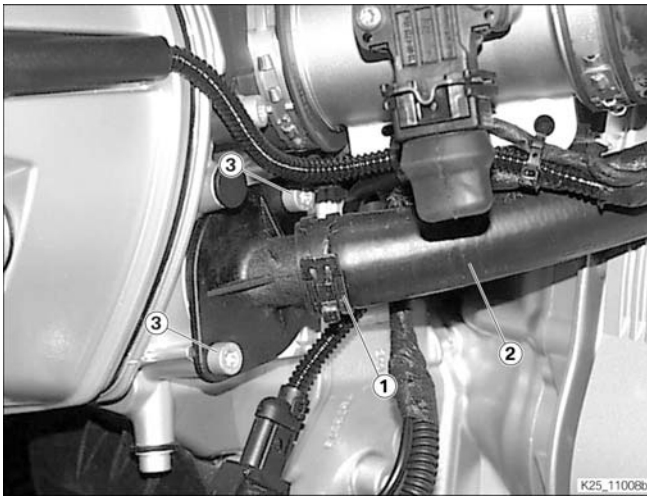
⚠ Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

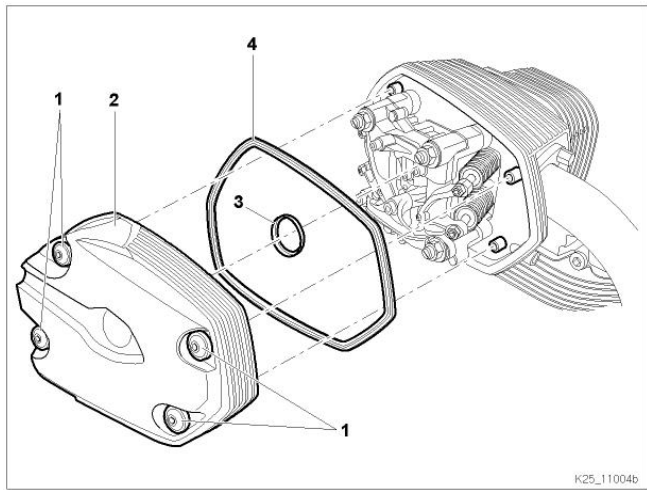
► Connecting hose for crankcase breather



- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



(-) Installing cylinder head cover



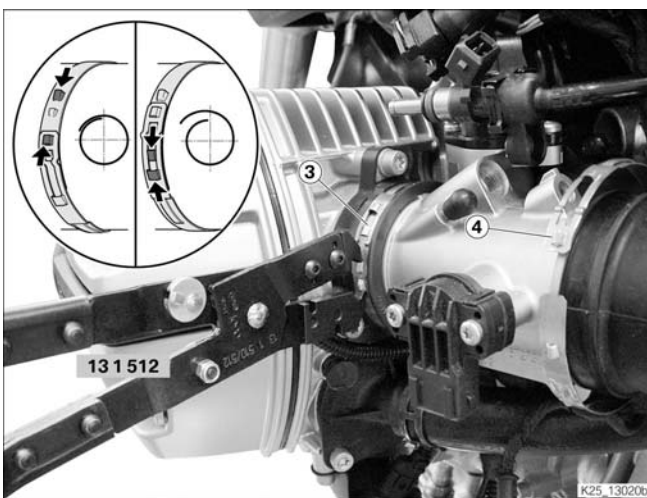
- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.



Tightening torques

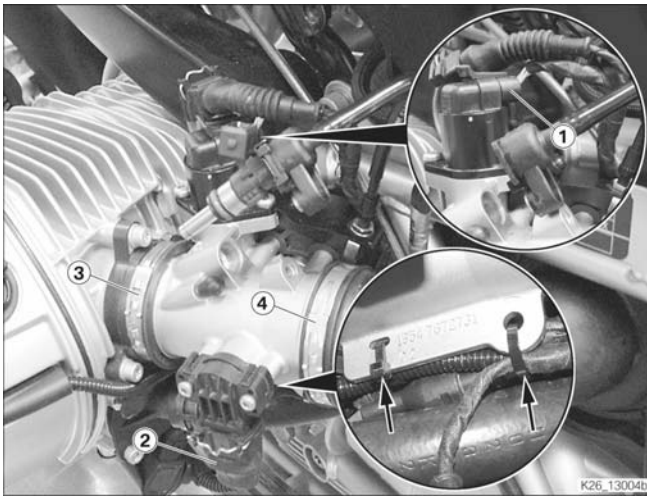
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	
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(-) Installing throttle-valve stub



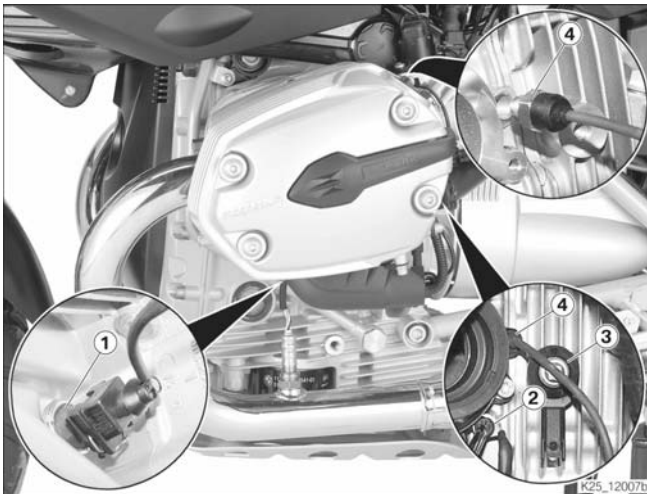
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512).

- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).




- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Connecting plugs of engine sensors and switches, left



- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.


 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (3).
- Connect temperature sensor (4).

(-) Connecting plugs of engine sensors, right



- Secure earth lead (1) to the cylinder head.

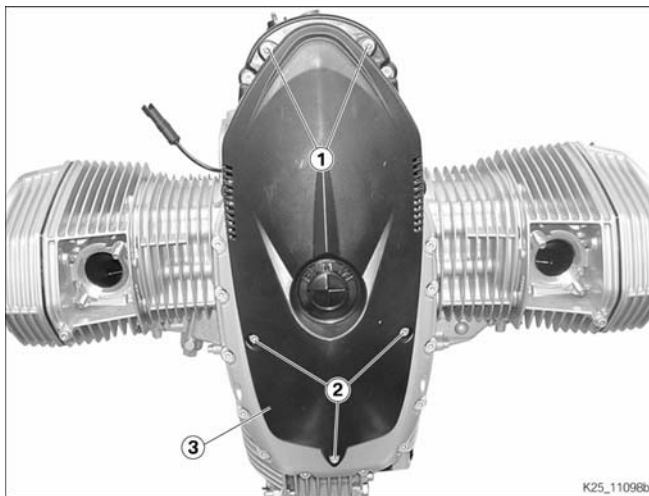
 Tightening torques		
left and right, M6 x 10	8 Nm	


- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

(-) Installing belt guard

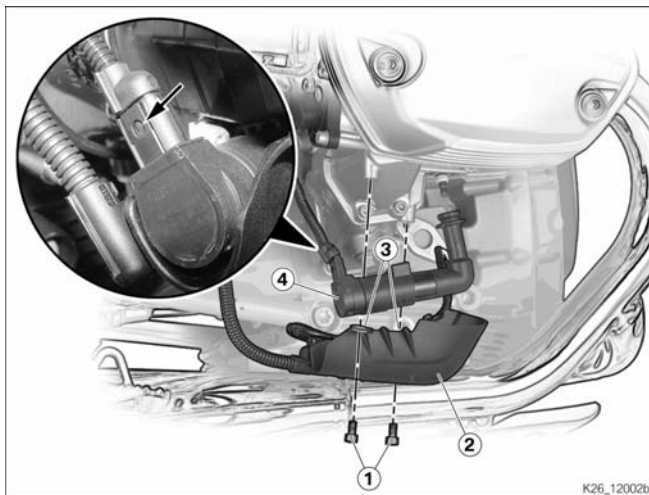
- Install belt guard (3) and secure with screws (1) and (2).

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 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	


(-) Installing secondary spark plug coil



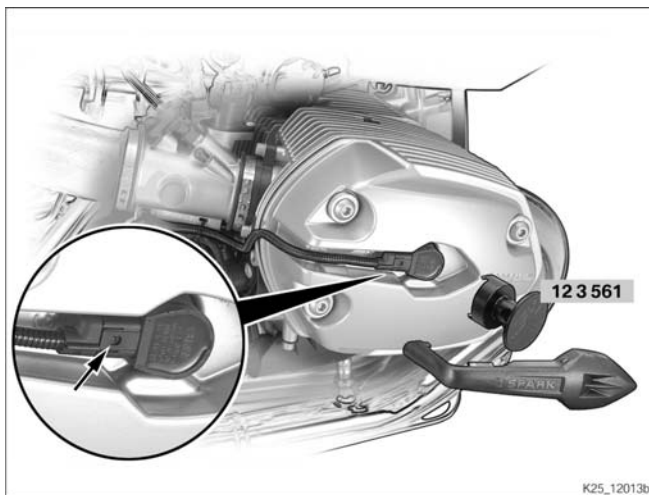
- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.

 Consumables/lubricants		
Talcum powder	Assembly aid	

- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	

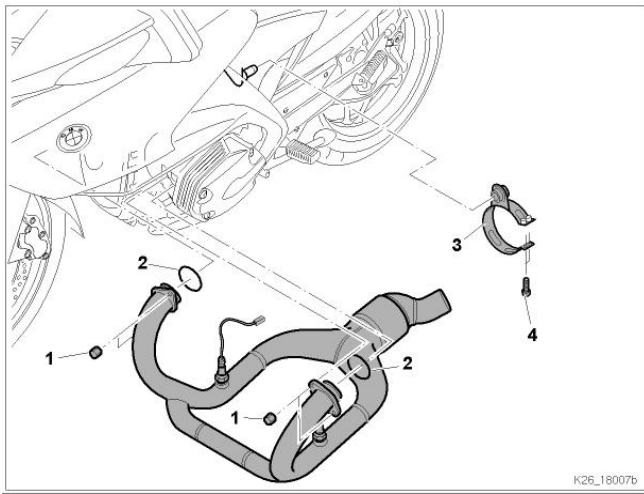
(-) Installing direct ignition coil



- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Installing exhaust elbow

- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	-----------------

- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	-----------------

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

<p>Tightening torques</p>		
Manifold to cylinder head, Acorn nut M8	21 Nm	

- Align the clamp (arrow) on the manifold and tighten screws (1).

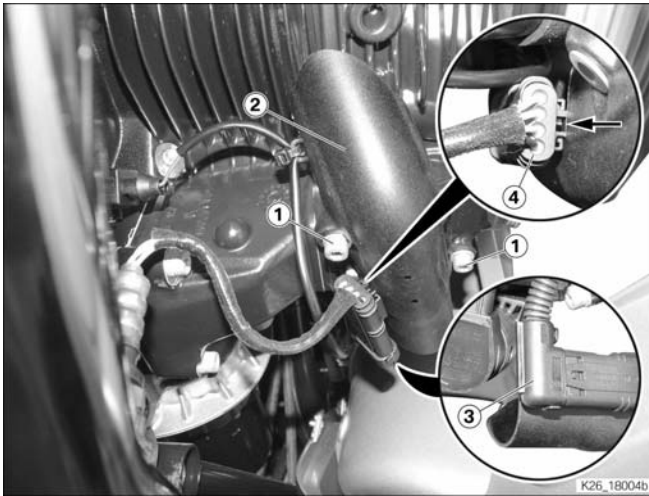


<p>Tightening torques</p>		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	

► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).

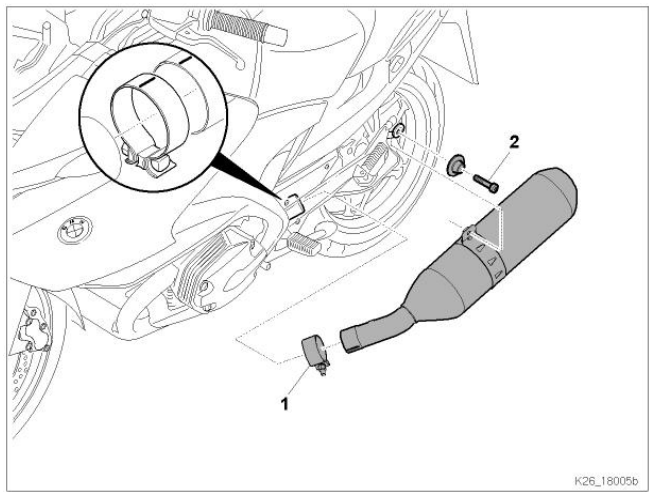
<p>Tightening torques</p>		



Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
--	------	--




- Install front screw (1) in both bottom sections of the fairing.




(-) Installing silencer

- Grease the inner face of Torca clamp (1).


 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

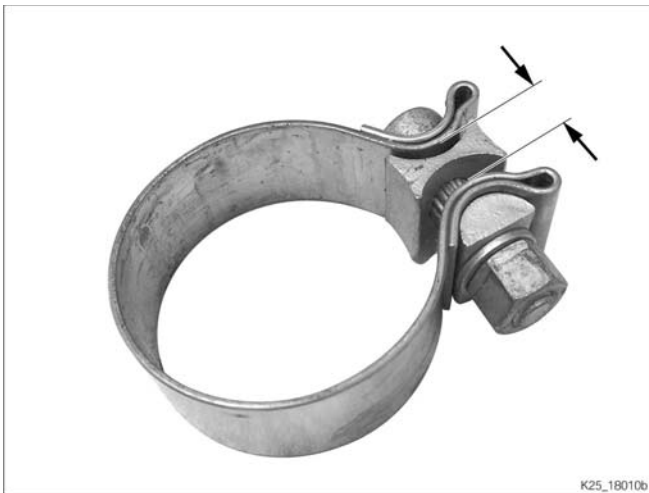
- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 <p>Tightening torques</p>		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**

Test

- Check distance (*arrows*) between silencer and rear wheel.



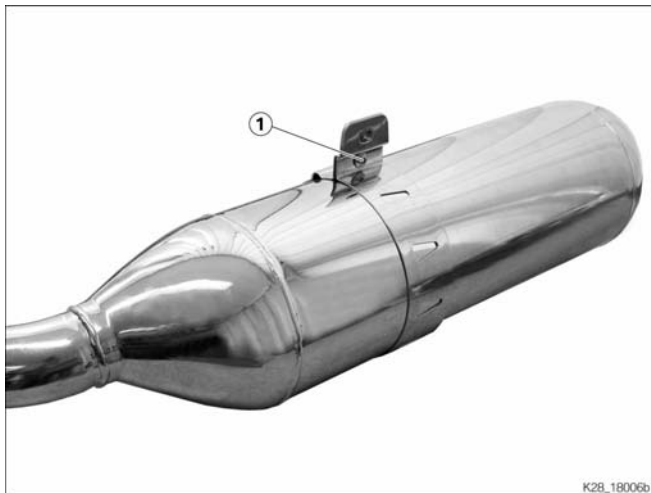
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



! Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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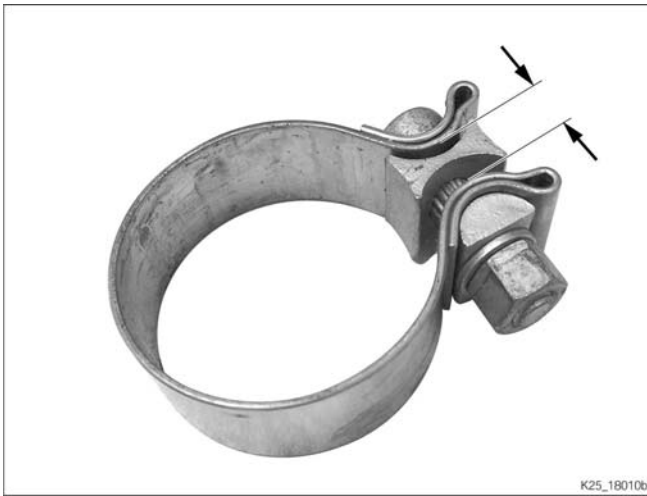



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.


Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.




 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
Consumables/lubricants			
Engine oil, 20W-50			
		Minimum = bottom ring	

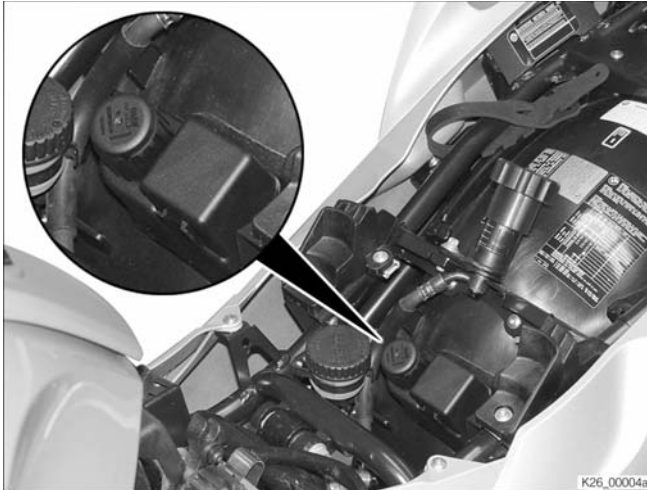
		mark on sight glass	
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(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

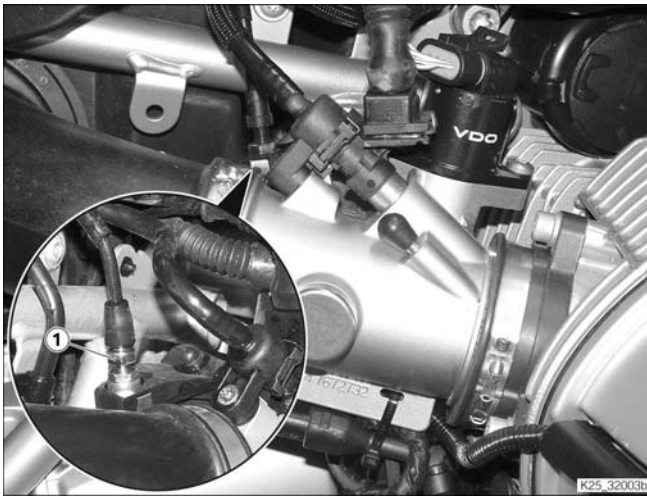
Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

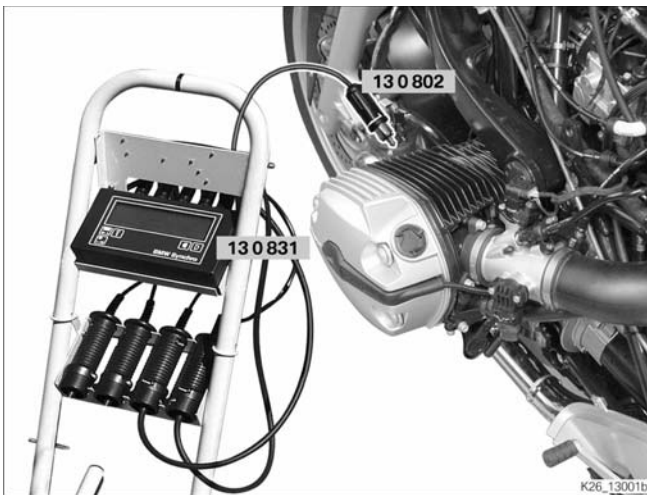
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

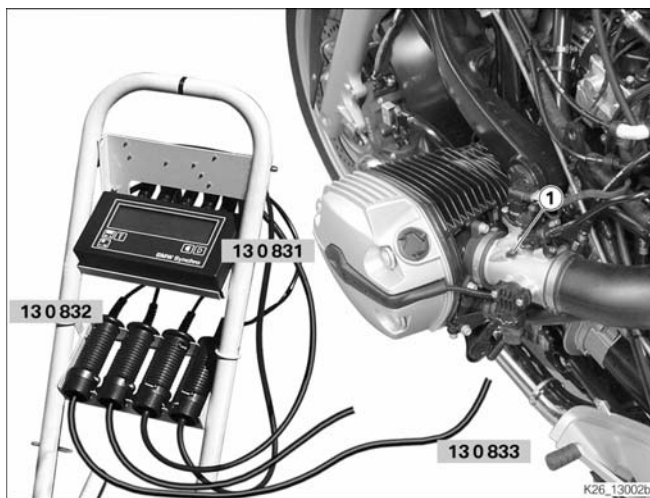


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



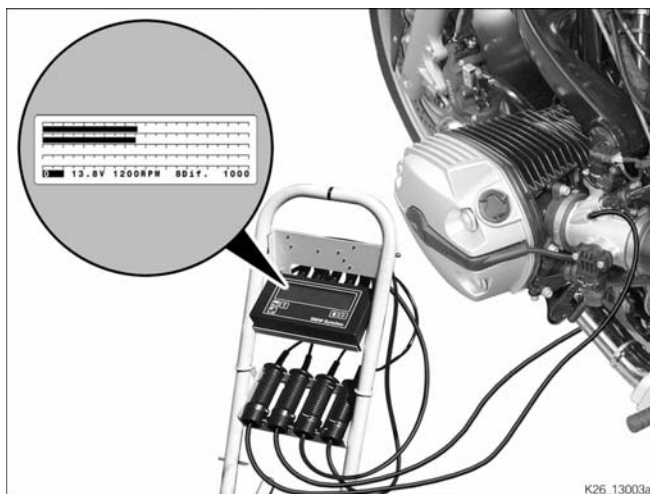
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

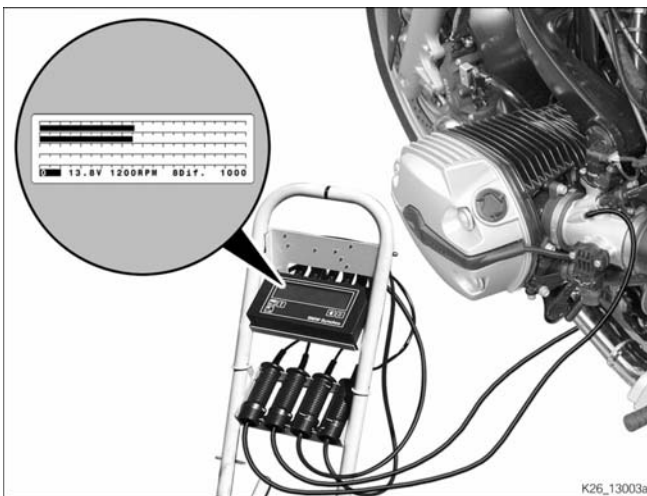
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

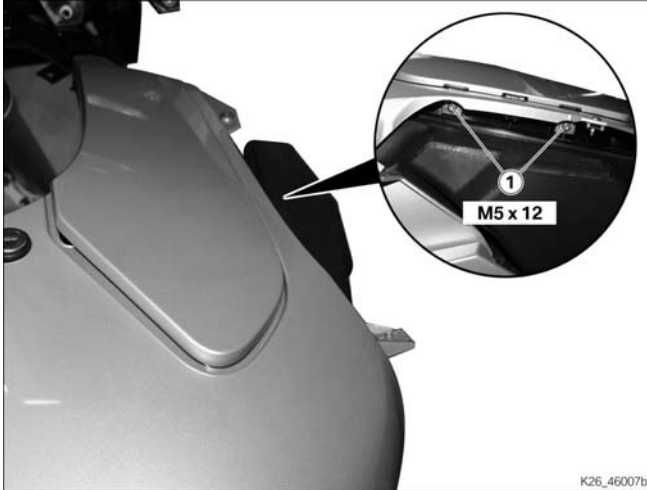
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).





(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



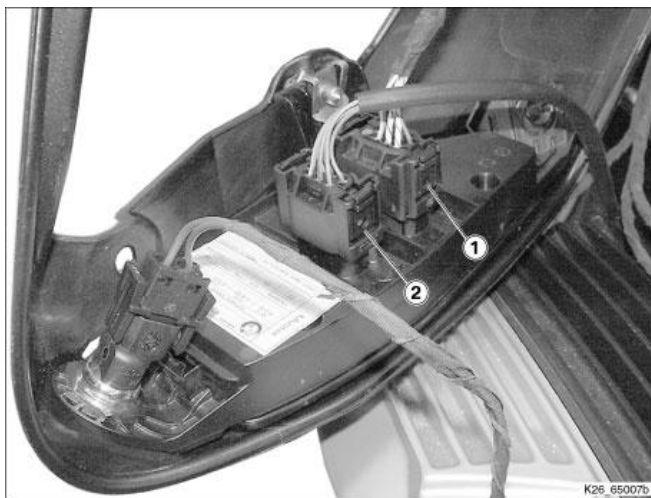
(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

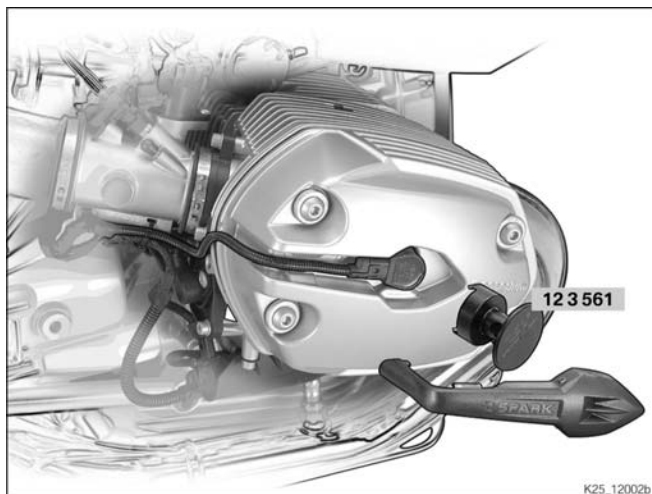
- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **11 12 268 Replacing covers for spark plugs**

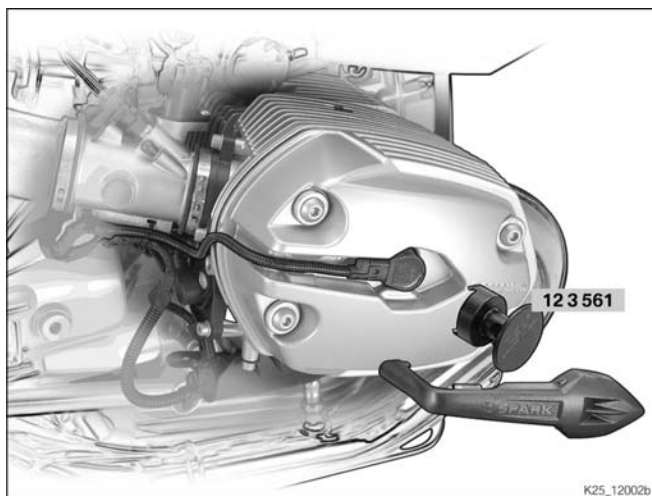
(-) Removing covers of primary spark plugs

- Grip primary spark plug covers at rear (as viewed in forward direction of travel) and pull to the rear and out to remove.



(-) Installing covers of primary spark plugs

- Position the primary spark plug covers on the cylinder head covers and clip them into position.



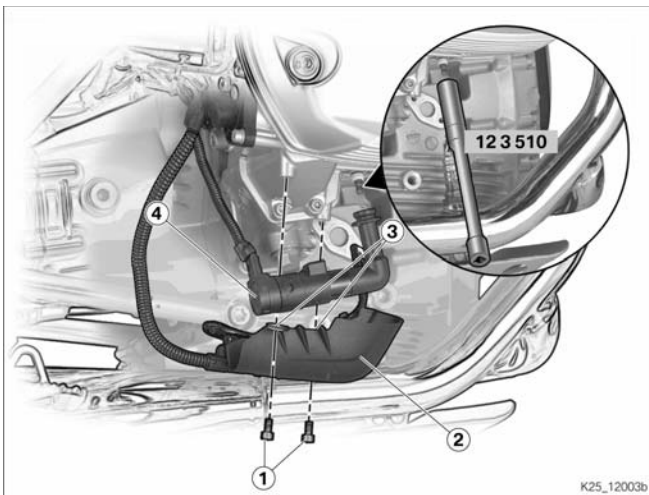
11 12 280 Replacing covers for secondary spark plugs

(-) Removing trim panels



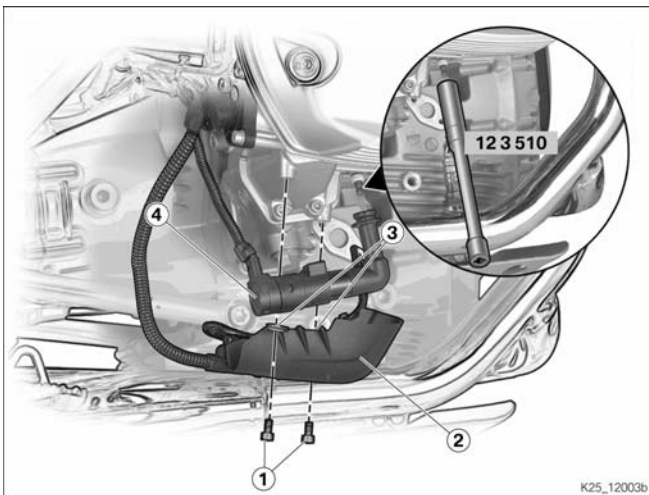
- Undo front screw (1) from both bottom sections of the fairing.

(-) Removing cover for secondary spark plug ignition coil




- Slacken screws (1) and remove cover (2) with sleeves (3).
- Unclip the plug for the oxygen sensor from the cover.

(-) Installing cover of secondary spark plug coil



- Clip the plug for the oxygen sensor into the cover.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	

(-) Securing trim panels



- Install front screw (1) in both bottom sections of the fairing.

 **11 12 288 Replacing cover for camshaft, left**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



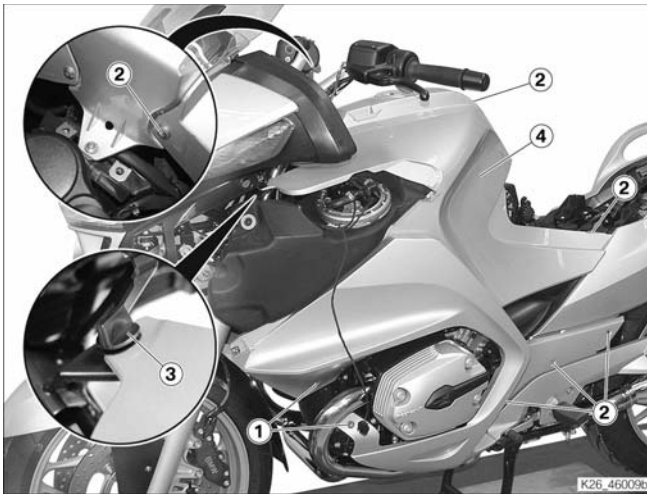
Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

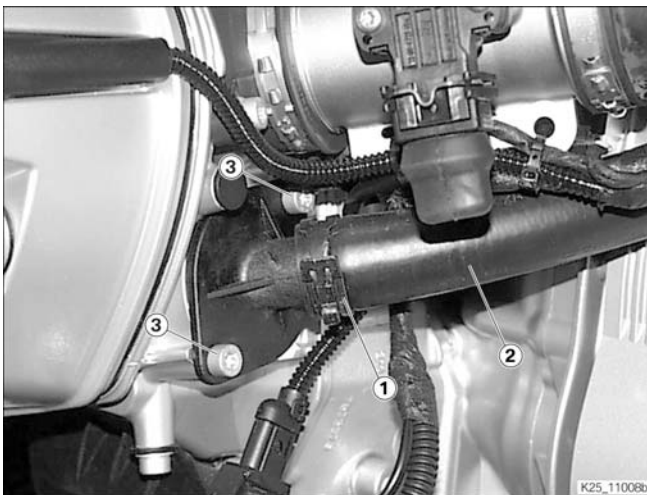
(-) Removing entire left side tank cover



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

(-) Removing left camshaft cover

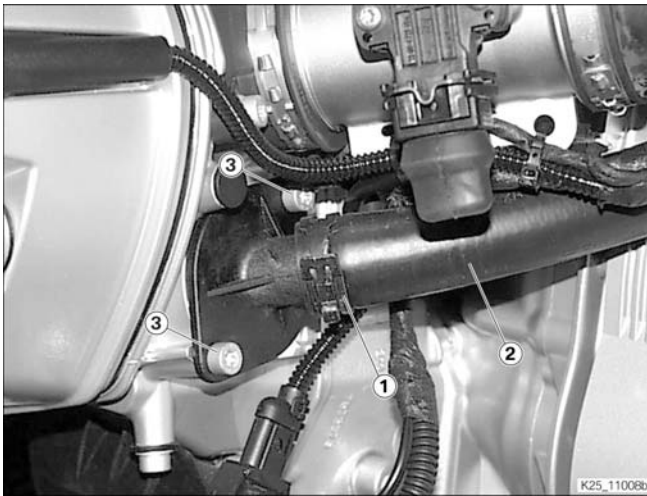
► Disconnecting hose for crankcase breather



- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



- Remove screws (3).
- Remove the camshaft cover complete with O-ring from



the cylinder head.

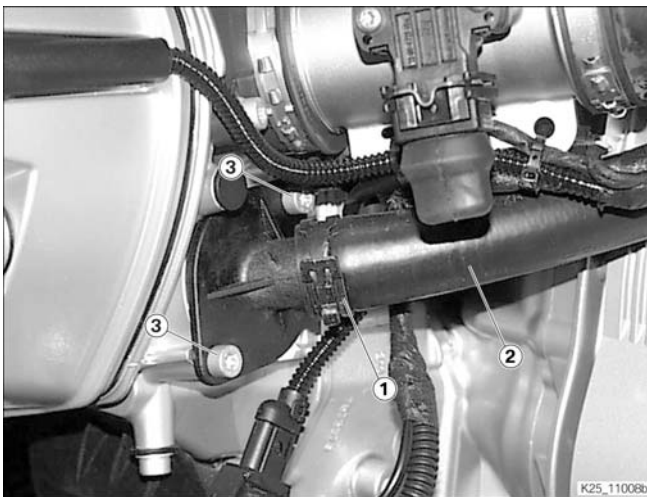
(-) Installing left camshaft cover



Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

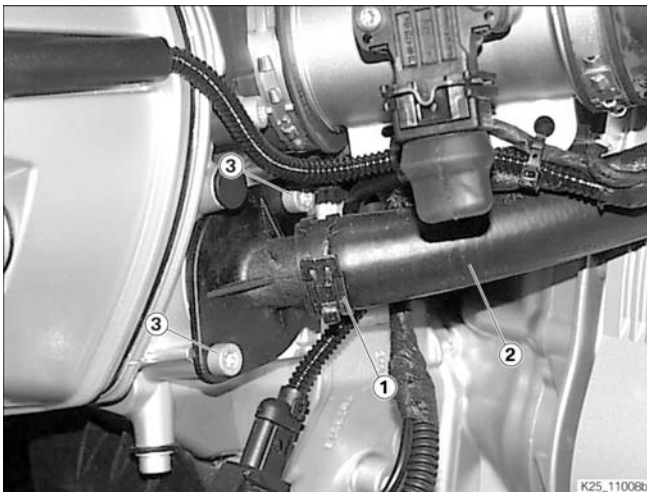
Avoidance: Deburr sharp edges of the housing.



- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

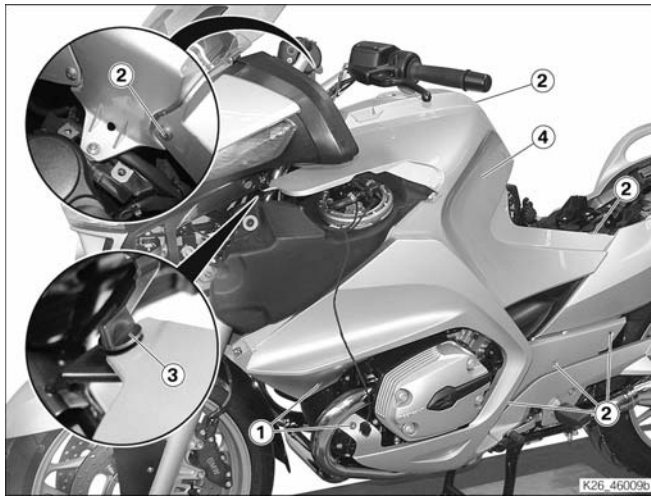
► Connecting hose for crankcase breather

- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).



- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **11 12 290 Replacing cover for camshaft, right**

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



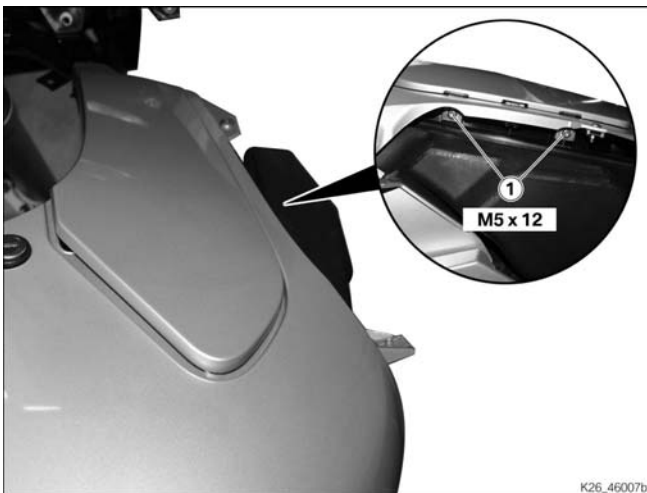
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



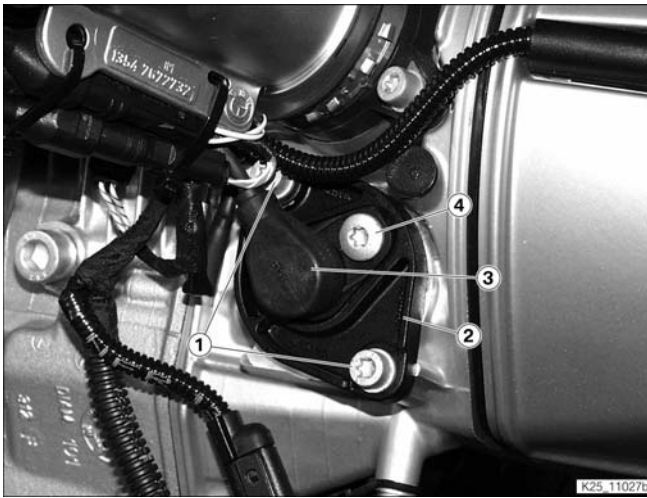
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



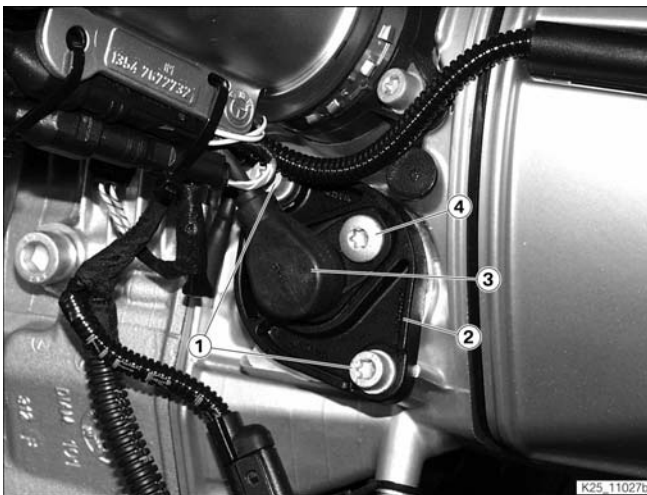
(-) Installing right camshaft cover

Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).



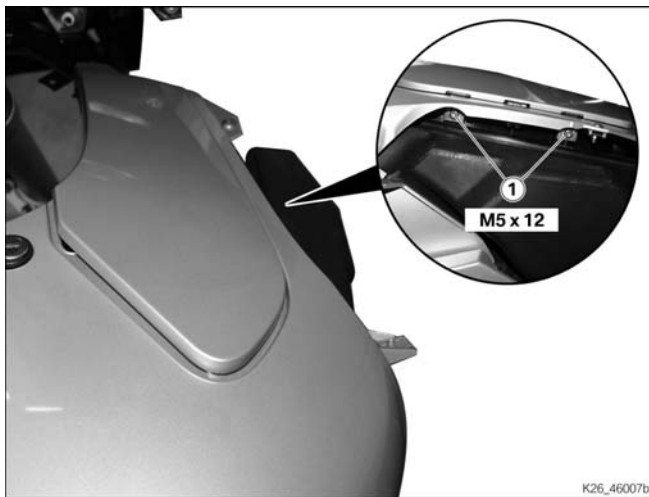
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

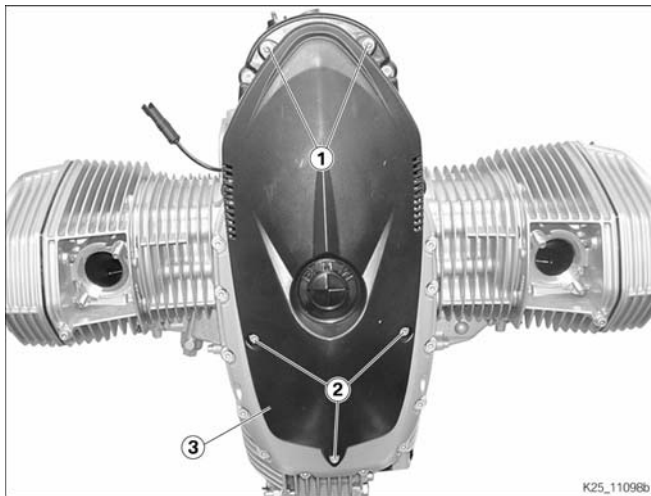


Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

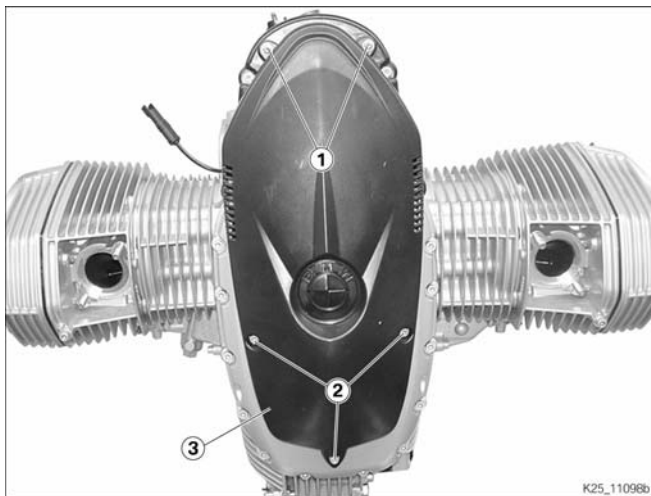


 **11 14 020 Replacing cover of engine**




(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).

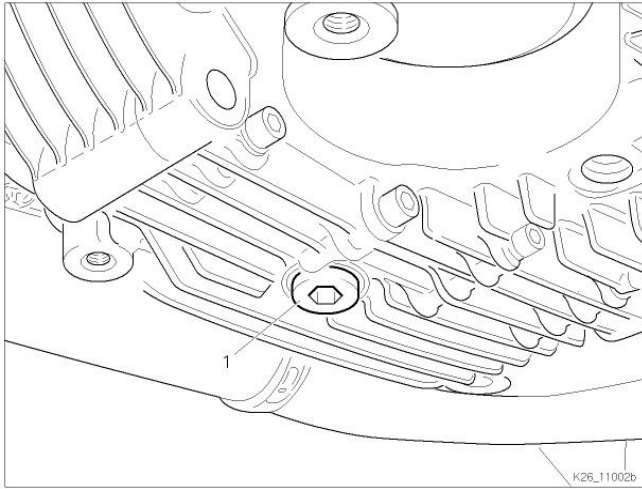


(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

 **11 14 061 Replacing timing case cover**



(-) Draining engine oil



Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the engine.
- Remove oil drain plug (1) and drain the oil.
- Dispose of used oil in an environmentally friendly manner.
- Remove the old sealing ring from the drain plug.



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

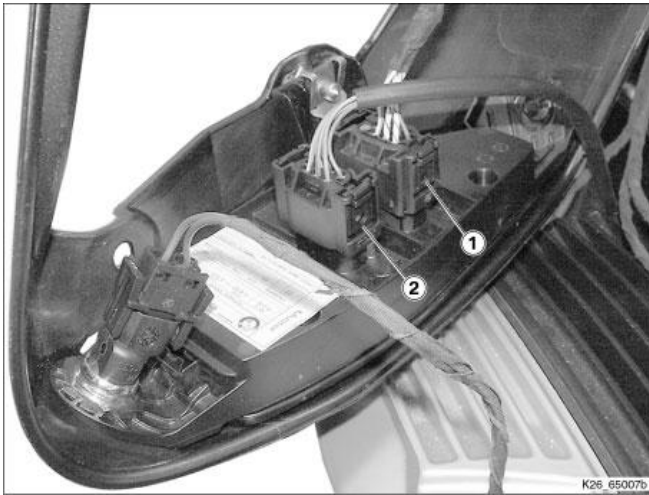
- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

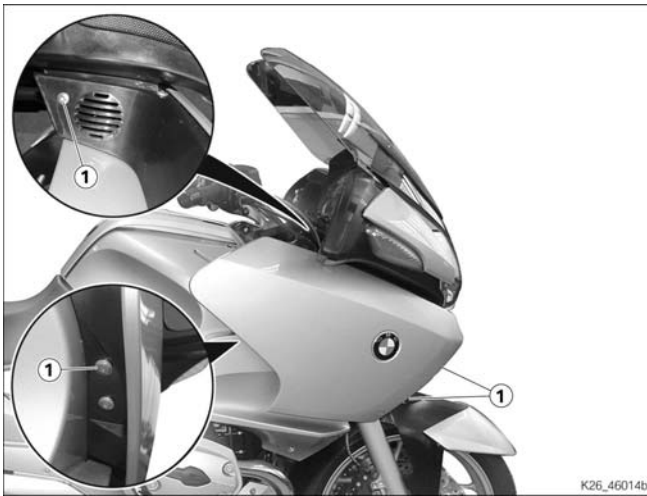
- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

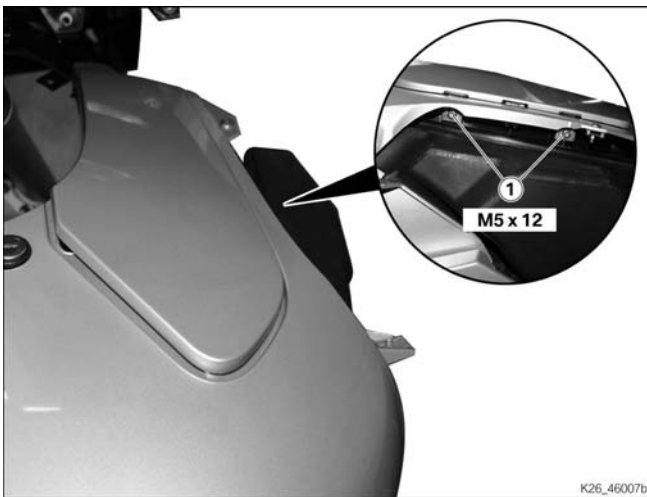
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



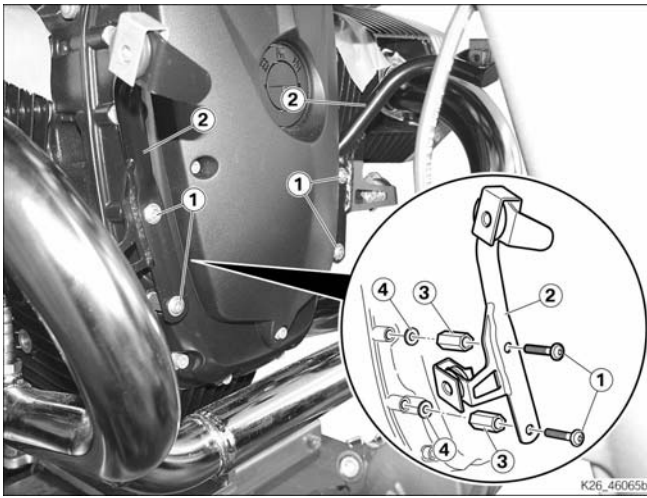
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



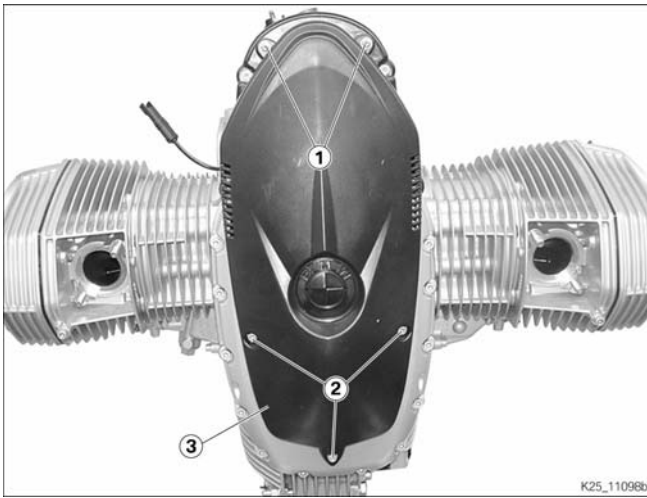
(-) Removing left and right fairing bracket

- Remove screws (1).
- Remove fairing bracket (2) with sleeves (3) and washers (4).



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

- Gearbox in neutral.



Warning

Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



(-) Locking engine at TDC

- By means of the crankshaft pulley, turn the engine in



- the normal direction of rotation until it is at TDC (TDC = top dead centre).
- » The inlet and exhaust valves of one cylinder are closed; those of the other cylinder are at overlap.
 - » The TDC locating pin can be inserted.
 - Insert locating pin (No. 11 2 650) to lock the engine in position.

(-) Removing cover for counterbalance shaft

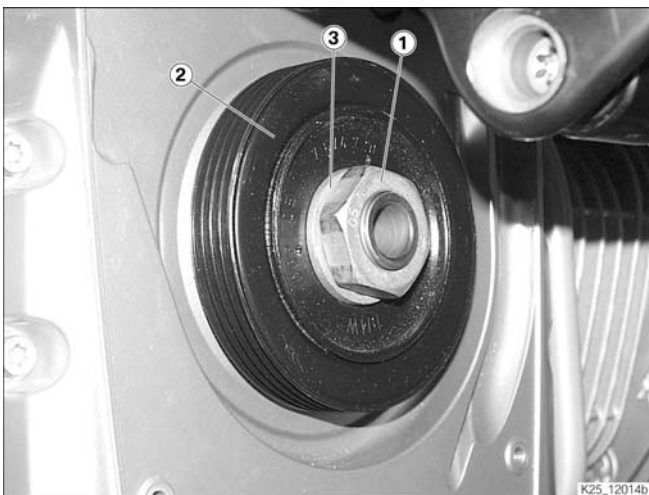


- Remove screws (1) and remove cover.

(-) Removing crankshaft belt pulley

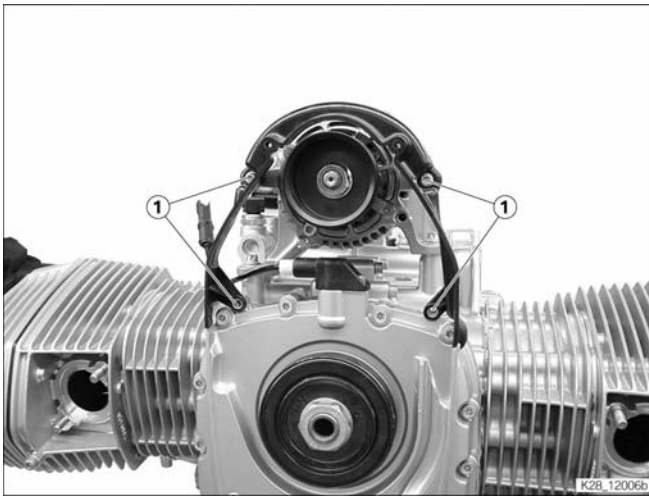
Precondition

- Engine locked.



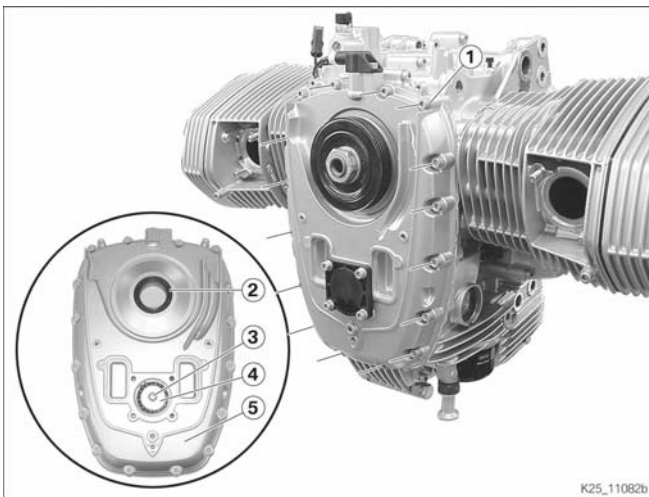
- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

(-) Removing belt cover, rear, from engine and alternator



- Remove screws (1).

(-) Removing time case cover



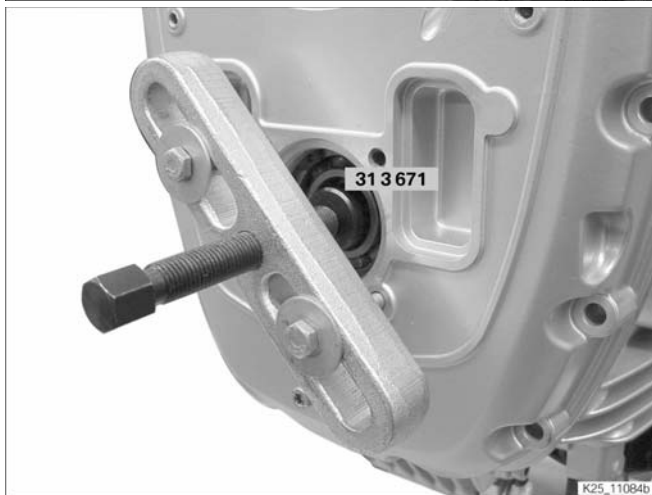
- Remove screw (3) and washer (4).
- Remove screws (1).



- Install the puller and thrust piece (No. 31 3 671) .
- Remove the timing case cover, noting the inductive sensor of the crankshaft, which is still fixed in position.

► Releasing crankshaft inductive sensor from timing case cover

- Remove screw and remove crankshaft inductive sensor (2) from the timing case cover.



- Remove puller and thrust piece (No. 31 3 671) .

(-) Replacing timing case cover

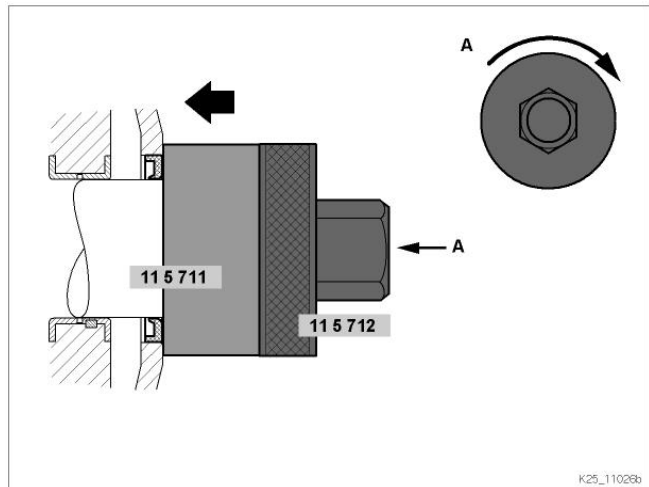
- Pry out shaft sealing ring (1).
- Remove circlip (2).
- Heat the timing case cover around the bearing.



Technical data



K25_11070b



K25_11026b



K25_11069b

Release/mating temperature		100 °C	
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Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Drive out bearing (3), using a suitable mandrel.

- Slip a new shaft sealing ring with the closed side out into position on the timing case cover.
- Use ring (No. 11 5 711) and thrust piece (No. 11 5 712) to drive the shaft sealing ring into the timing case cover until it is flush.

- Heat the new timing case cover around the bearing.

Technical data			
Release/mating temperature		100 °C	



Warning

Nature: Heated/hot parts can cause burns.

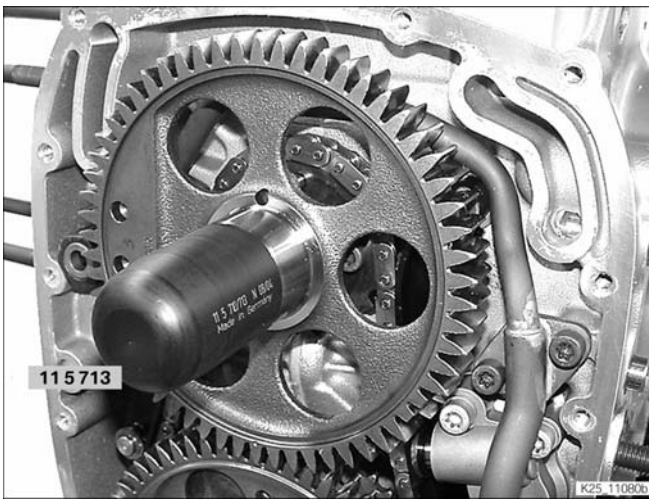
Avoidance: Wear protective gloves when handling heated parts.

- Drive in bearing (1) using handle (No. 00 5 500) and drift (No. 23 4 660) .
- Install circlip (2).

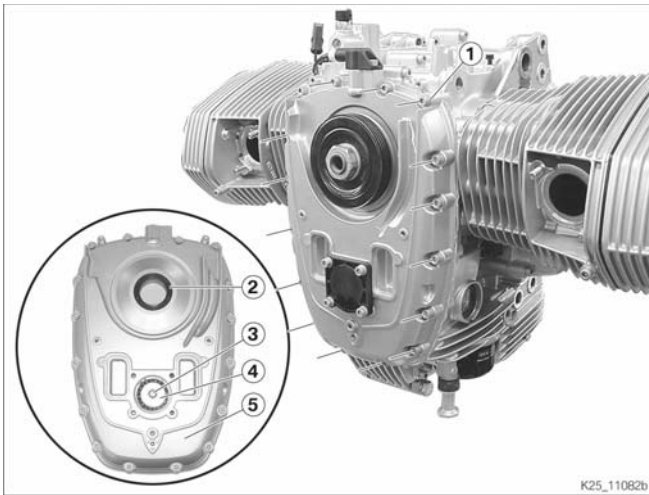



(-) Installing timing case cover

- Install sliding sleeve (No. 11 5 713) .




- Make sure the sealing surface of the timing case cover is clean and free of grease and run a uniform bead of sealant round the face.



 <p>Consumables/lubricants</p>		
3 - Bond 1209	Surface sealant	07 58 9 062 376

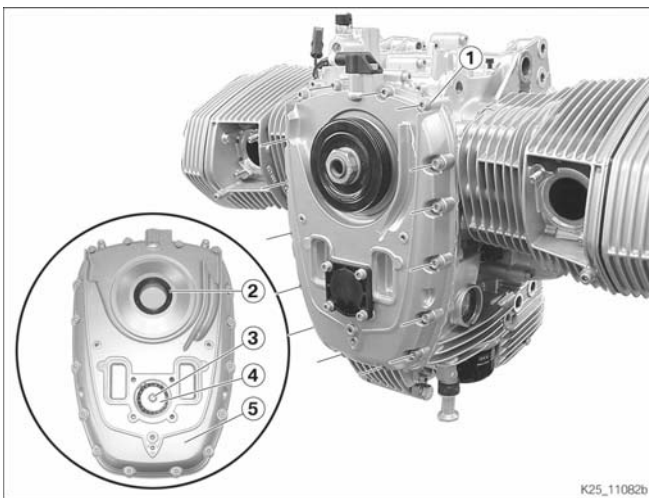
► Securing crankshaft inductive sensor in timing case cover

- Position inductive sensor for crankshaft (2) on the timing case cover and install the screw.


 <p>Tightening torques</p>		




Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	
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- Place timing case cover (5) in position.
- Install screws (1).

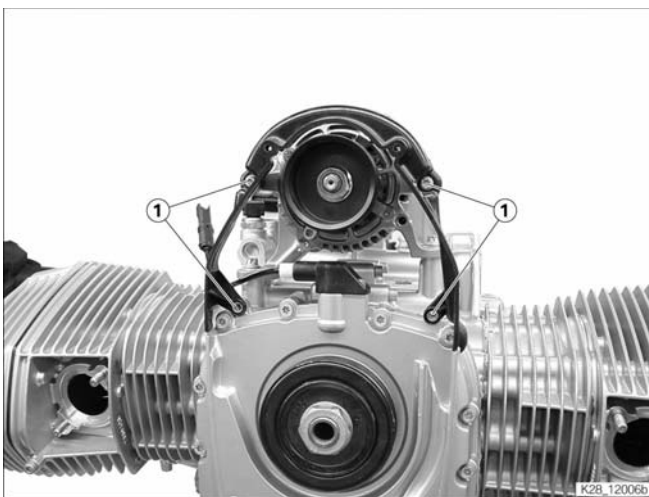
 Tightening torques		
Timing case cover to crankcase, M6	8 Nm	


- Remove sliding sleeve (No. 11 5 713) .
- Install screw (3) and washer (4).

 Tightening torques		
Gear wheel to balancing shaft, M8 x 50	19 Nm	

(-) Securing belt cover, rear, to engine and alternator

- Install screws (1).

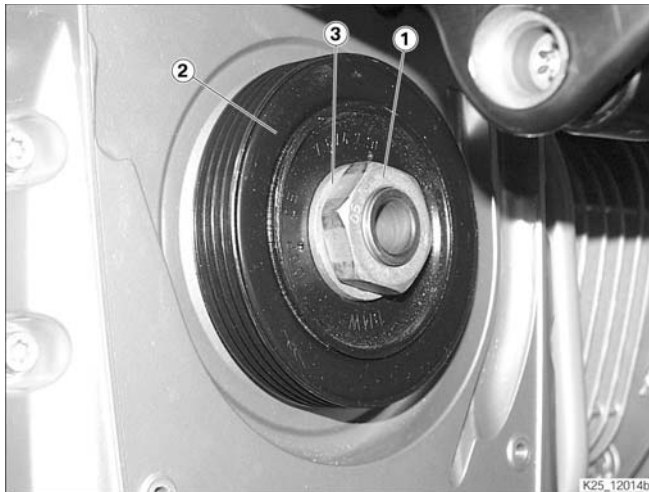


 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
Belt cover to alternator, M5 x 16	5 Nm	


(-) Installing crankshaft belt pulley

Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	




- Remove TDC locating pin (No. 11 2 650) .

(-) Installing counter balance shaft cover

- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).



 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
-



- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.

⚠ Attention

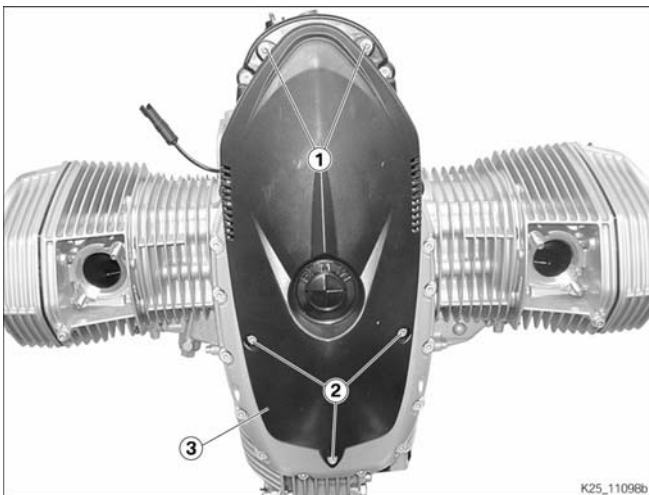
Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

(-) Installing belt guard

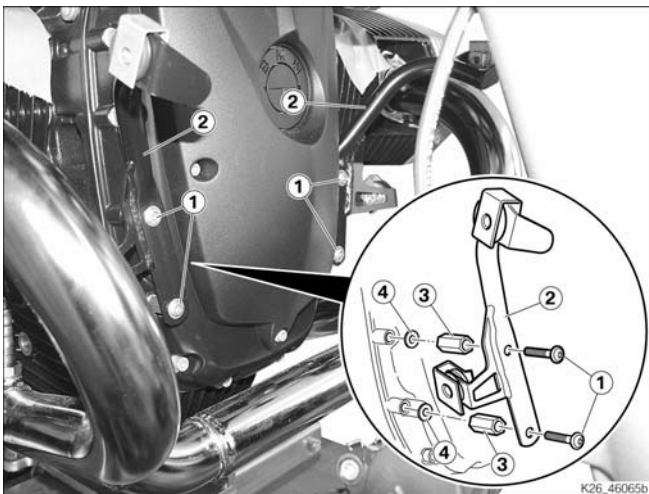
- Install belt guard (3) and secure with screws (1) and (2).



 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing fairing bracket on left and right

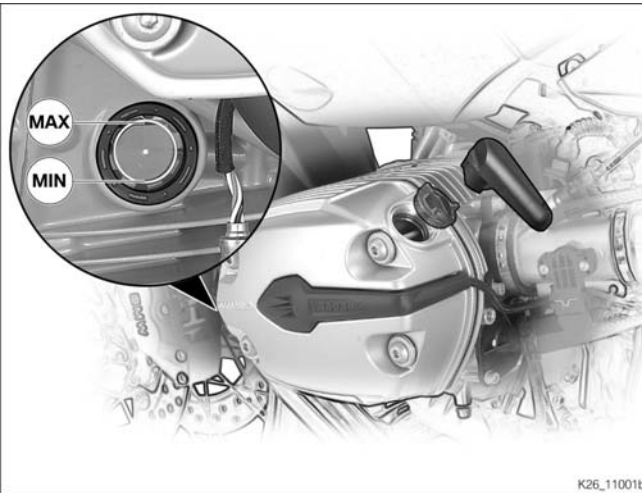
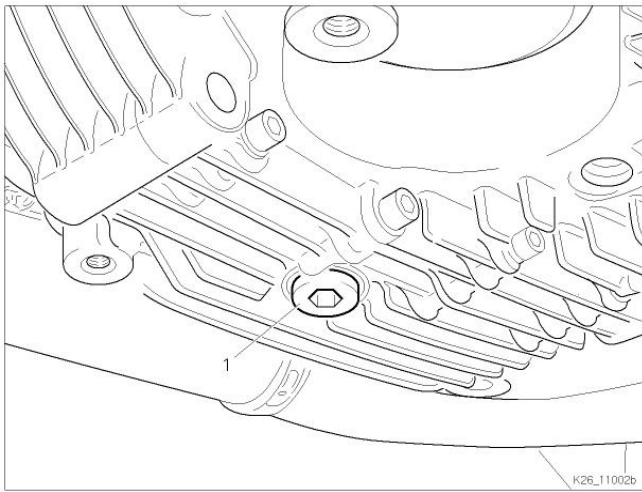
- Hold fairing bracket (2) with sleeves (3) and washers (4) in position.
- Install screws (1).




(-) Pouring engine oil into engine


- Replace the sealing ring of oil drain plug (1).
- Screw in oil drain plug.






 Tightening torques		
Oil drain plug, M16 x 1.5	Initial torque,	
	23 Nm	
	Final torque,	
	32 Nm	

- Open oil filler plug using spanner from toolkit.
- Pour engine oil into the engine until the level reaches the MAX mark.

 Technical data		
Oil capacity, engine	with filter change Difference between Min. / Max. marks	max. 4 l 0.5 l
Consumables/lubricants		
Engine oil, 20W-50		

 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

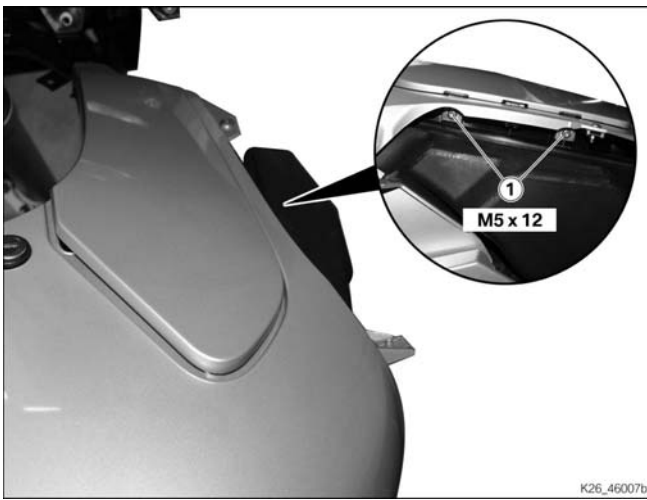
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



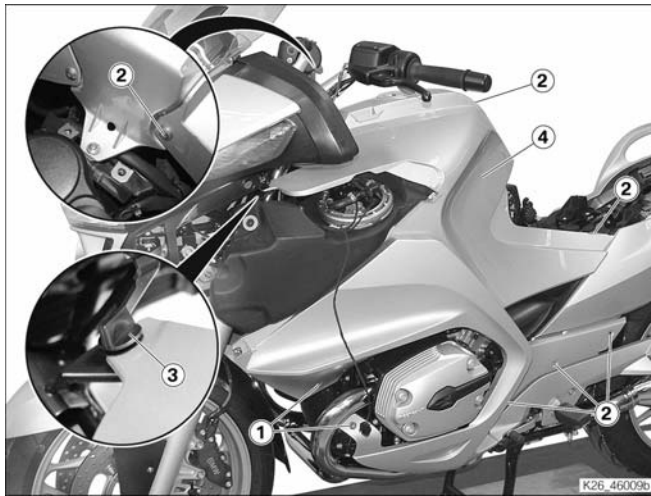
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 14 065 Replacing shaft sealing ring in timing case cover**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



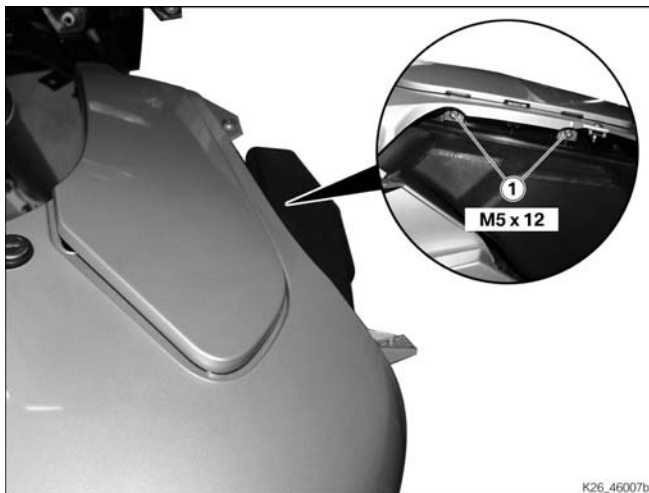
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



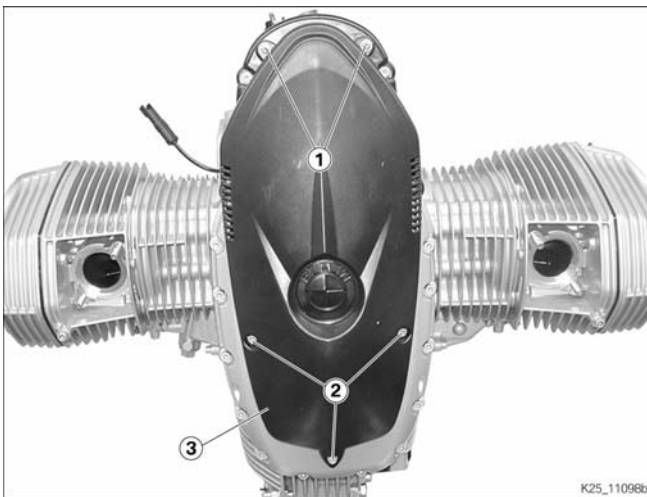
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

- Gearbox in neutral.



Warning

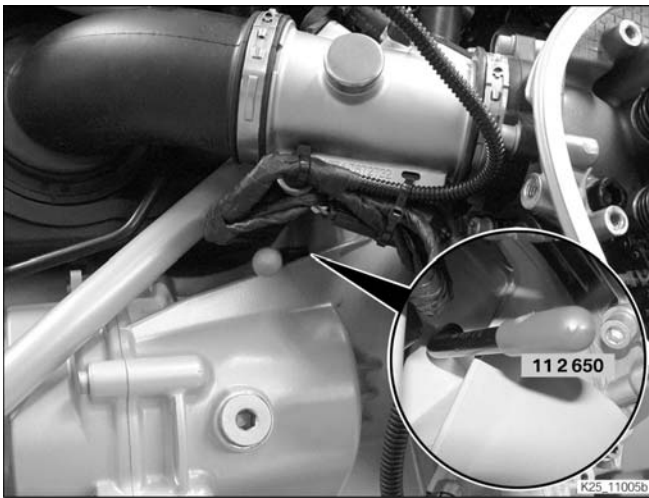
Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



(-) Locking engine at TDC

- By means of the crankshaft pulley, turn the engine in

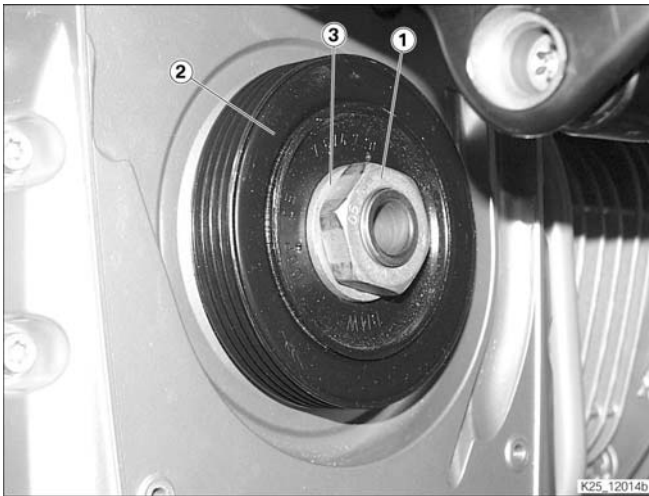


- the normal direction of rotation until it is at TDC (TDC = top dead centre).
- » The inlet and exhaust valves of one cylinder are closed; those of the other cylinder are at overlap.
- » The TDC locating pin can be inserted.
- Insert locating pin (No. 11 2 650) to lock the engine in position.

(-) Removing crankshaft belt pulley

Precondition

- Engine locked.



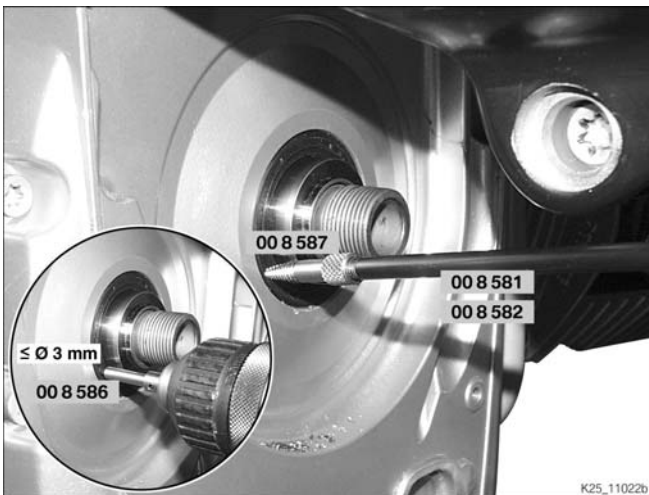
- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

(-) Removing shaft sealing ring from timing case cover

⚠ Attention

Nature: Incorrect removal of the shaft sealing ring can result in damage to the housing.


Avoidance: Do not use too large a twist drill. Make sure the bore is centred.



- Using a drill bit (< 3 mm) and drill stop (No. 00 8 586), carefully drill a centred hole into, but not through, the shaft sealing ring.
- Screw pull rod (No. 00 8 581) with adapter for cone-head self-tapping screw (No. 00 8 587) and impact weight (No. 00 8 582) into the hole drilled in the shaft sealing ring.
- Use pull rod (No. 00 8 581), (No. 00 8 587) and impact weight (No. 00 8 582) to remove the shaft

sealing ring from the crankcase.

- Clean the bore in the crankcase and the crankshaft collar where the rotary shaft seal sits on the shaft.

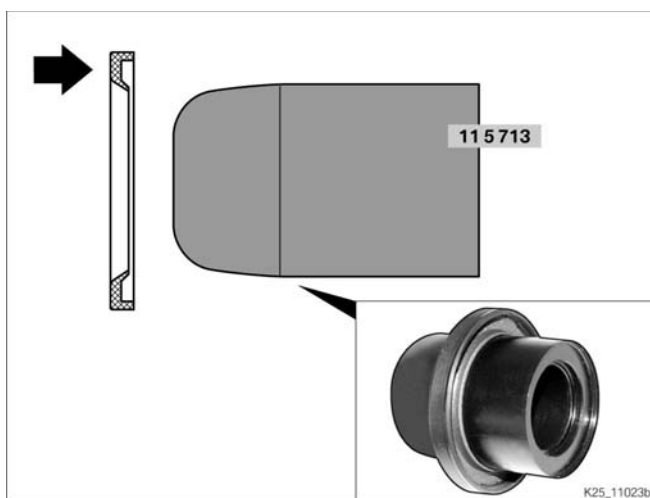
 Consumables/lubricants		
Brake cleaner	Cleaners	83 11 9 407 848

(-) Installing shaft sealing ring in timing case cover

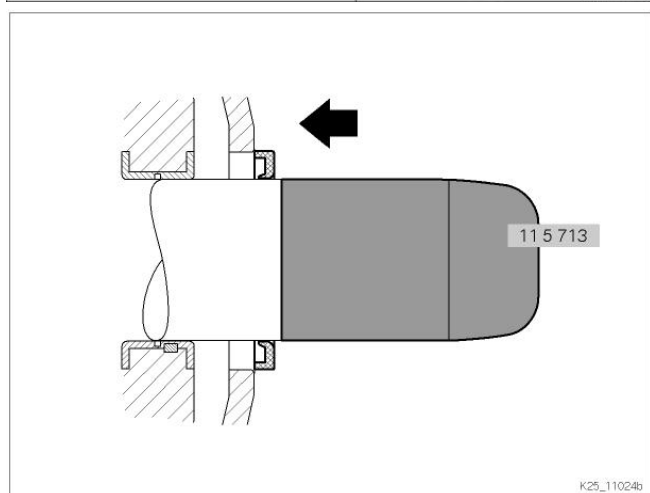
! Attention

Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.

Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.

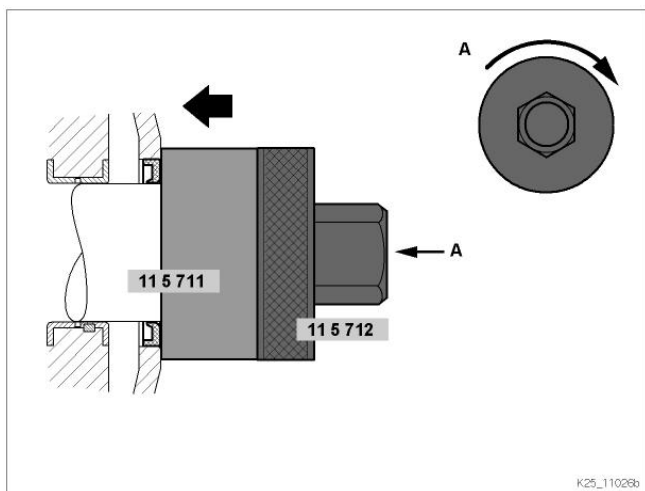
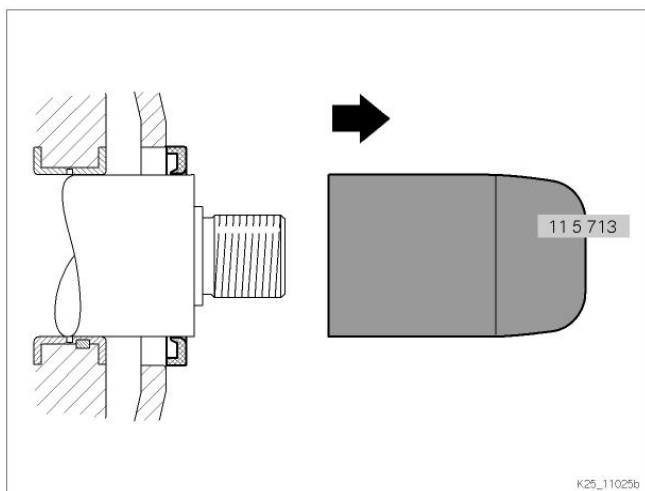


- Slip the new shaft sealing ring with the closed side down onto sliding sleeve (No. 11 5 713) .
- » The sealing lip of the rotary shaft seal is correctly preshaped.



- Seat sliding sleeve (No. 11 5 713) with the shaft sealing seal on the crankshaft.
- Slip the shaft sealing ring off sliding sleeve (No. 11 5 713) and onto the crankshaft.

- Remove sliding sleeve (No. 11 5 713) .



- Place ring (No. 11 5 711) in position and secure thrust piece (No. 11 5 712) on the crankshaft.
- Using ring (No. 11 5 711) and thrust piece (No. 11 5 712), screw the shaft sealing ring into the timing case cover.

- Remove thrust piece (No. 11 5 712) and remove ring (No. 11 5 711).

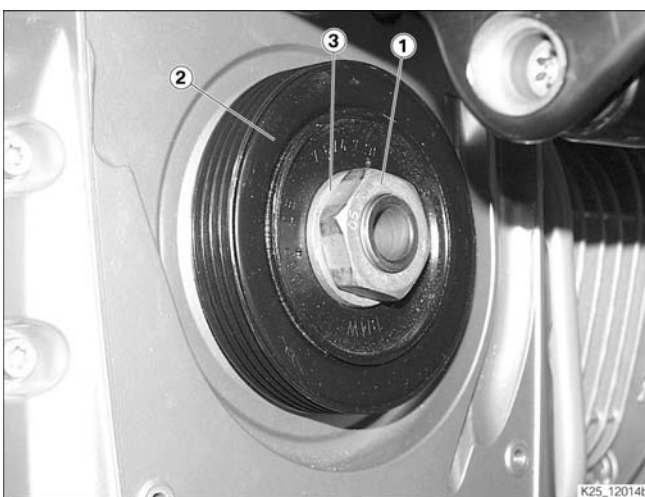
(-) Installing crankshaft belt pulley

Precondition

- Engine locked.

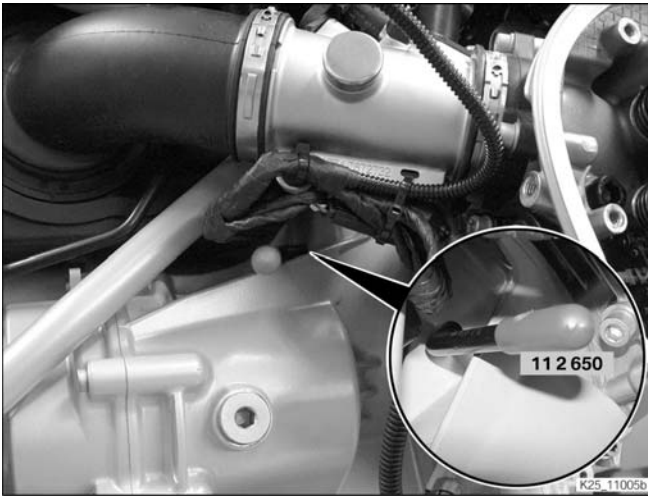


- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.



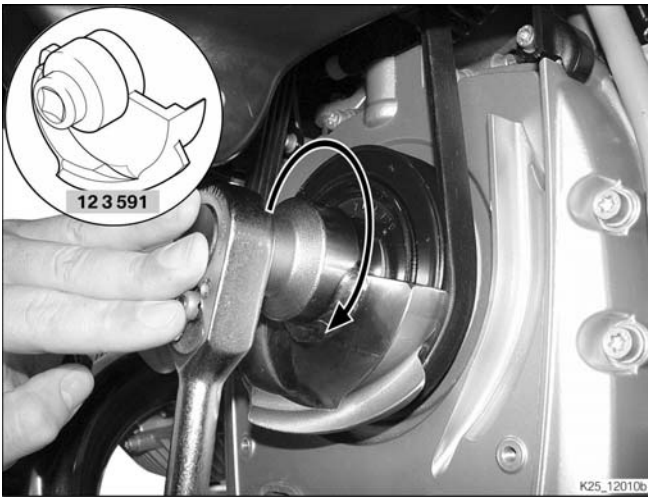
Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	

- Remove TDC locating pin (No. 11 2 650).



(-) Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.



⚠ Attention

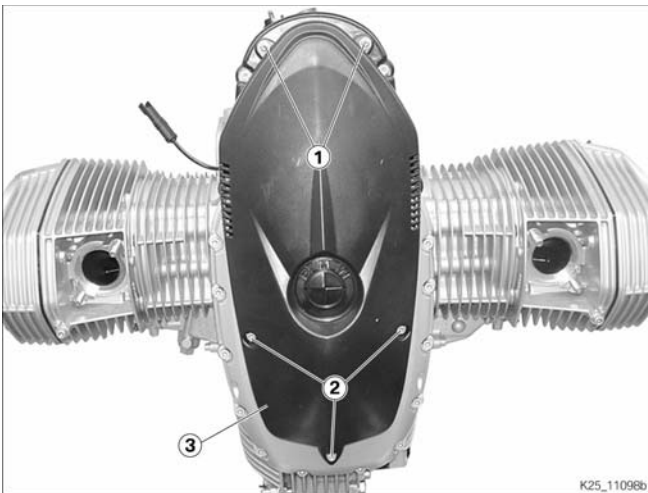
Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).



 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

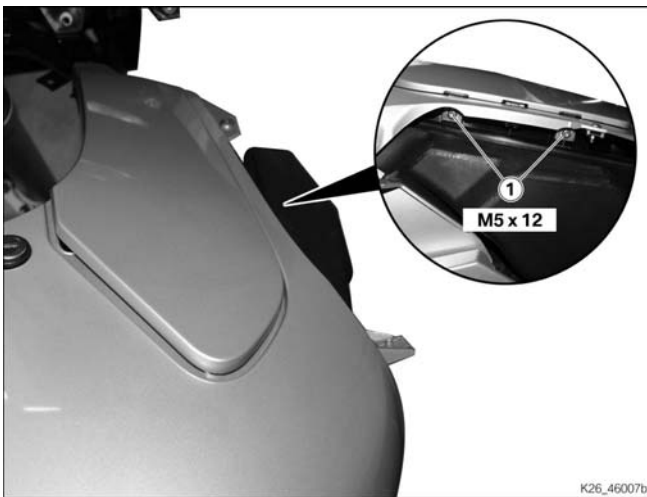
(-) Installing entire right side tank cover

- Fit tank cover.



- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



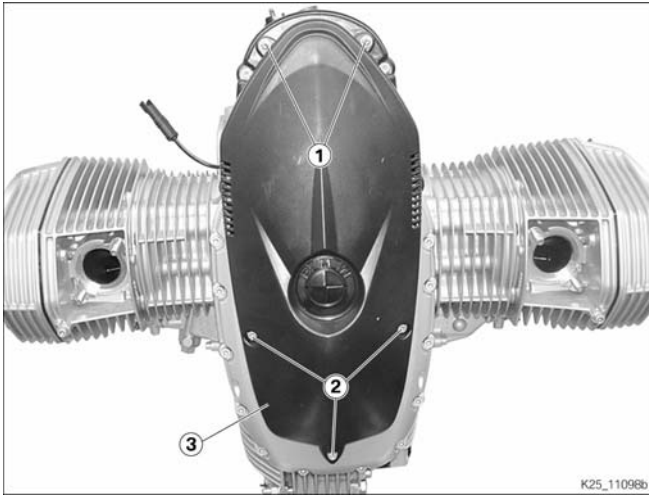
(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

11 14 067 Replacing sealing ring for balancing shaft in timing case cover

(-) Removing belt guard



- Remove screws (1) and (2).
- Remove belt guard (3).

(-) Removing cover for counterbalance shaft




- Remove screws (1) and remove cover.

(-) Installing counter balance shaft cover

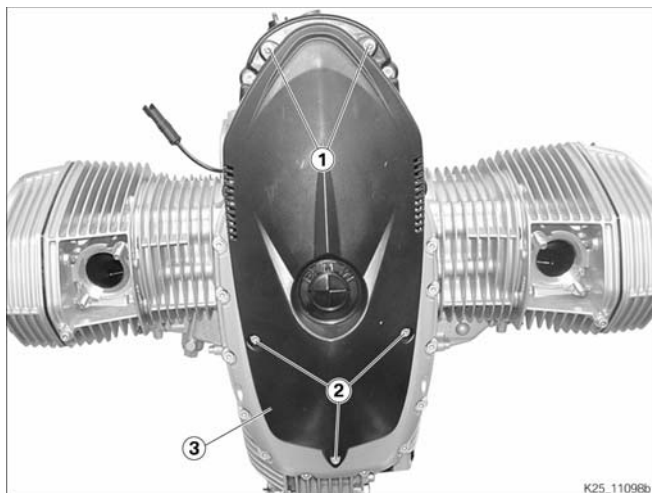
- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).



 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).



Tightening torques	
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm

 **11 15 050 Replacing engine breather with hose**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing left-hand trim panel

- Remove screws (1).

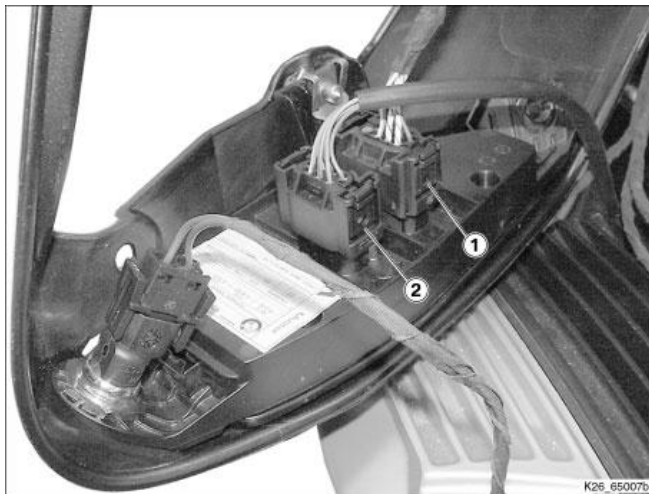


- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

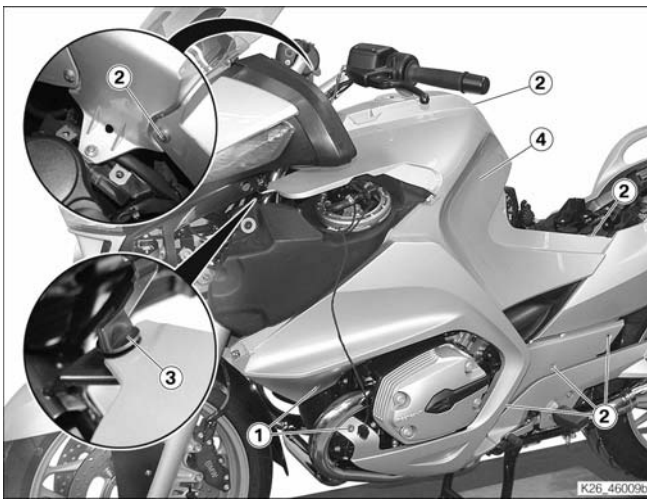
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



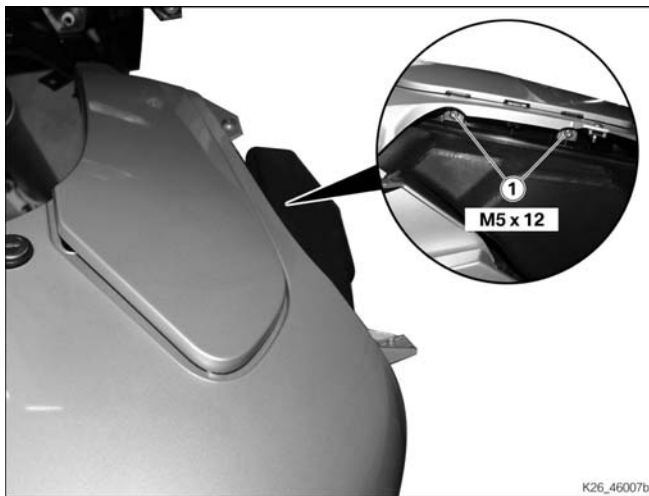
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing direct ignition coil

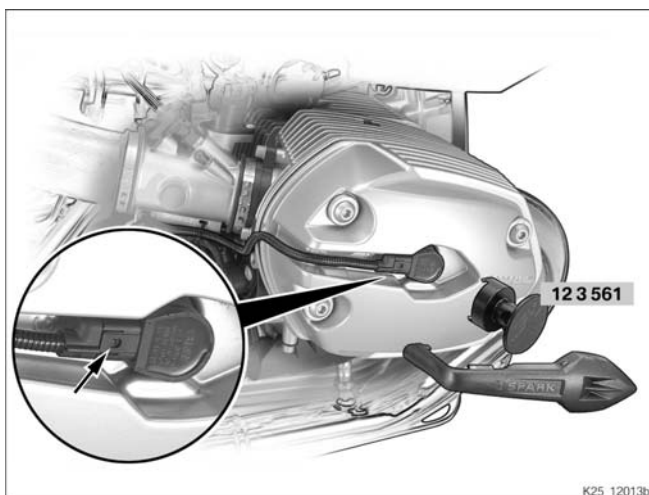
Precondition

- Ignition is switched OFF
- ▶
- Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

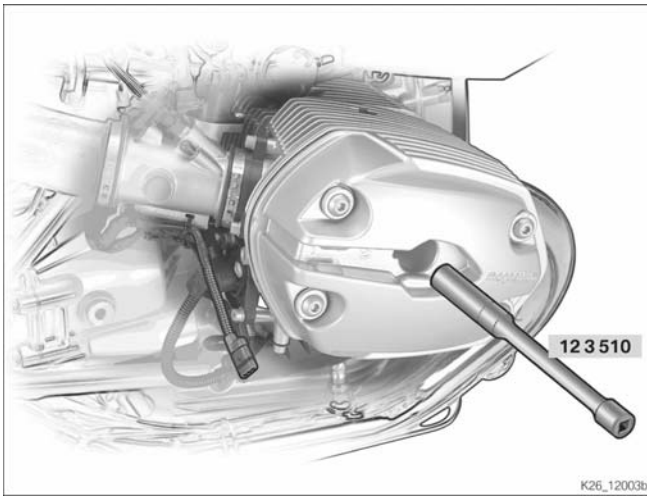
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



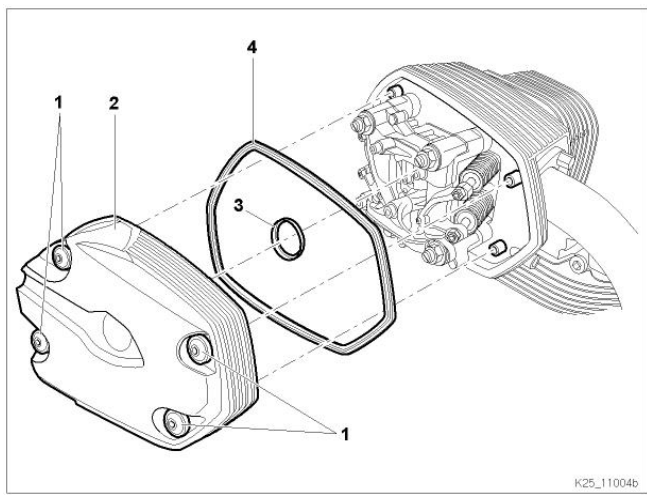
- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the



primary spark plug.




(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

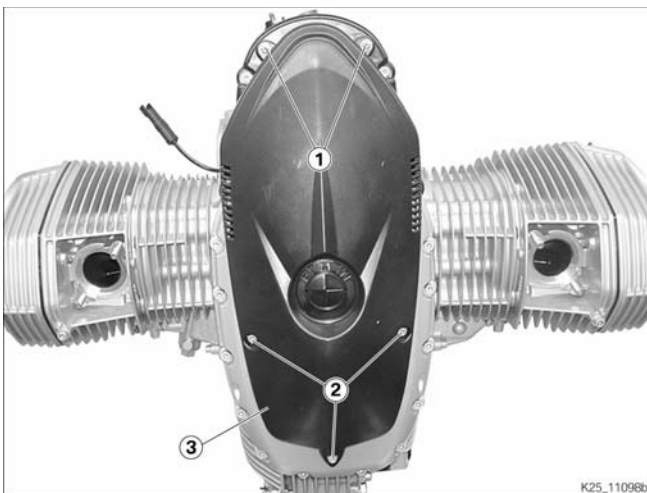
On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

 Technical data			
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	

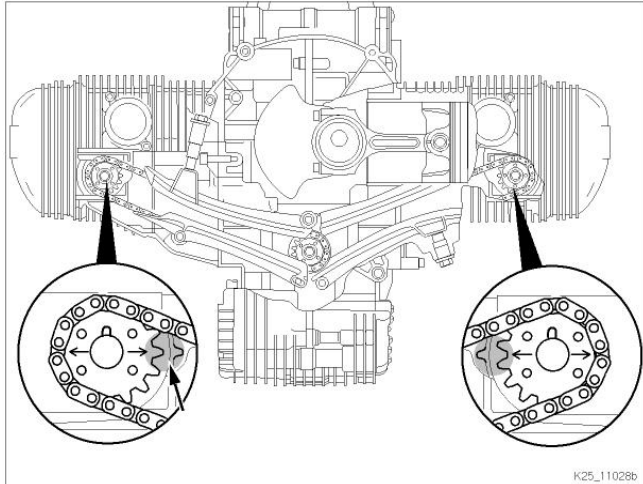
- Remove gaskets (3) and (4).

(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Setting left cylinder to firing TDC



- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

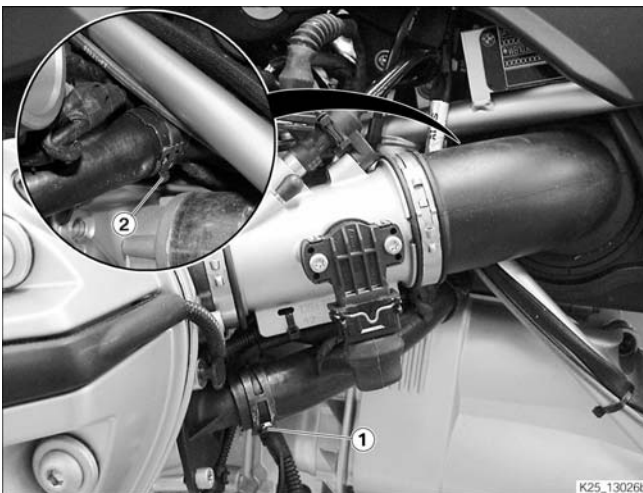
- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



(-) Removing hose for crankcase breather

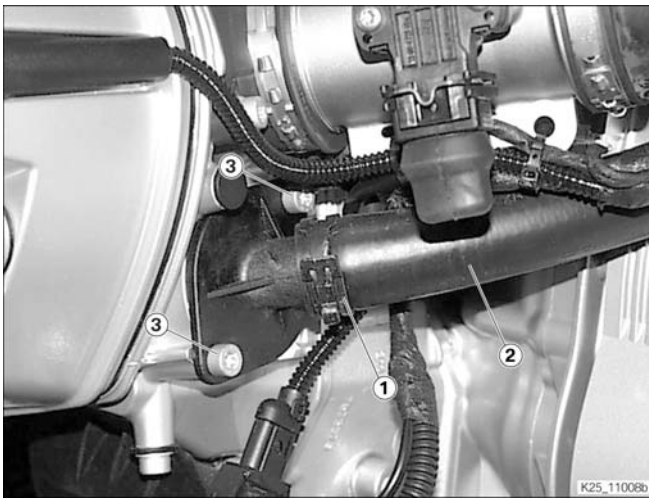
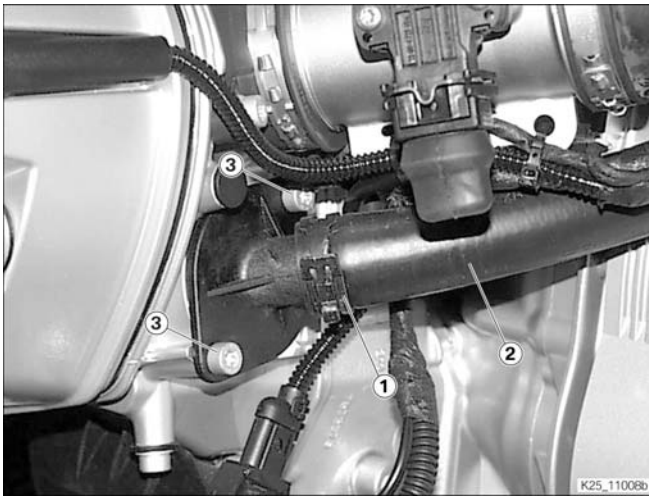
- Expand clip (2) and push it along the hose to the front.
- Disconnect the hose from the intake air silencer.



(-) Removing left camshaft cover

► Disconnecting hose for crankcase breather

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.

(-) Removing breather plate

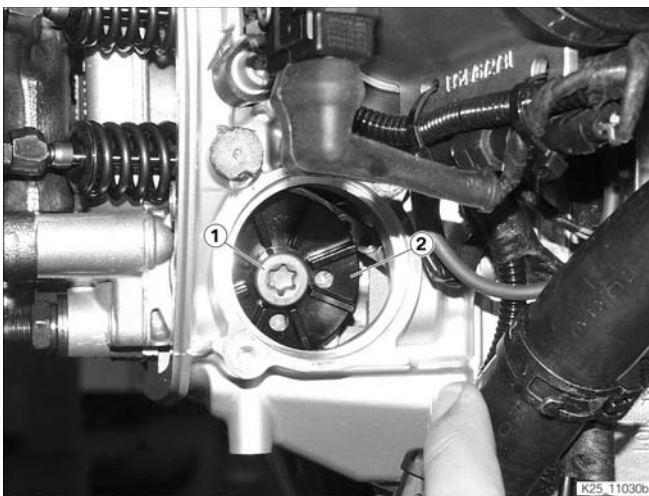
- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).



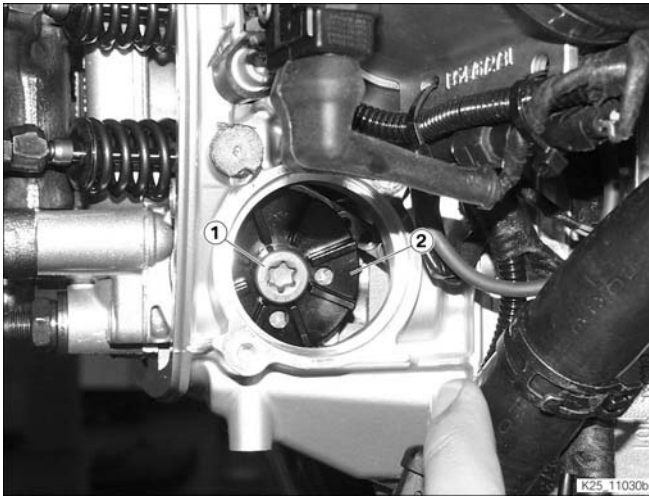
(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



- Install breather plate (2) with screw (1).



- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

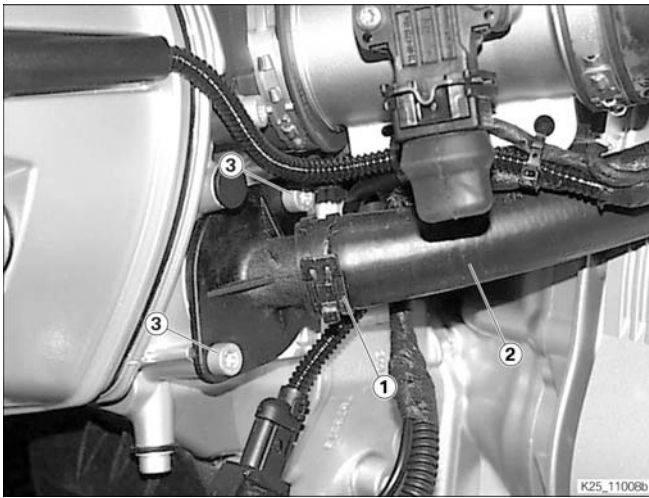
(-) Installing left camshaft cover



Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

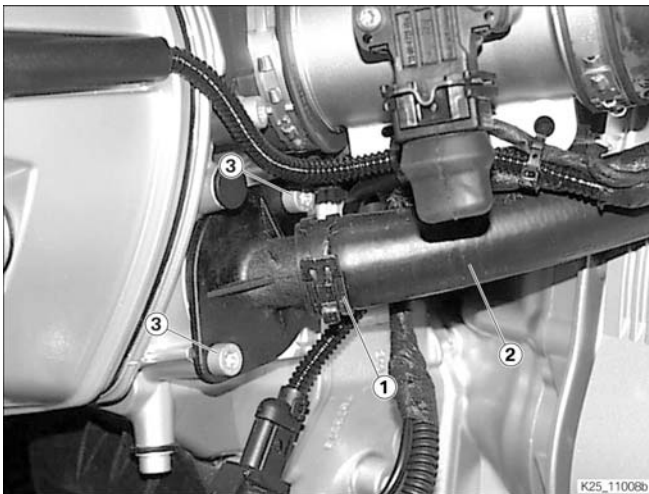
Avoidance: Deburr sharp edges of the housing.



- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

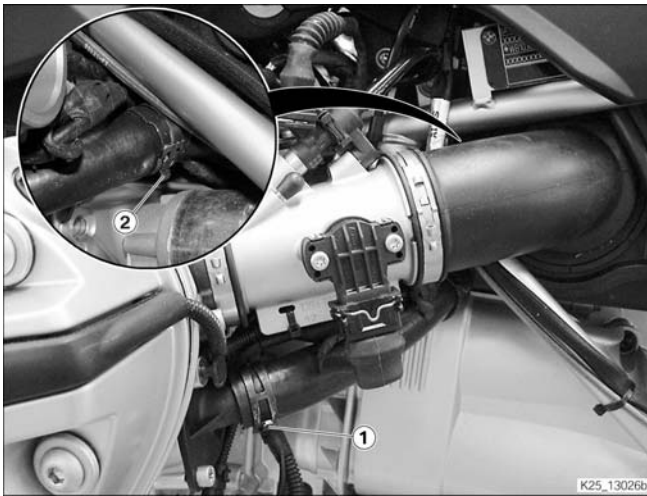
► Connecting hose for crankcase breather

- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



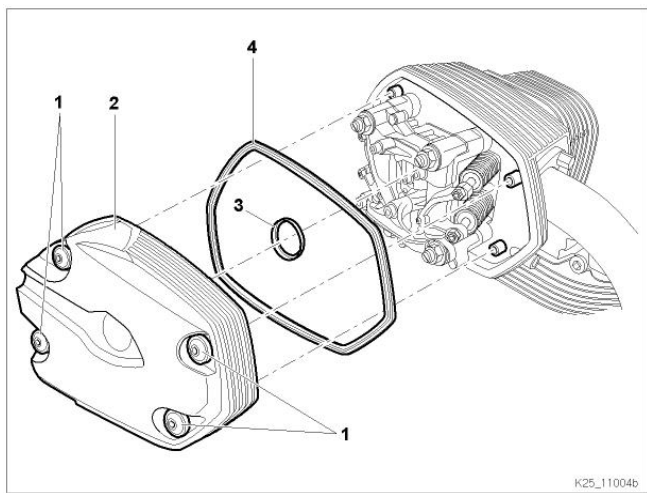
(-) Installing hose for crankcase breather

- Connect the hose to the intake air silencer.
- Expand clip (2) and push it up the hose and into position.




» Hose secured to the intake air silencer.

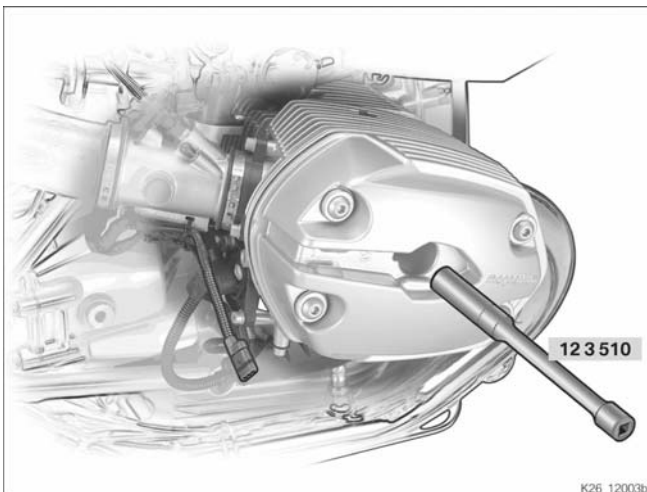
(-) Installing cylinder head cover




- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.


 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing primary spark plug



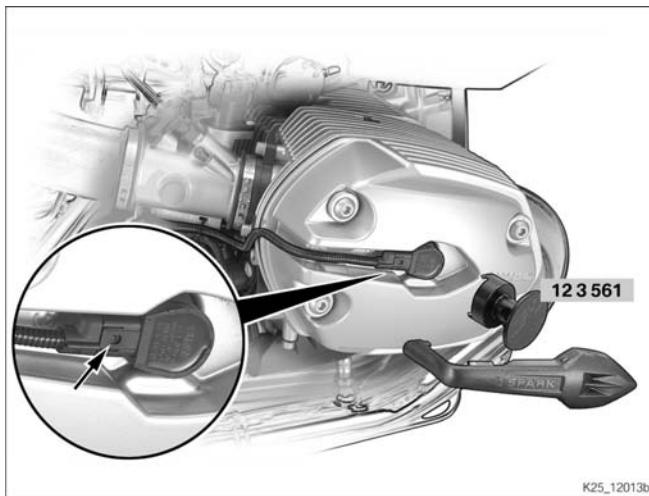
- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

 Tightening torques		
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	

 Technical data		
Spark plug, manufacturer and designation		Bosch YR 5 LDE

(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.



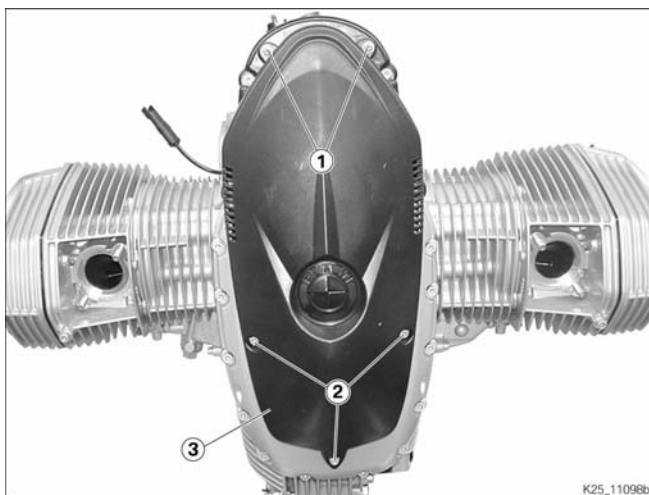
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Removing TDC locating pin




- Remove TDC locating pin (No. 11 2 650) .

(-) Installing belt guard



- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

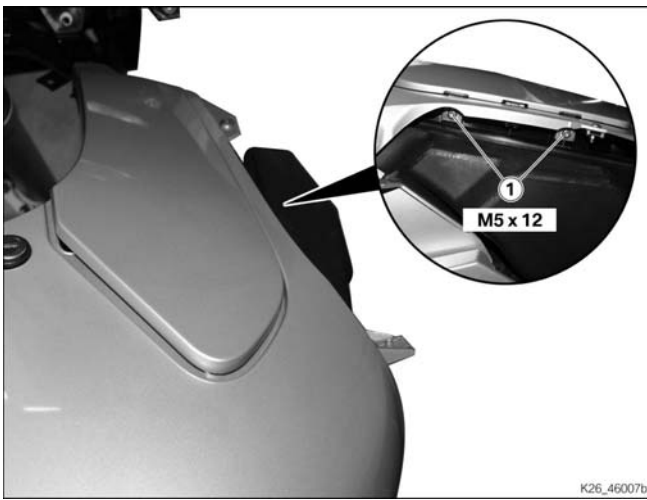
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



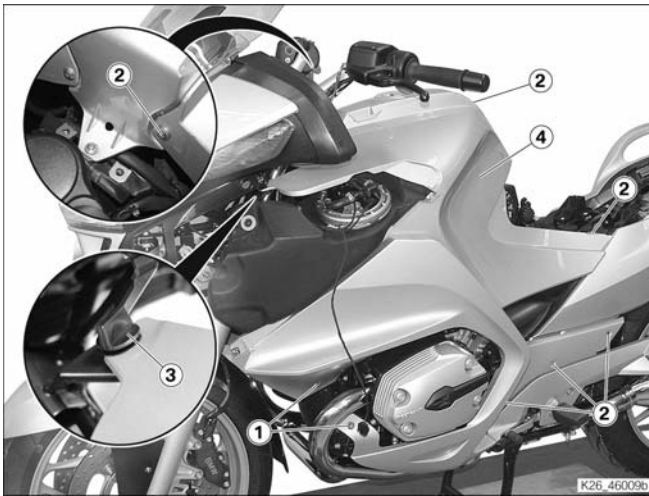
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing tank rail

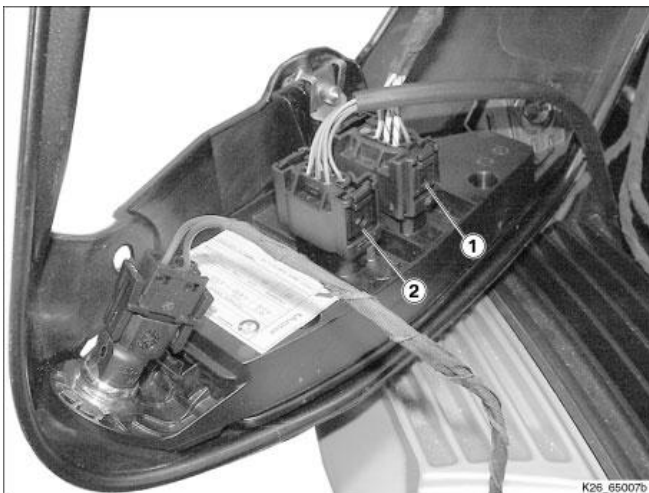
- Fit tank rail.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.

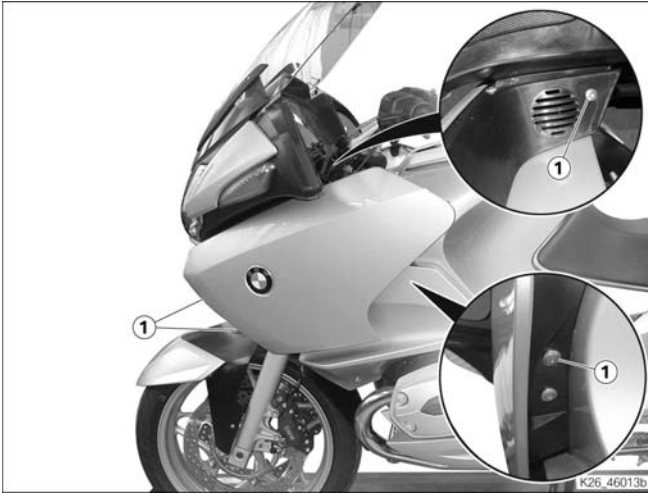


- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

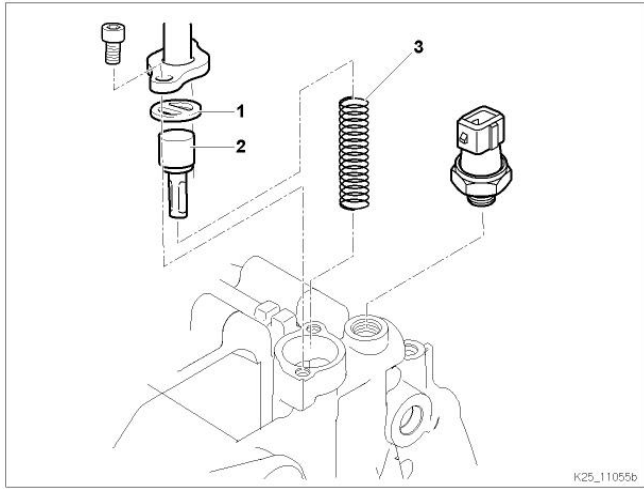


Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

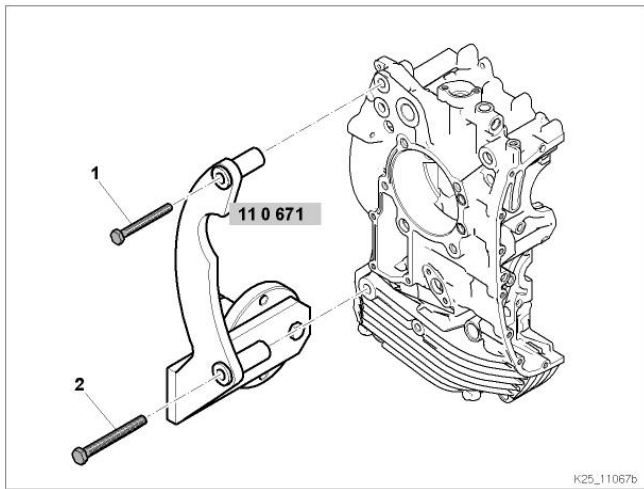
11 21 511 Replacing crankshaft (engine removed)

(-) Removing oil thermostat



- Remove supporting plate (1), control element (2), and spring (3).

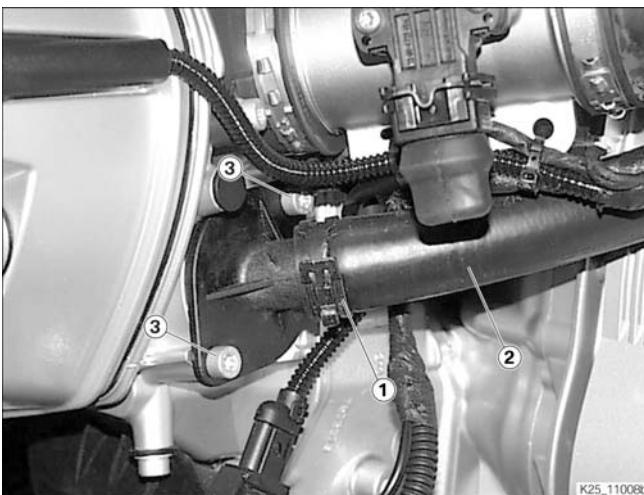
(-) Securing engine holder to right half of engine block



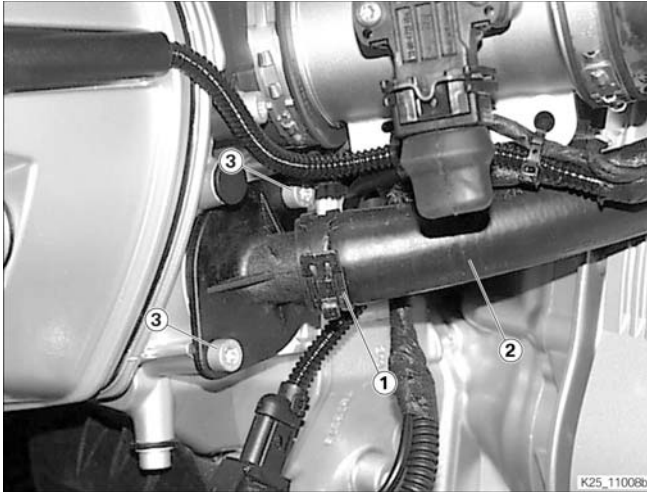
- Position engine holder (No. 11 0 671) at the right half of the engine block.
- Install screws (1) and (2).

(-) Removing left camshaft cover

► Disconnecting hose for crankcase breather

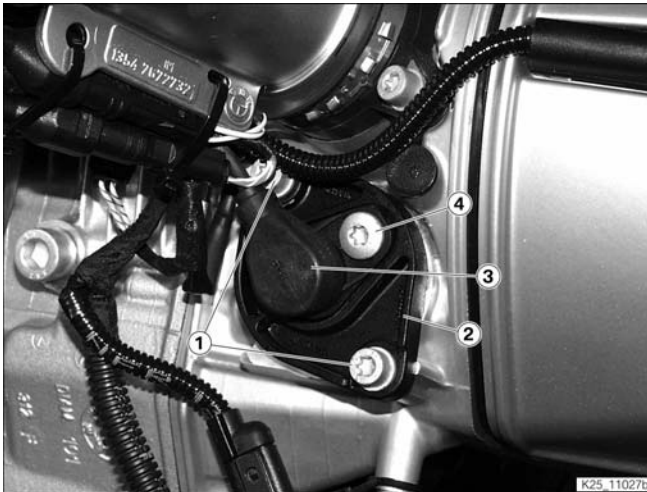


- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



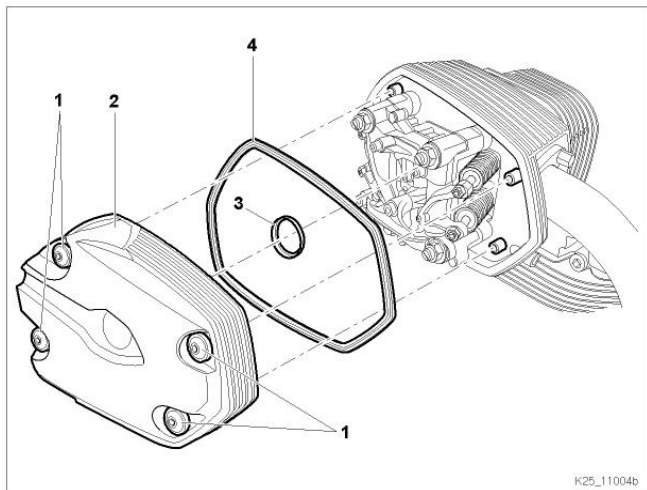
- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.

(-) Removing right camshaft cover



- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.

(-) Removing cylinder head covers




- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head covers (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

 Technical data			
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	

- Remove gaskets (3) and (4).

(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



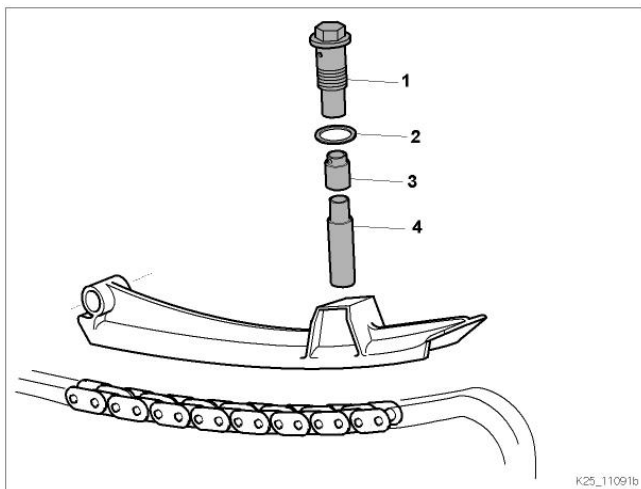
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

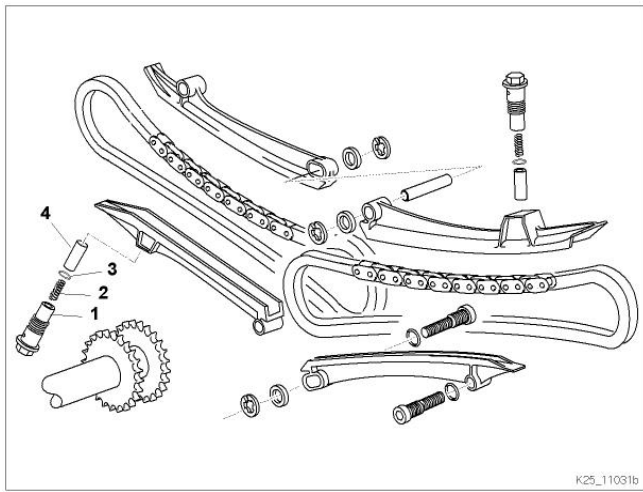
(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



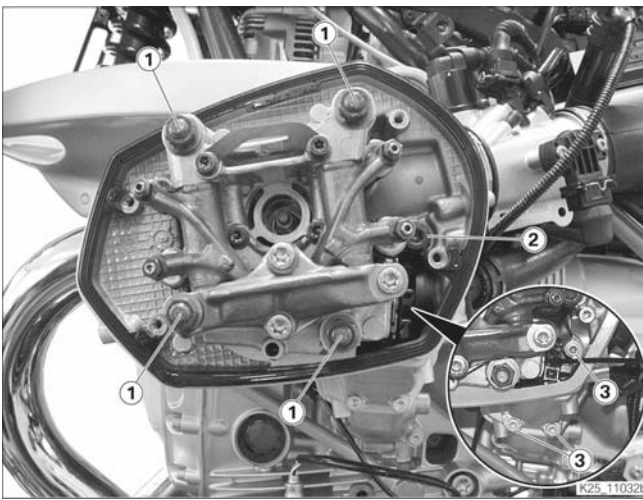
(-) Removing right chain tensioner

- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly



- manner.
- Remove spring (2) and piston (4) from the cylinder.

(-) Removing left cylinder head



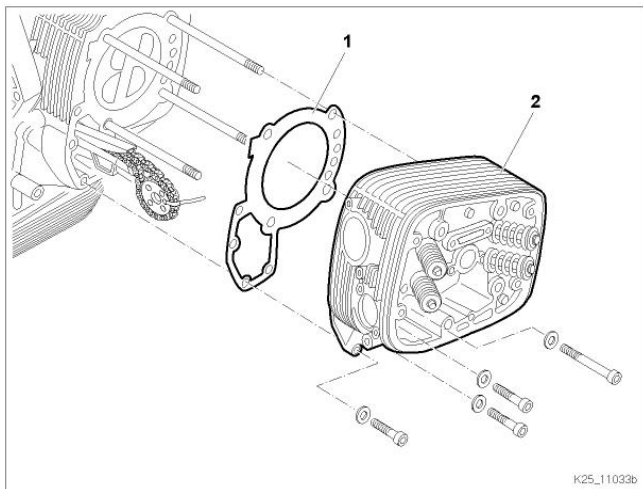
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.

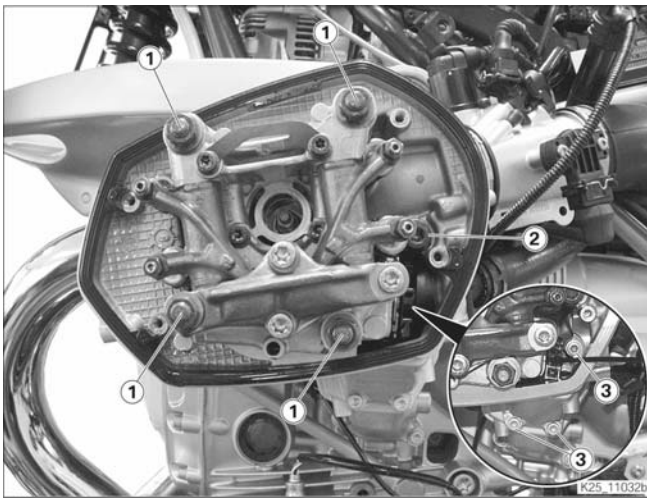
(-) Removing right cylinder head

- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



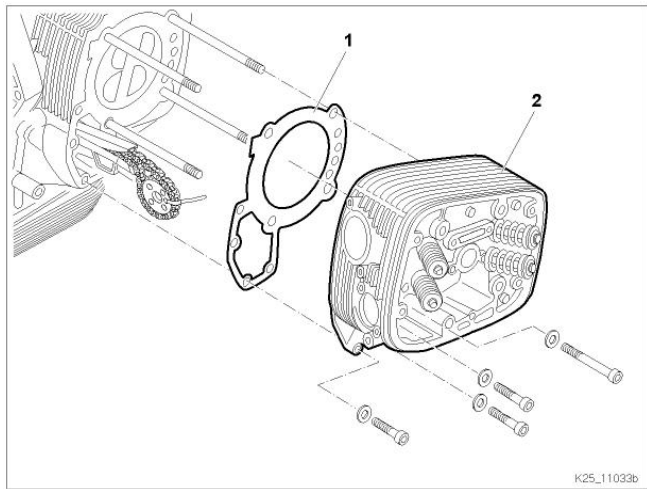
Note

When removing and installing the screws in the chain

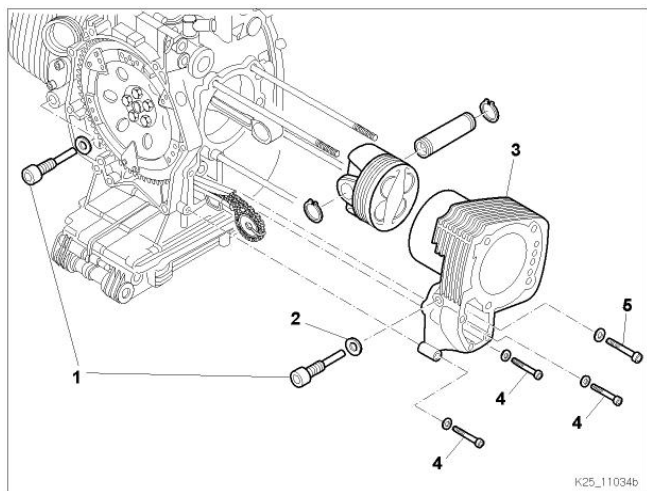


cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing left cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

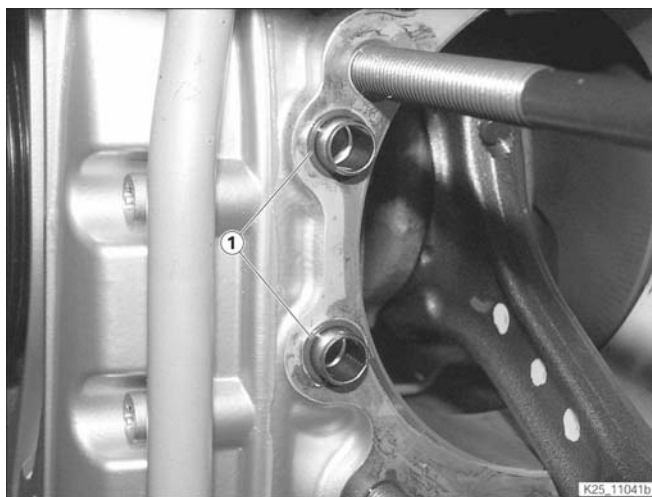
Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

- Pull the cylinder outward to remove.

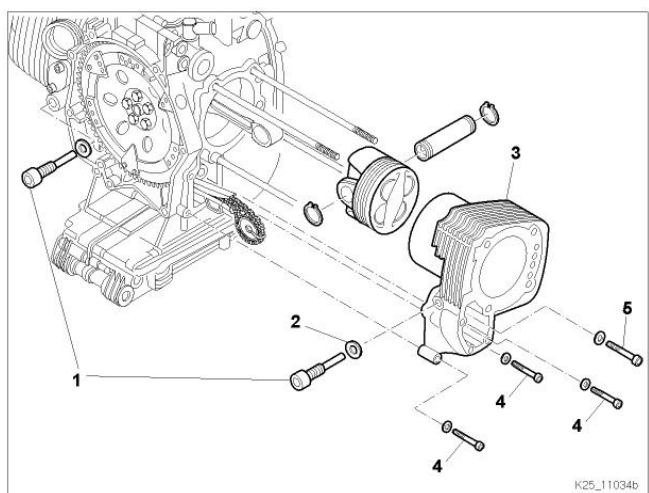


Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.



- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Removing right cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

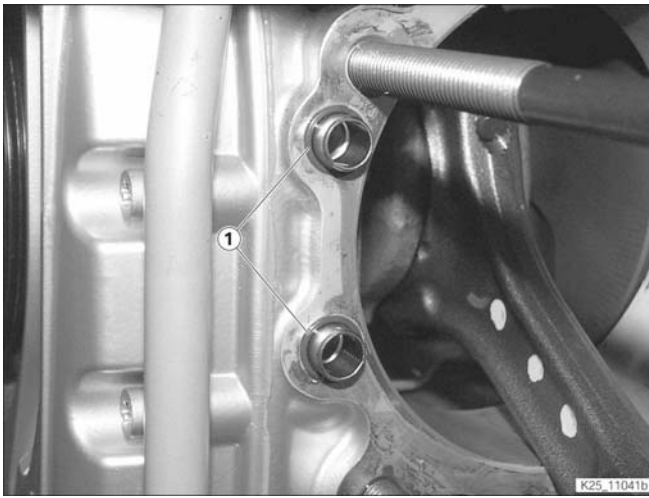
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



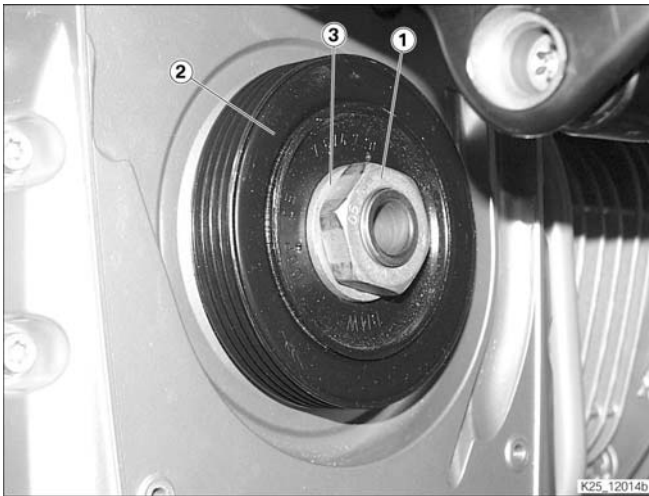
(-) Removing crankshaft belt pulley

Precondition

- Engine locked.



- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.



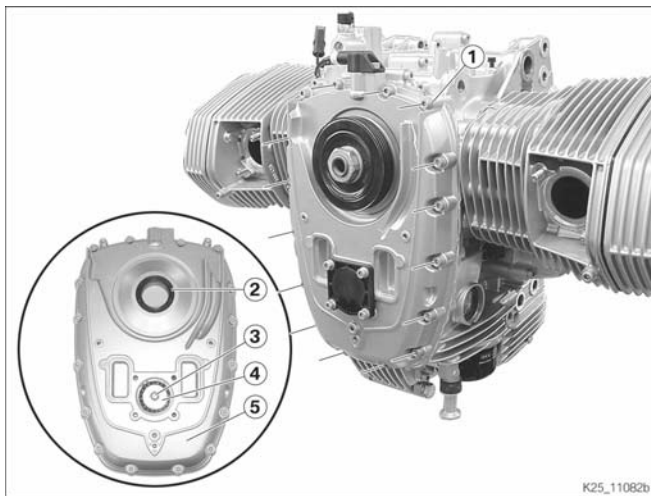
(-) Removing cover for counterbalance shaft

- Remove screws (1) and remove cover.



(-) Removing time case cover

- Remove screw (3) and washer (4).



- Remove screws (1).



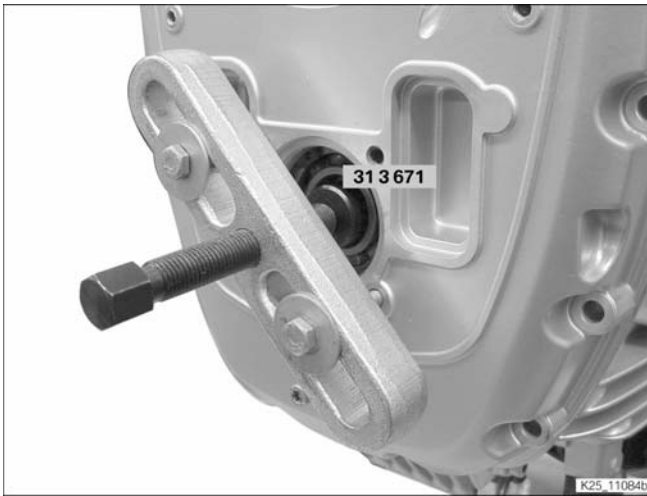
- Install the puller and thrust piece (No. 31 3 671) .
- Remove the timing case cover, noting the inductive sensor of the crankshaft, which is still fixed in position.



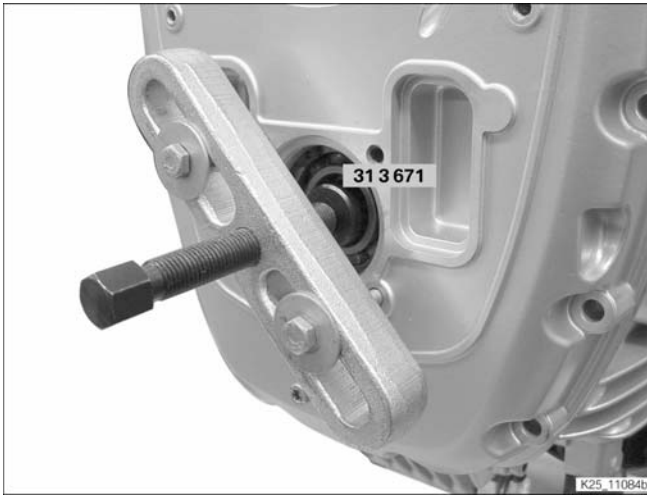
► **Releasing crankshaft inductive sensor from timing case cover**

- Remove screw and remove crankshaft inductive sensor (2) from the timing case cover.





- Remove puller and thrust piece (No. 31 3 671) .



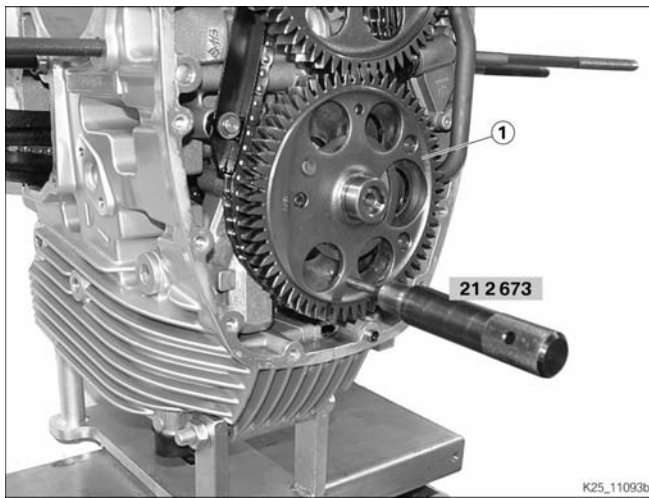
(-) Removing balance weight

- Remove screw (2) from the balance weight.
- Pull balance weight (1) back and off the counterbalance shaft.



(-) Removing tensioning wheel

- Use clutch centring pin (No. 21 2 673) to fix the tensioning wheel in position.
- Remove tensioning wheel (1).



(-) Removing counterbalance shaft

- Pull balancing shaft (1) to the rear to remove.



(-) Removing drive gear on counterbalance shaft

- Tighten nut (1) until hand-tight.



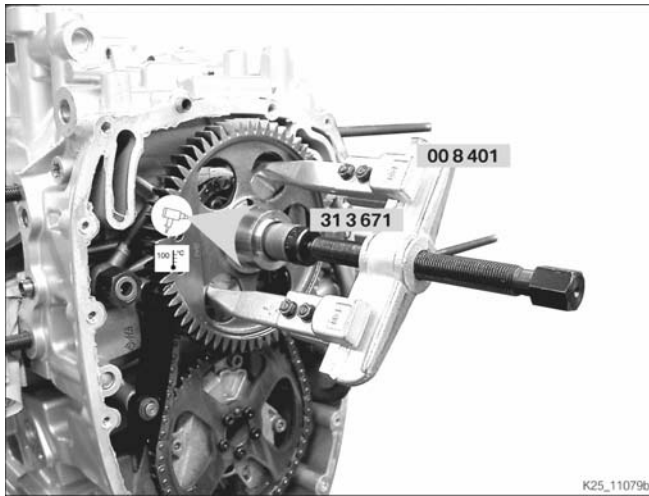
- Install puller (No. 00 8 401) and thrust piece (No. 31 3 671) and pretension.



Attention

Nature:

Once the gear has been heated it can



work loose suddenly and damage components in the vicinity.

Avoidance: Cover components in the vicinity and protect them against damage.

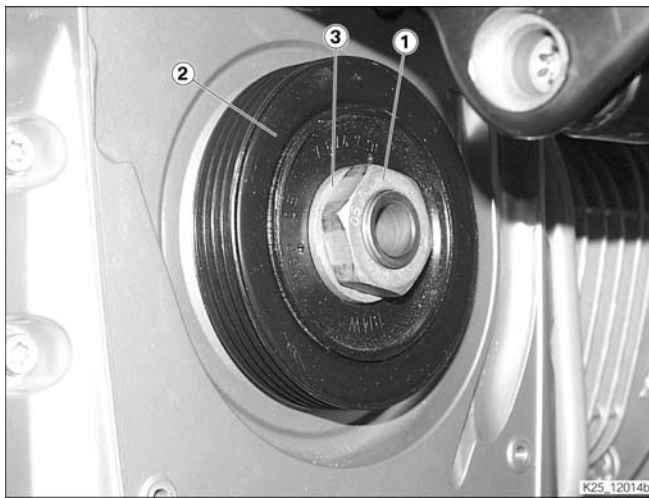
- Heat the drive gear for the balancing shaft at the crankshaft and tap it to release.



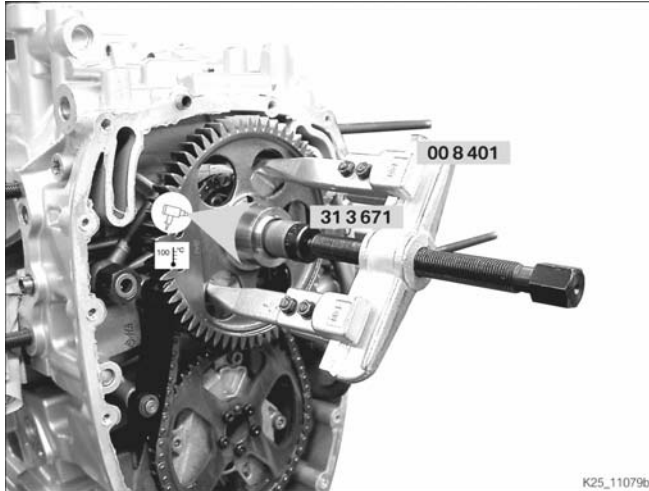
Technical data

Release temperature, drive gear for balancing shaft on crankshaft

80 °C



- Remove nut (1).



Warning

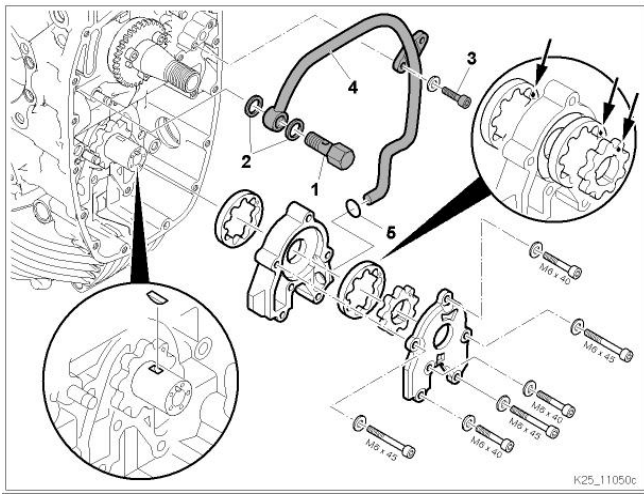
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Remove the drive gear for the balancing shaft and remove puller (No. 00 8 401) and thrust piece (No. 31 3 671).

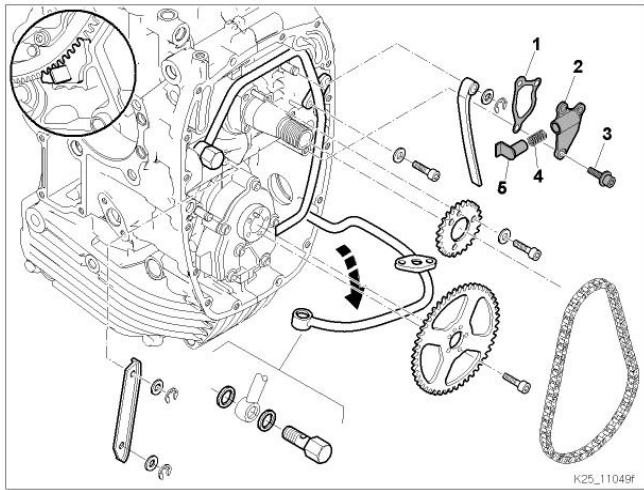
(-) Removing cooling oil line

- Remove banjo bolt (1) with sealing rings (2).
- Remove screws (3).
- Swing cooling oil line (4) forward and remove.
- Remove O-ring (5).



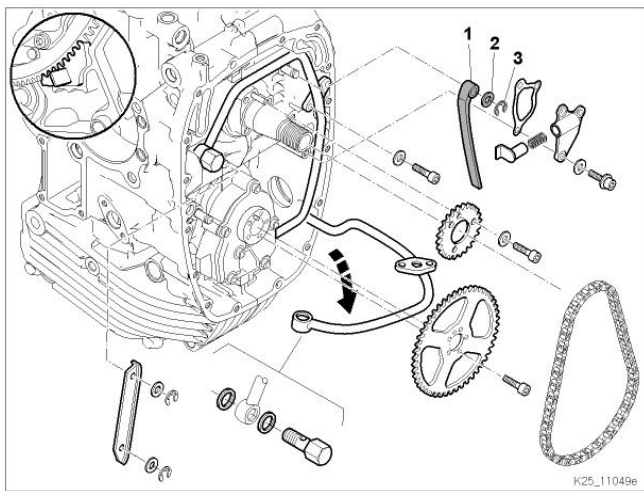
(-) Removing timing chain tensioner, crankshaft/auxiliary shaft

- Remove screws (3).
- Remove housing (2) with spring (4) and piston (5).
- Remove seal (1).



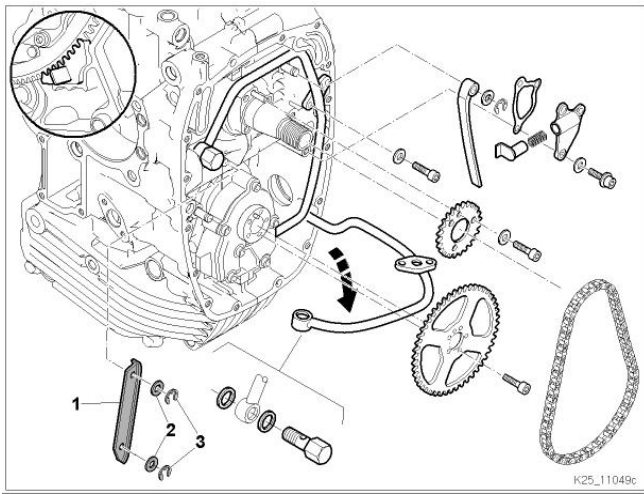
(-) Removing timing chain tensioner rail, crankshaft/auxiliary shaft

- Remove retaining washer (3) and lift off spacer (2).
- Remove timing-chain tensioning rail (1).



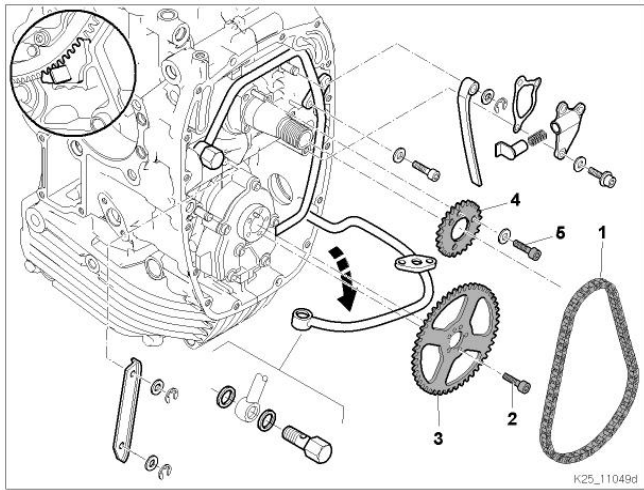
(-) Removing timing chain guide rail, crankshaft/auxiliary shaft

- Remove retaining washers (2) and lift off spacers (3).
- Remove timing-chain guide rail (1).



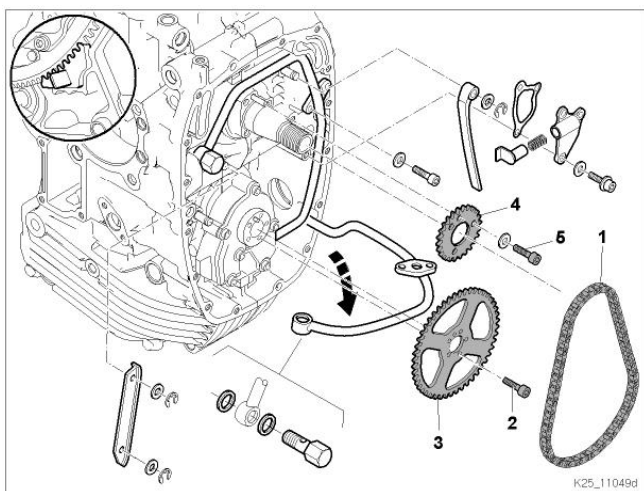
(-) Removing timing chain, crankshaft/auxiliary shaft

- Remove screws (2).
- Remove timing chain (1) with sprocket of countershaft (3).



(-) Removing timing-chain pinion from crankshaft

- Remove screws (5).
- Remove timing-chain pinion (4).



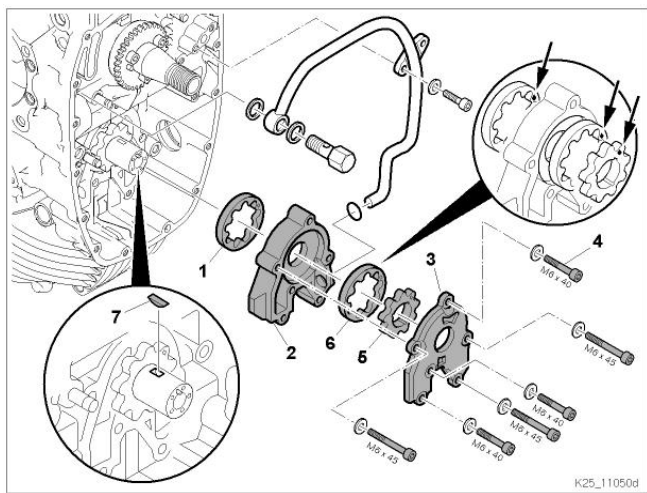
(-) Removing counterbalance shaft

- Pull balancing shaft (1) to the rear to remove.



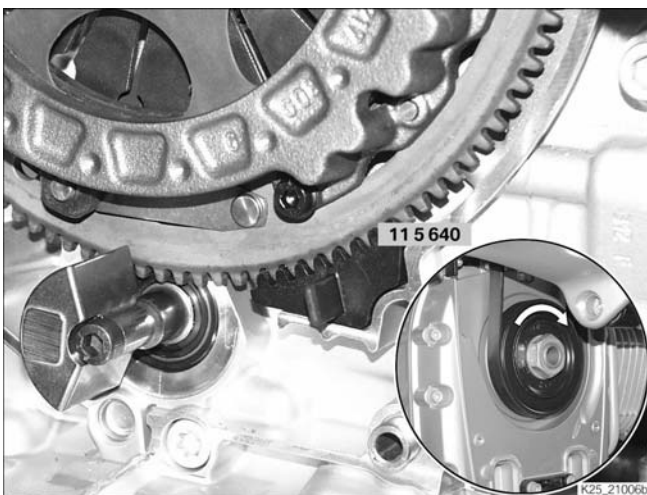
(-) Removing oil pump

- Remove screws (4).
- Remove oil-pump cover (3).
- Remove outer rotor for cooling oil (6) and inner rotor for cooling oil (5).
- Remove oil-pump housing (2) with outer rotor for lube oil (1).

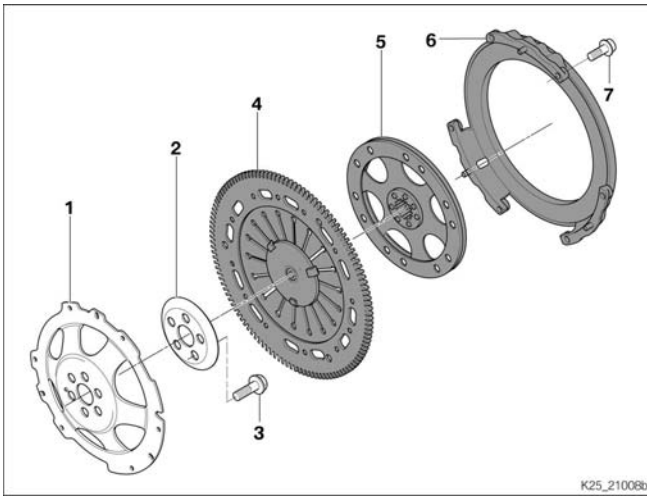


(-) Removing clutch

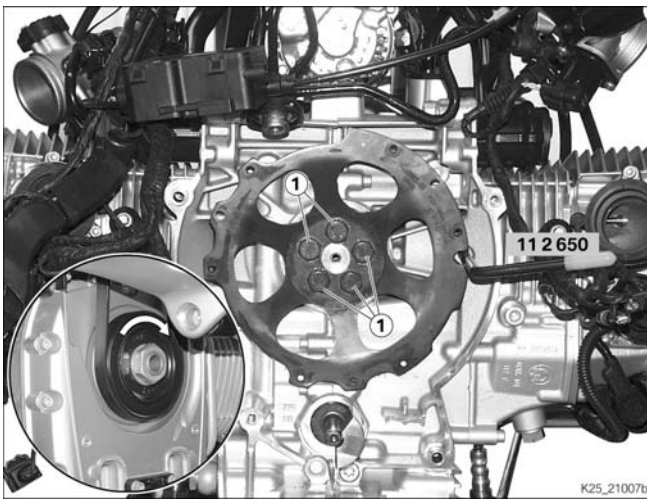
- By means of the belt pulley, turn the engine in the normal direction of rotation until the engine locking device can be inserted.
- Insert engine locking device (No. 11 5 640) .



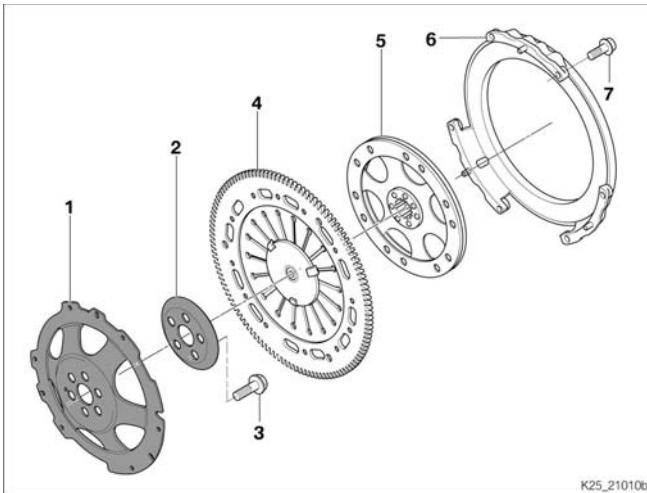
- Working in diagonally opposite sequence, loosen screws (7) in stages.
- Remove engine locking device (No. 11 5 640) .
- Remove the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6).



(-) Removing clutch housing



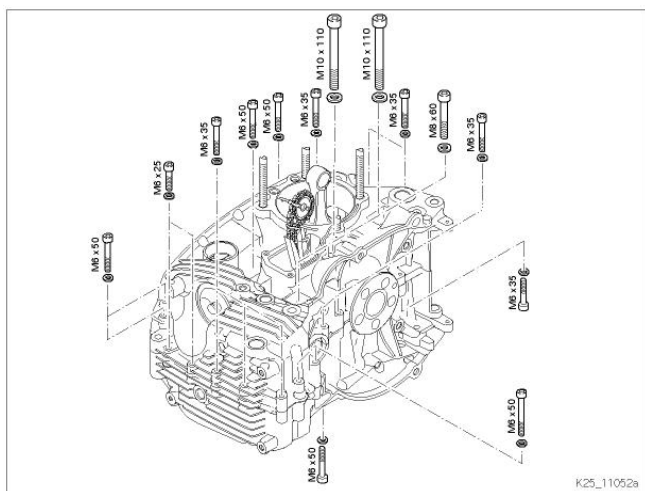
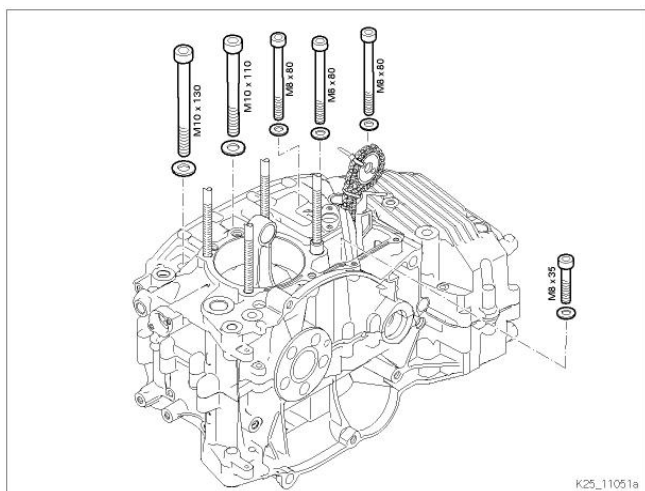
- By means of the belt pulley, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .



- Remove screws (3).
- Remove clutch housing (1) and reinforcing plate (2).
- Remove TDC locating pin (No. 11 2 650) .

(-) Removing left half of engine casing

- Turn engine to side position.
- Remove the screws on the right-hand side.



- Turn engine to side position.
- Remove the screws on the left-hand side.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

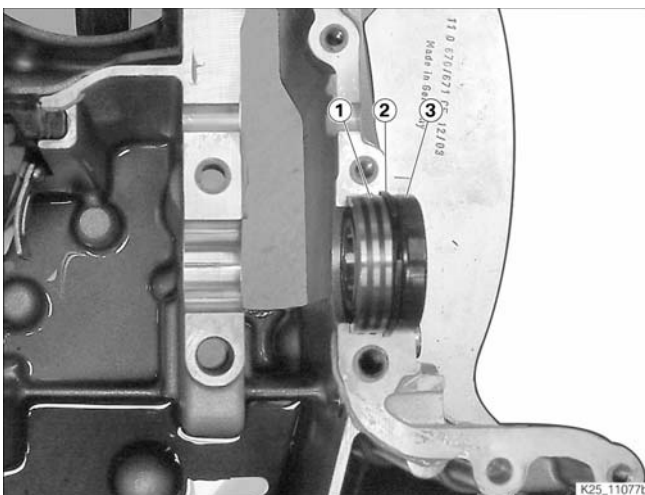


Attention

Nature: If the engine block is not kept straight during removal and installation, the bearing shells can be damaged.

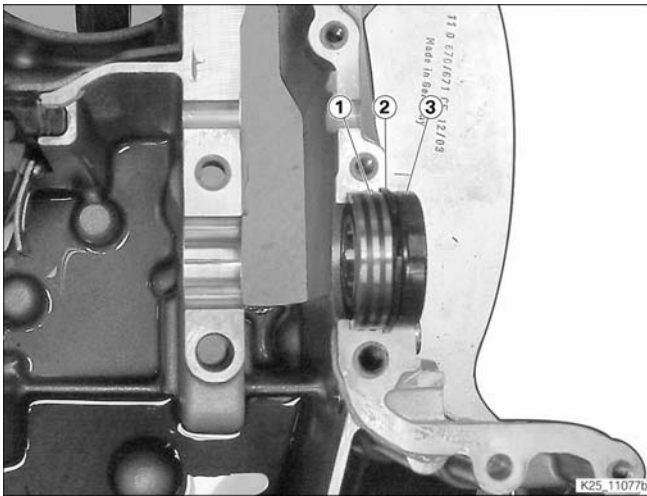
Avoidance: Do not tilt the engine block when removing and installing.

- Remove left half of engine casing.
- (-) Removing counterbalance shaft on clutch side**



- Remove deep groove ball bearing (1).
- Remove circlip (2).

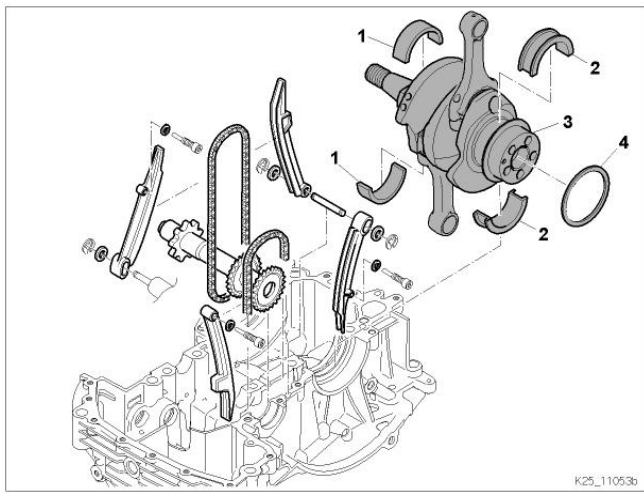
(-) Removing rotary shaft seal, counterbalance shaft



- Remove rotary shaft seal (3).

(-) Removing crankshaft

- Remove crankshaft (3) with connecting rod.



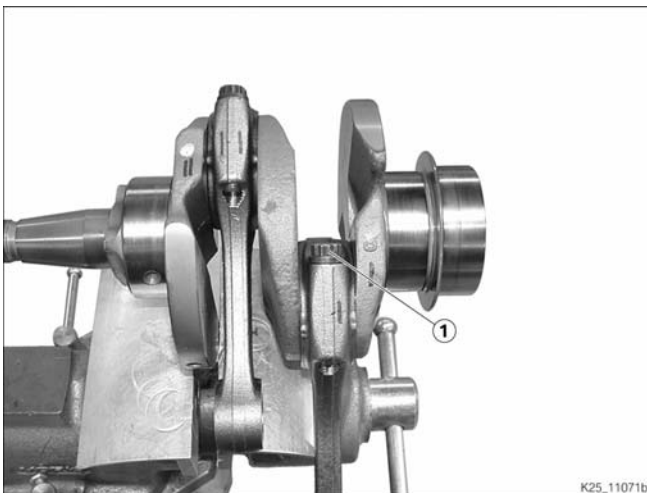
(-) Removing conrods

- Clamp the crankshaft in a vice with protective jaws.

⚠ Attention

Nature: Friction faces in the engine have to run in against each other. If components are mixed up they have to run in again.

Avoidance: Do not mix up conrods or bearing shells; always mark the components to ensure that they are reinstalled in their original positions.



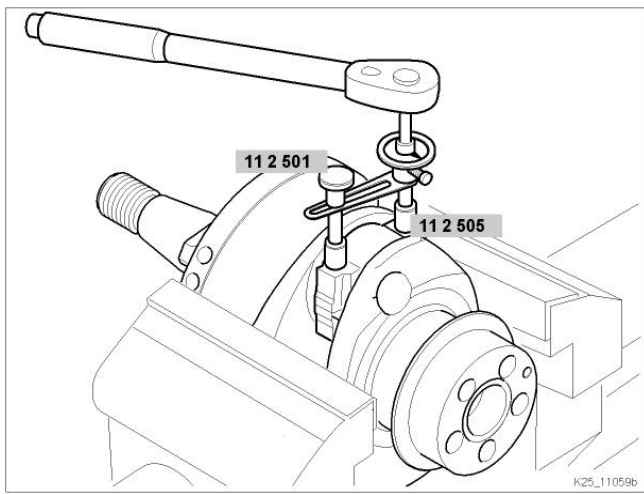
- Use a felt-tipped pen to mark the installed positions of the conrods.
- Remove screws (1).
- Remove the conrod and conrod cap.

(-) Installing conrods (crankshaft removed)

- Clamp the crankshaft in a vice with protective jaws.

⚠ Attention

Nature: Friction faces in the engine have to run in



against each other. If components are mixed up they have to run in again.

Avoidance: Do not mix up conrods or bearing shells; always mark the components to ensure that they are reinstalled in their original positions.

! Attention

Nature: In order to ensure low-vibration, smooth engine operation, all the conrods must belong to the same weight class.

Avoidance: Make sure that the conrods all belong to the same weight group.

- Oil the friction faces and install the conrod and conrod cap.

! Attention

Nature: Conrod cap screws are stress bolts; when tightened, these fasteners are subjected to loads in excess of the proof stress and they can shear off if they are retightened.

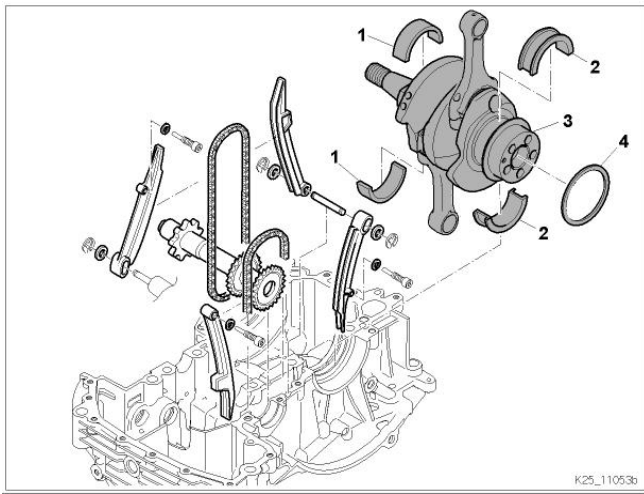
Avoidance: Never re-use the conrod cap screws.

- Install new, oiled conrod cap bolts and tighten with angle-of-rotation gauge, (No. 11 2 501) and socket wrench insert (No. 11 2 505) .

! Tightening torques	
Conrod bearing cap screws, M10 x 1.25, Replace screws	Threads and underside of head lightly oiled
	Closing torque, 5 Nm
	Initial torque, 20 Nm
	Final torque, 90 °

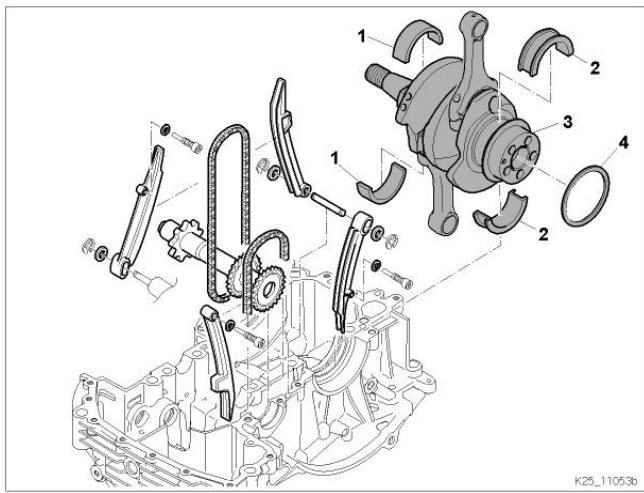
(-) Removing rotary shaft seal on crankshaft

- Remove shaft sealing ring (4).



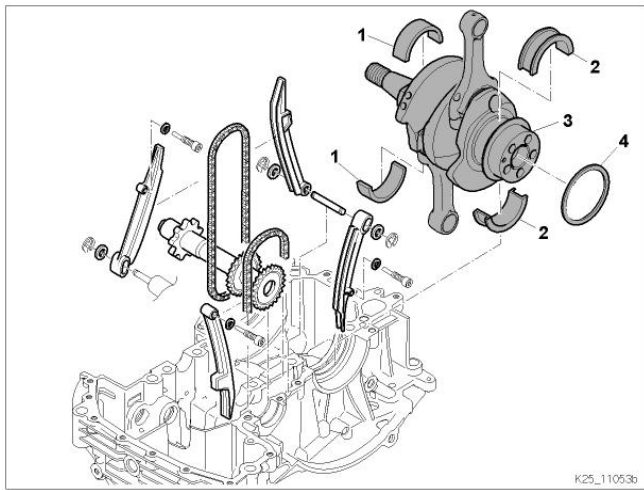
(-) Removing crankshaft guide-bearing shells

- Remove crankshaft guide-bearing shells (2) from the two halves of the engine block.



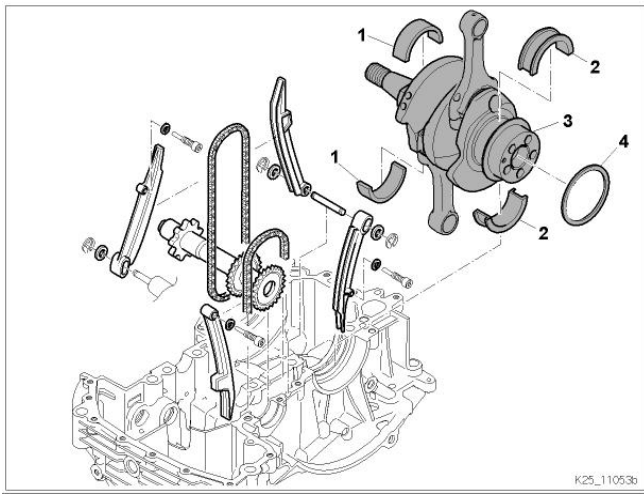
(-) Removing crankshaft main bearing shells

- Remove crankshaft main-bearing shells (1) from the two halves of the engine block.



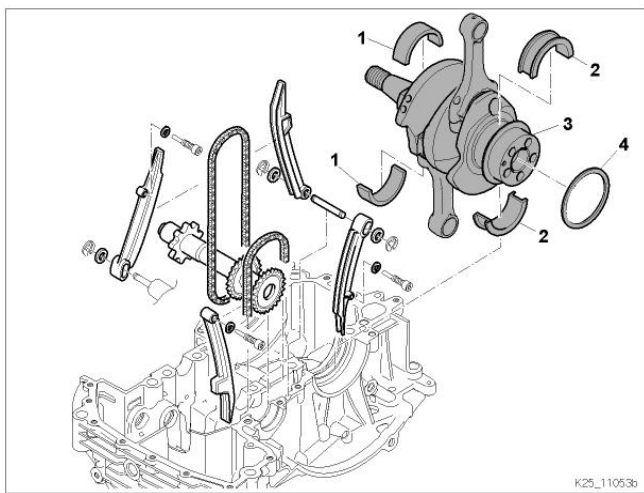
(-) Installing crankshaft main-bearing shells

- Install the oiled crankshaft main-bearing shells (1) in the two halves of the engine block, making sure that the "lugs" of the bearing shells engage the grooves in the engine-block halves.



(-) Installing crankshaft guide-bearing shells

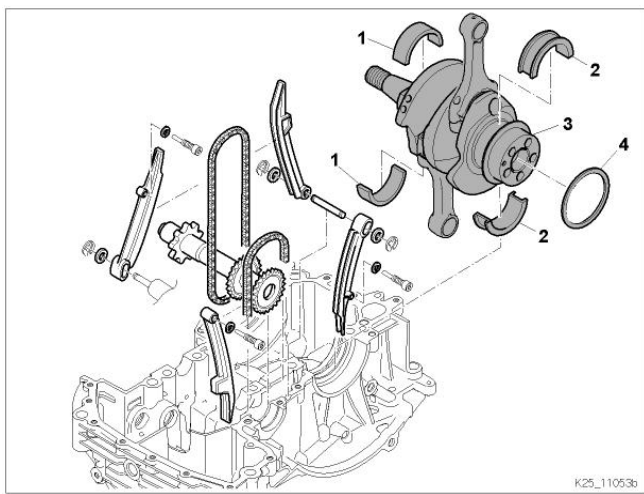
- Install the oiled crankshaft guide-bearing shells (2) in the two halves of the engine block, making sure that the "lugs" of the bearing shells engage the grooves in the engine-block halves.



(-) Measuring crankshaft bearing axial play

► Installing crankshaft

- Oil the friction faces of crankshaft (3) and bearing shells (1) and (2).



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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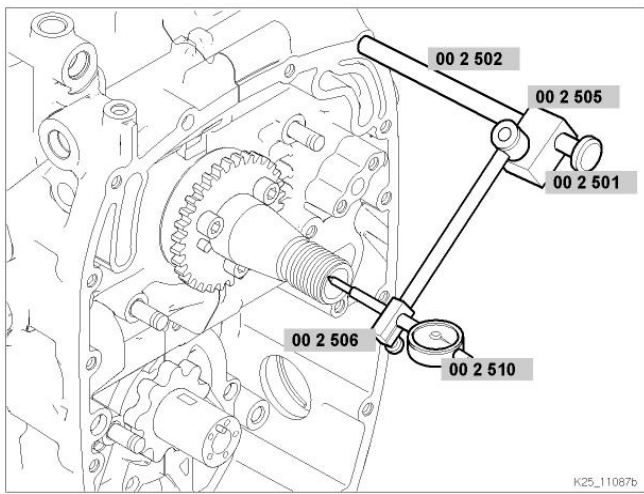
- Install crankshaft (3) with connecting rod in the right half of the engine block.




► Provisionally assembling engine block



Attention

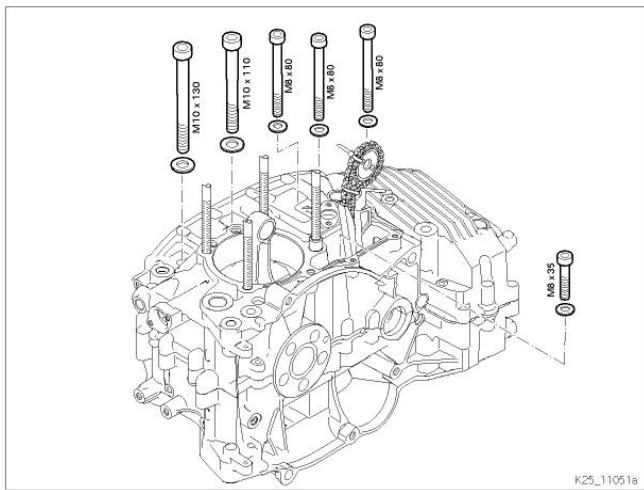


the dial gauge readings.

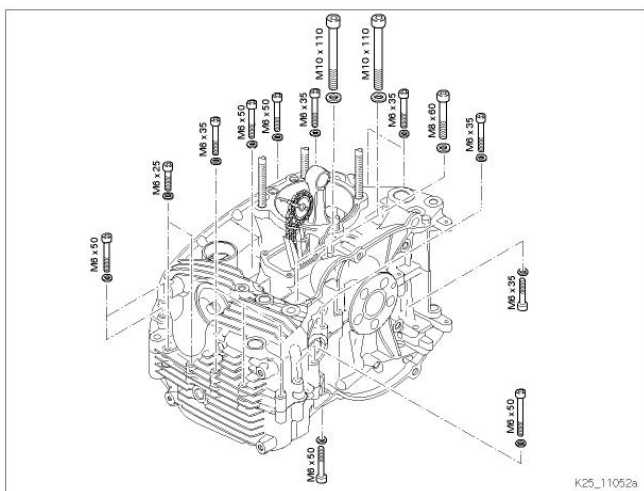
 Technical data			
Endplay, crankshaft Value definition: When new		0.08 - 0.163 mm	
Endplay, crankshaft Value definition: Wear limit		max. 0.2 mm	

(-) Removing left half of engine casing

- Turn engine to side position.
- Remove the screws on the right-hand side.



- Turn engine to side position.
- Remove the screws on the left-hand side.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.



Attention

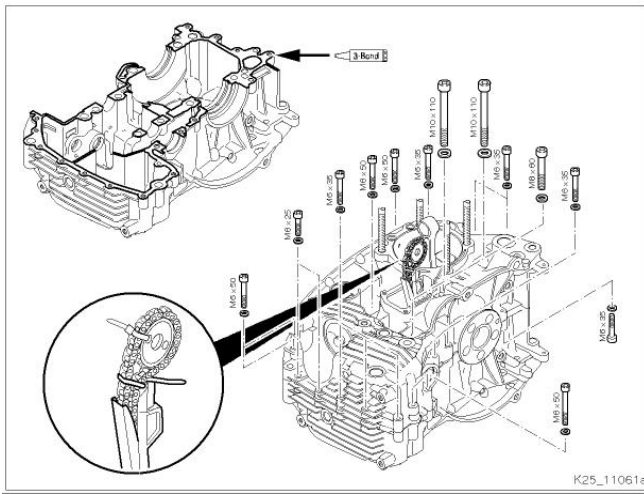
Nature: If the engine block is not kept straight during removal and installation, the bearing shells can be damaged.

Avoidance: Do not tilt the engine block when removing and installing.

- Remove left half of engine casing.


(-) Installing left half of engine casing

- Secure timing chain with rubber band to timing chain



tensioning and slide rail.

- Apply lubricant to the clean and grease-free sealing surfaces.


 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

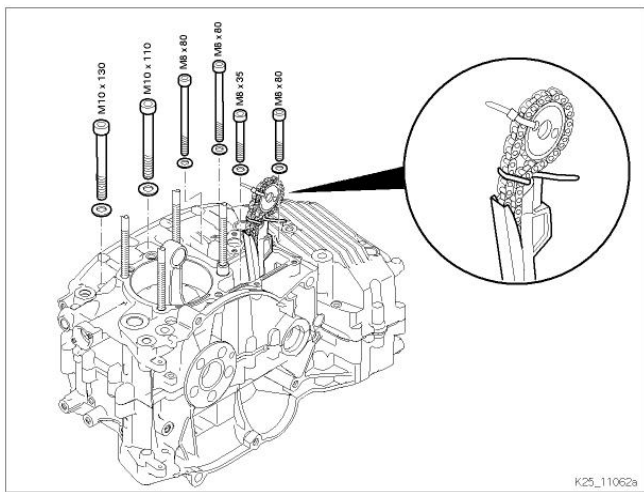
⚠ Attention

Nature: If the engine block is not kept straight during removal and installation, the bearing shells can be damaged.


Avoidance: Do not tilt the engine block when removing and installing.

- Place left half of engine casing in position.
- Install the screws on the left-hand side.

 Tightening torques		
Engine block, M6 x 35	8 Nm	
Engine block, M6 x 50	8 Nm	
Engine block, M6 x 25	8 Nm	
Engine block, M8 x 60, Bolted with sealing ring, A8 x 13 Al	19 Nm	
Engine block, M8 x 35	19 Nm	
Engine block, M10 x 110/130	Initial torque, 25 Nm	
	Final torque, 90°	



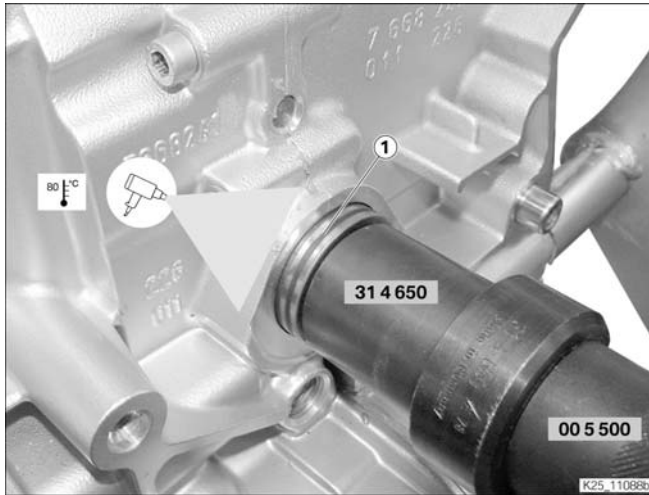
- Turn engine to side position.
- Install the screws on the right-hand side.

 Tightening torques		
Engine block, M6 x 35	8 Nm	
Engine block, M6 x 50	8 Nm	
Engine block, M6 x 25	8 Nm	
Engine block, M8 x 60, Bolted with sealing ring, A8 x 13 Al	19 Nm	
Engine block, M8 x 35	19 Nm	

Engine block, M10 x 110/130	Initial torque, 25 Nm	
	Final torque, 90 °	

(-) Installing counterbalance shaft on clutch side

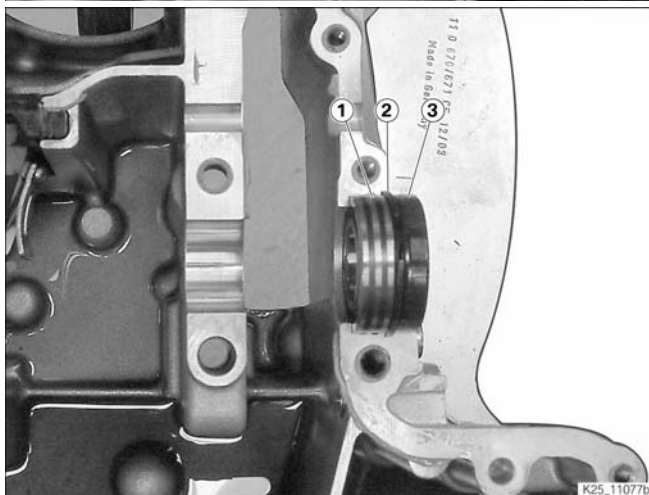
- Heat up engine casing in area of deep groove ball bearing.



<p>Technical data</p>			
Release/mating temperature		80 °C	

- Fit deep groove ball bearing (1) with handle (No. 00 5 500) and drift (No. 23 4 660) .

- Install circlip (2).

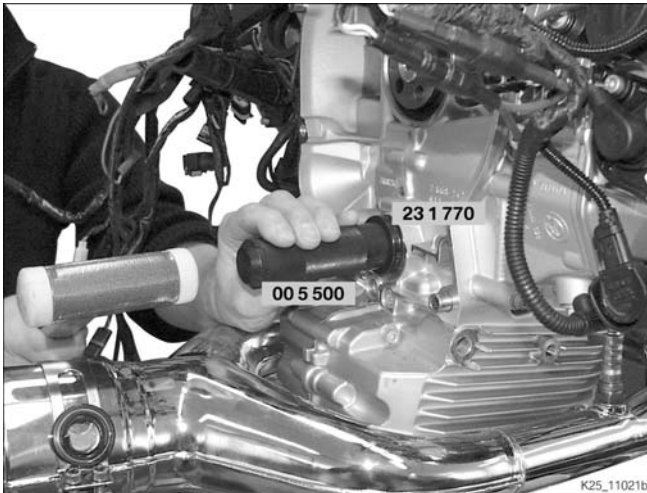


(-) Installing counterbalance shaft

- Install balancing shaft (1) from behind.



(-) Installing rotary shaft seal, counterbalance shaft



Attention

Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.

Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.

- Using handle (No. 00 5 500) and drift (No. 23 1 770) , drive the rotary shaft seal into the crankcase.

(-) Installing rotary shaft seal, crankshaft, output side



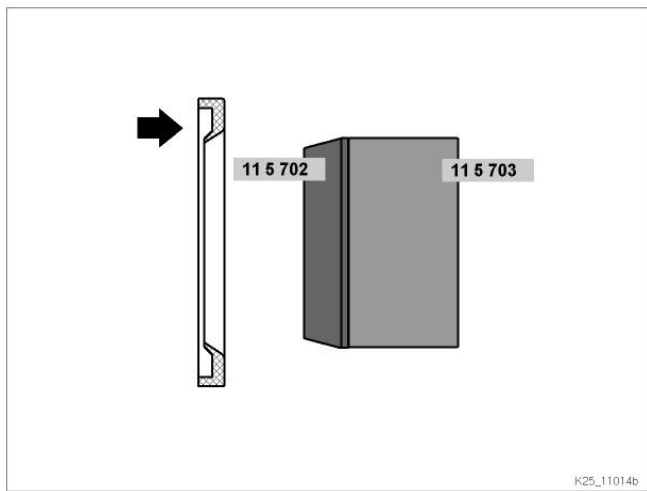
Attention

Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.

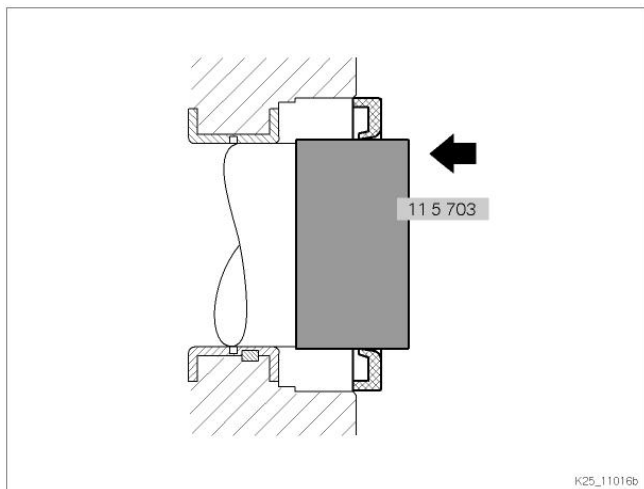
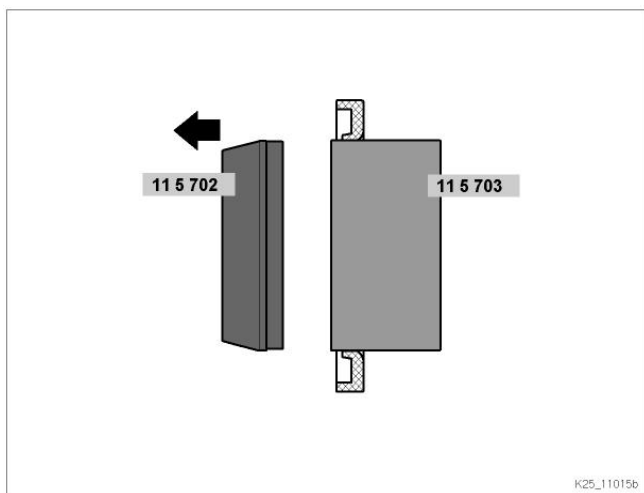
Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.

- Using sliding sleeve (No. 11 5 702) , slip the rotary shaft seal with the closed side toward the clutch onto sleeve (No. 11 5 703) .

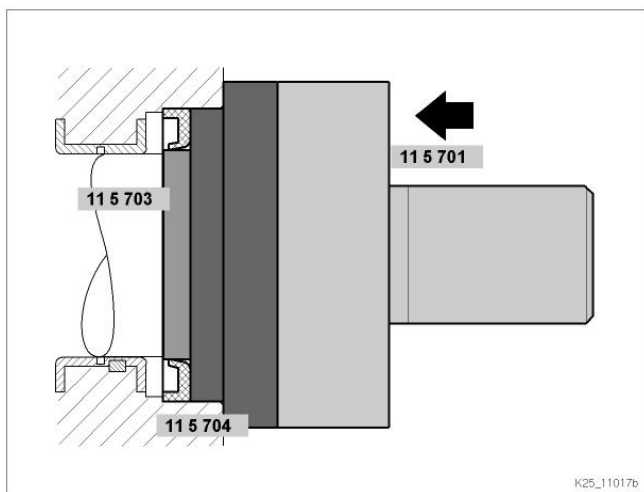
» The sealing lip of the rotary shaft seal is correctly preshaped.



- Remove sliding sleeve (No. 11 5 702) from sleeve (No. 11 5 703) .

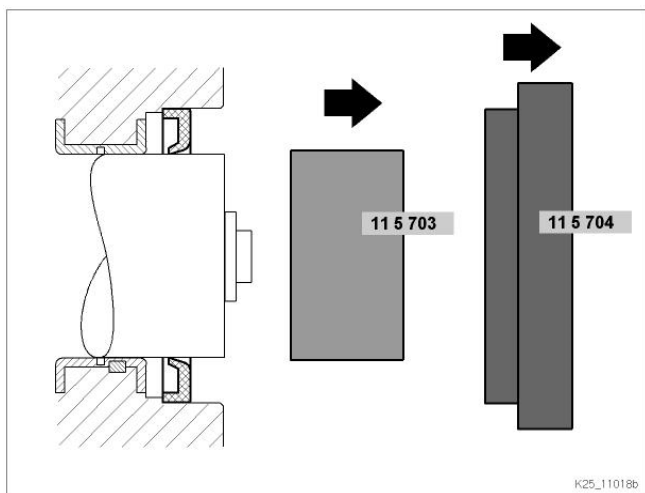


- Seat sleeve (No. 11 5 703) with the rotary shaft seal on the crankshaft.



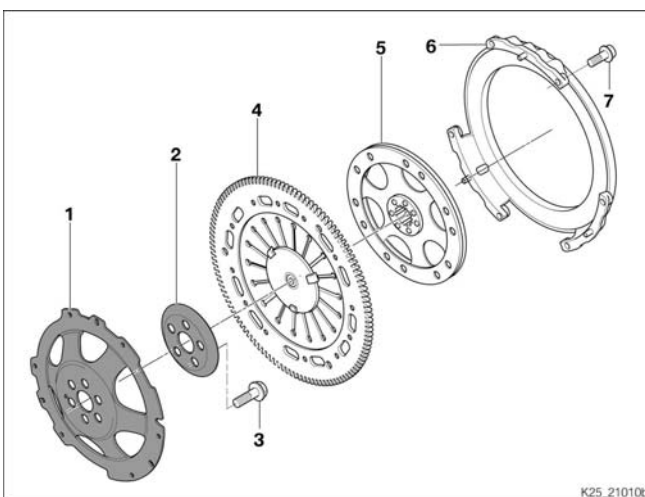
- Seat ring (No. 11 5 704) and drift (No. 11 5 701) on sleeve (No. 11 5 703) and uniformly drive the rotary shaft seal into the crankcase until the special tool comes into contact with the crankcase.
- Remove drift (No. 11 5 701) .

- Remove ring (No. 11 5 704) and sleeve (No. 11 5 703) from the crankshaft.

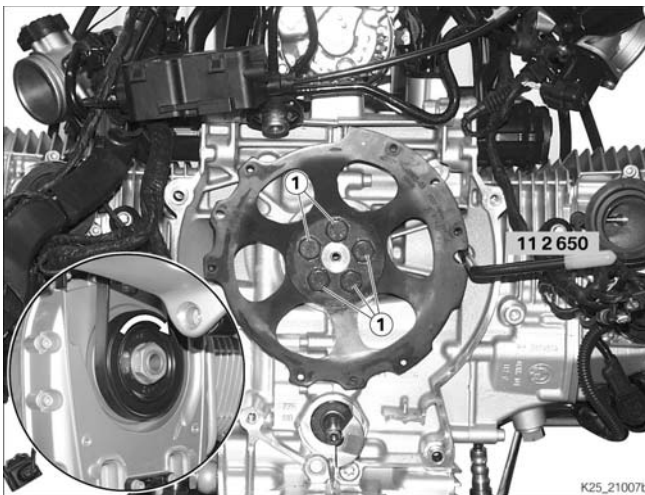



(-) Installing clutch housing

- Install clutch housing (1) with the locating lug engaged in the locating bore of the crankshaft.
- Install reinforcing plate (2) and install screws (3) to hold it in position.



- By means of the clutch housing, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .
- Install new screws (1) and tighten in correct tightening sequence.

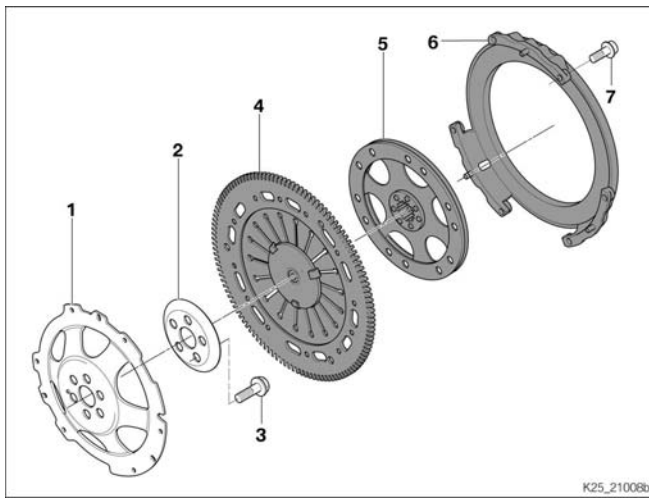


 Tightening torques		
Never re-use the original screws, M11 x 1.5 12.9	Threads and underside of head lightly oiled	
	Initial torque, 40 Nm	
	Final torque, 40 °	

- Remove TDC locating pin (No. 11 2 650) .

(-) Installing clutch

- Install the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6) in clutch




housing (1).



Note

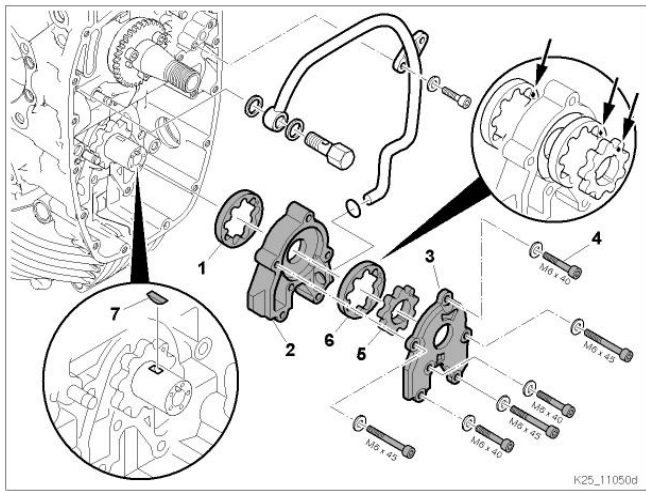
The clutch components are all precision-balanced. It is not necessary to check for identification marks when assembling.

- Insert screws (7).
- Use centering pin for clutch (No. 21 2 673) to centre the clutch plate.
- Insert engine locking device (No. 11 5 640) .
- Install screws (7) and tighten in correct tightening sequence.


 Tightening torques		
Never re-use the original screws, M6 x 20, in diagonally opposite sequence and stage by stage	12 Nm	

- Remove engine locking device (No. 11 5 640) and centering pin for clutch (No. 21 2 673) .

(-) Installing oil pump

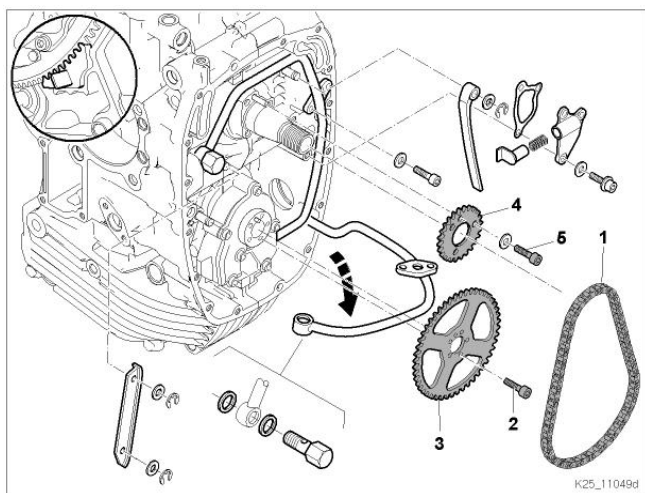


- Ensure Woodruff key (7) is seated correctly.
- Install outer rotor for lube oil (1) in the oil pump housing with the mark (arrow) facing forward. Take care not to mix up the outer rotors.
- Hold oil pump housing (2) in position.
- Install outer rotor for cooling oil (6) with the mark (arrow) facing forward.
- Install inner rotor for cooling oil (5). Make sure that the groove in the inner rotor is in line with Woodruff key (7) of the countershaft and that the mark (arrow) is pointing forward.
- Install new screws (4), noting the different lengths of the screws.

 Tightening torques		
Never re-use the original screws, M6 x 40	Initial torque, 4 Nm	
	Final torque, 90 °	
Never re-use the original screws, M6 x 45	Initial torque, 4 Nm	
	Final torque, 90 °	


(-) Installing timing-chain pinion on crankshaft

- Install timing chain pinion (4), making sure that the



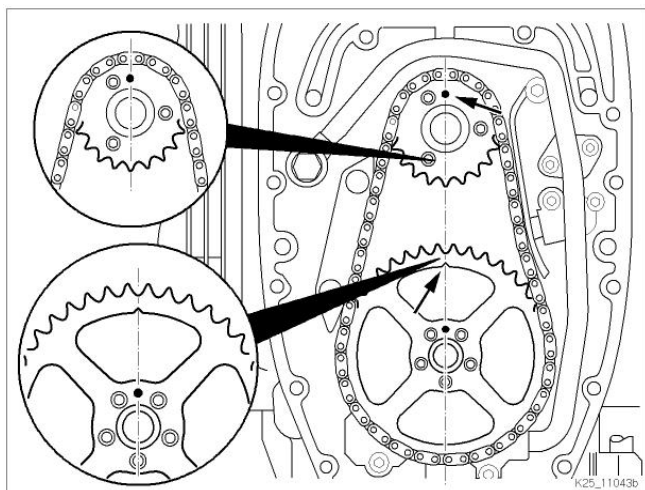
locating pin for the crankshaft engages the hole in the timing chain pinion.

- Install screws (5).

 Tightening torques		
Chain sprocket to crankshaft, M6 x 16	8 Nm	

(-) Adjusting crankshaft and auxiliary shaft to ignition TDC

- Make sure that the crankshaft and countershaft are in the **"firing TDC, right cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



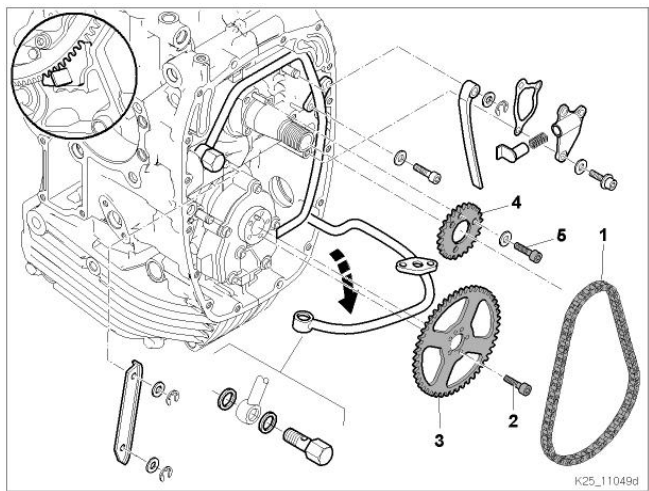
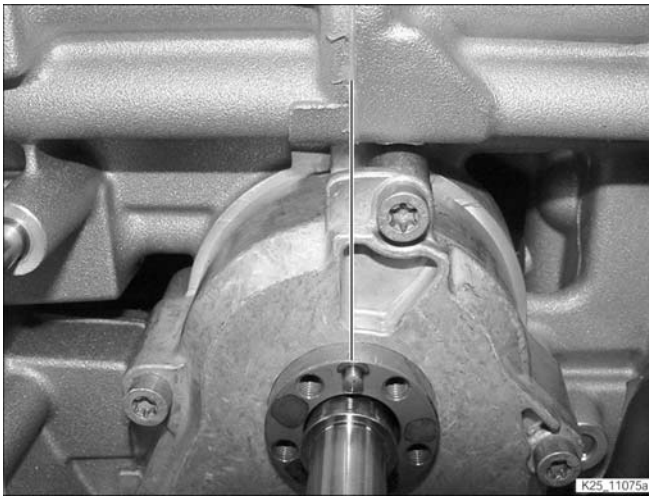
(-) Installing timing chain, crankshaft/auxiliary shaft

Precondition

- The countershaft is at firing TDC for right-hand cylinder, the locating pin of the countershaft is at the top, at the split line between the two halves of the crankcase.



- If necessary, turn the countershaft to firing TDC for the right-hand cylinder, so that the locating pin of the countershaft is at the top, at the split line between the two halves of the crankcase.




! Attention

Nature: Installing the timing chain in the wrong position will result in poor engine performance or cause parts to collide because the valve timing is off

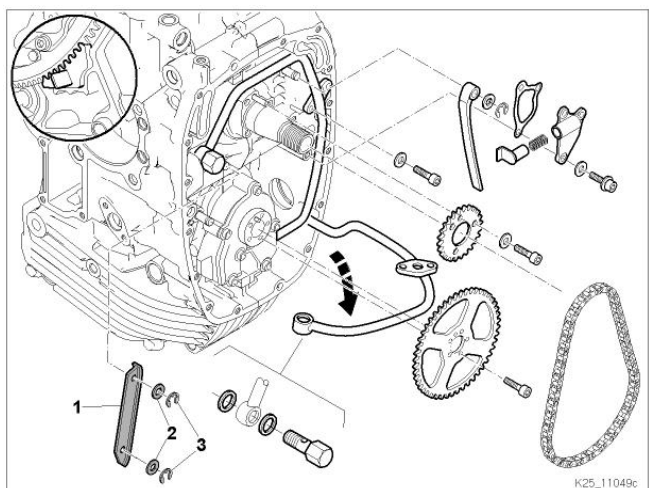
Avoidance: When turning the crankshaft, make sure that the timing chain does not come away from the crankshaft pinion (keep the timing chain taut).

- Install timing chain (1) with countershaft sprocket (3), making sure that the locating pin for the countershaft engages the hole in the countershaft sprocket.
- Install new screws (2).

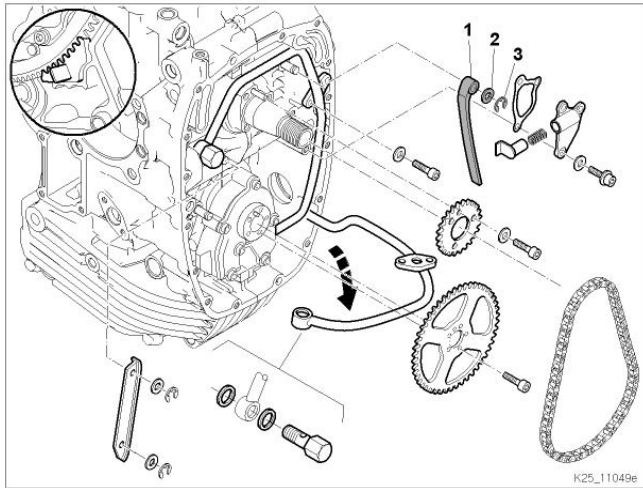
 Tightening torques	
Sprocket to auxiliary shaft, M5 x 16, Replace screws	8 Nm

(-) Installing timing chain guide rail, crankshaft/auxiliary shaft

- Install timing-chain guide rail (1).
- Install spacers (2) and retaining washers (3).



(-) Installing timing chain tensioner rail,

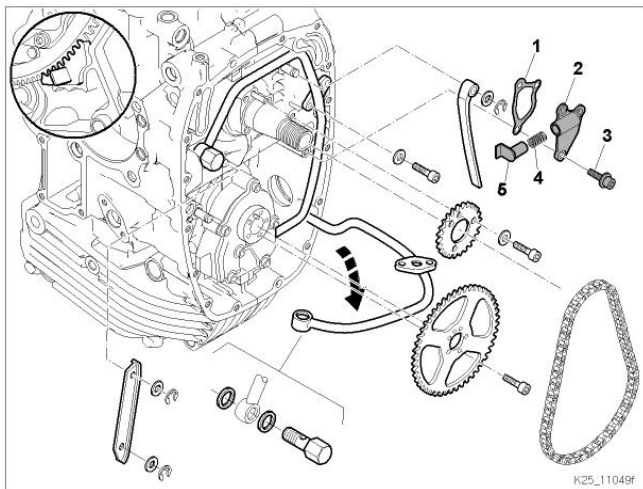



crankshaft/auxiliary shaft

- install timing-chain tensioning rail (1).
- Install spacer (2) and retaining washer (3).

(-) Installing timing chain tensioner, crankshaft/auxiliary shaft

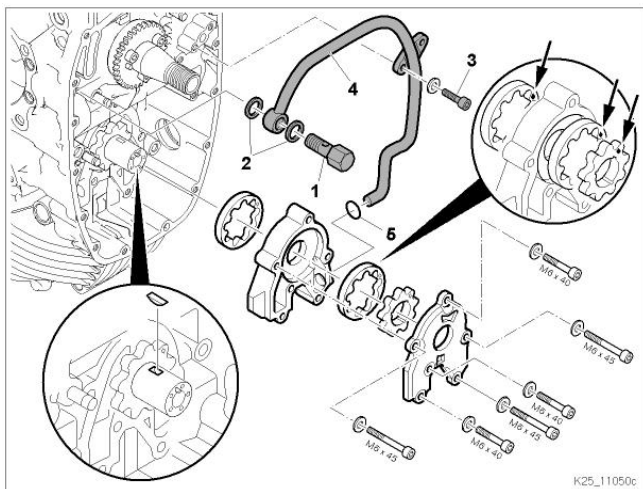
- Check gasket (1) for damage; replace if necessary.
- Install seal (1).
- Place housing (2) in position together with spring (4) and piston (5), making sure that the piston is angled toward the rear.
- Install screws (3).




 Tightening torques		
Housing for chain tensioner to crankcase, M6 x 25	8 Nm	


(-) Installing cooling oil line

- Install new O-ring (5).
- Install cooling oil line (4) and pivot it up.
- Install screws (3).



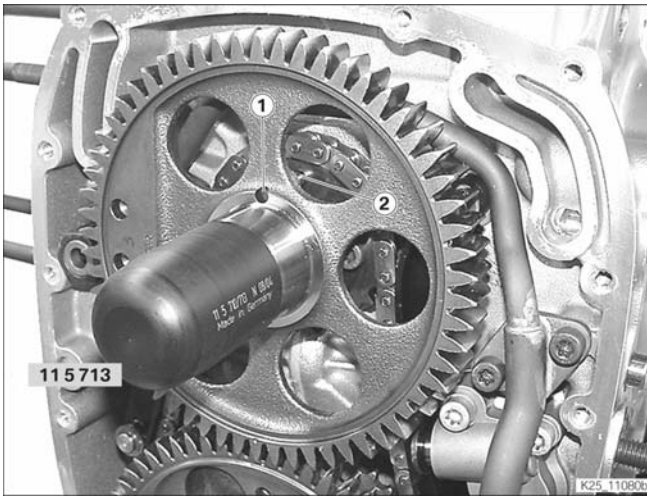
 Tightening torques		
Cooling oil line (inside engine) to crankcase, left, M6 x 16	8 Nm	

- Install banjo bolt (1) with new sealing rings (2).

 Tightening torques		
Banjo bolt, M14 x 4.5	25 Nm	

(-) Installing counterbalance shaft drive gear

- Clean inner taper of counterbalance drive gear and outer taper of crankshaft, **both must be free of oil**



and grease.

- Install the drive gear for the balancing shaft, making sure that straight pin (2) of the crankshaft engages hole (1) in the drive gear.
- Install a suitable tool for holding the drive gear and preventing it from turning.

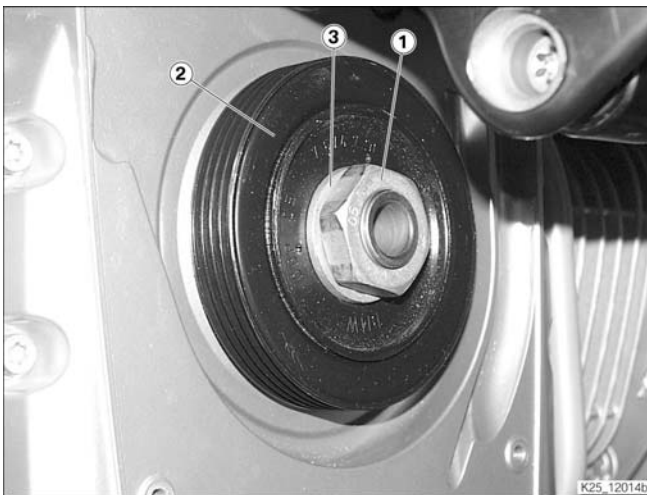
► **Installing crankshaft belt pulley**


Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.



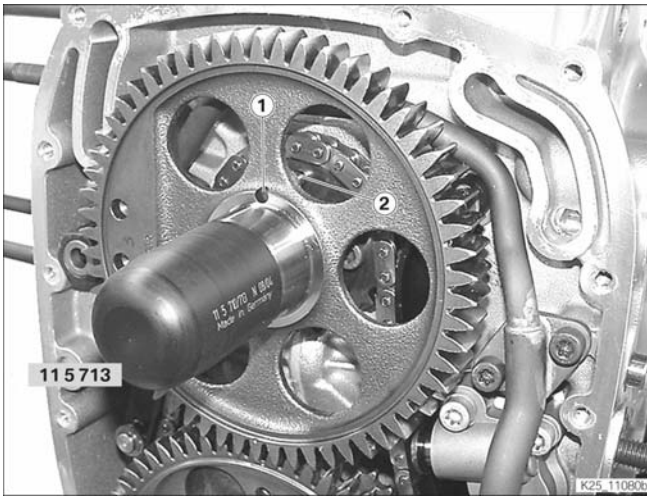
 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	



- Remove TDC locating pin (No. 11 2 650) .



- Remove the tool for holding the drive gear and preventing it from turning.



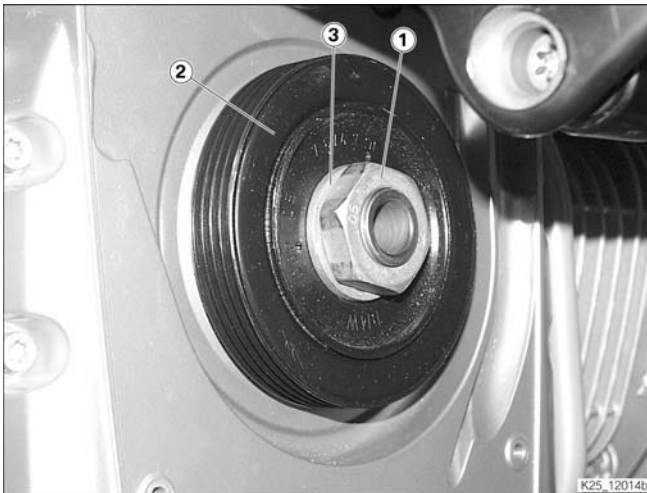
► **Removing crankshaft belt pulley**

Precondition

- Engine locked.

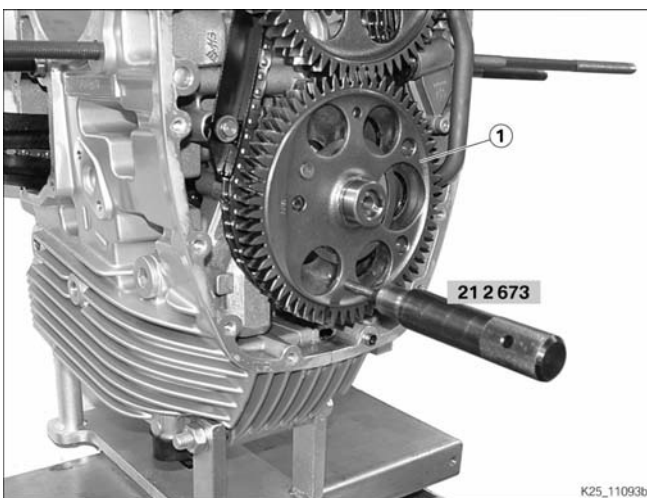


- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

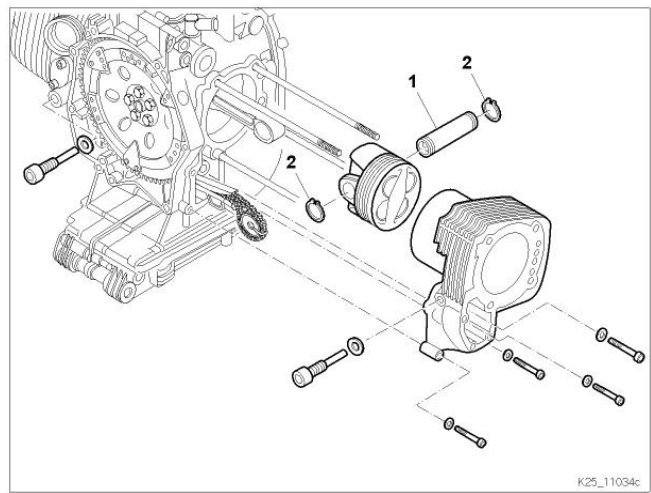
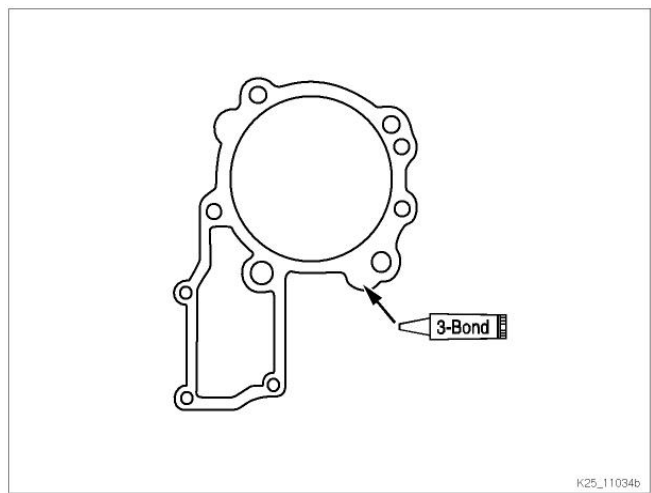
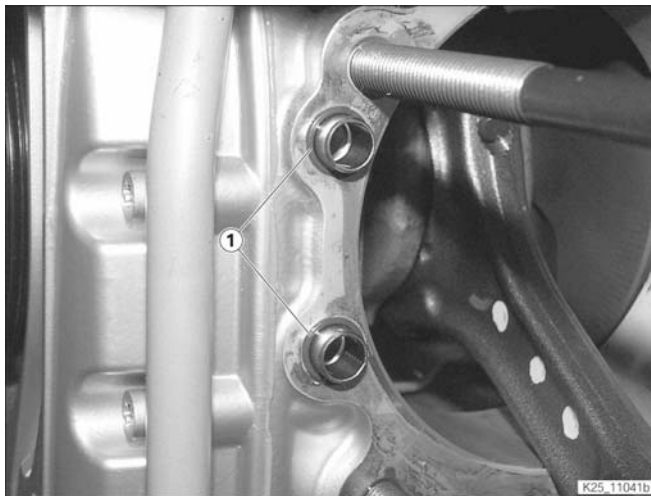


(-) Installing tensioning wheel

- Install tensioning gear (1), if necessary noting the feather key in the balancing shaft.
- Remove clutch centring pin (No. 21 2 673) .



(-) Installing right cylinder




Precondition

- Crankshaft is locked at TDC.




- Slip new O-rings (1) over the reamed sleeves and into the crankcase.

- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.

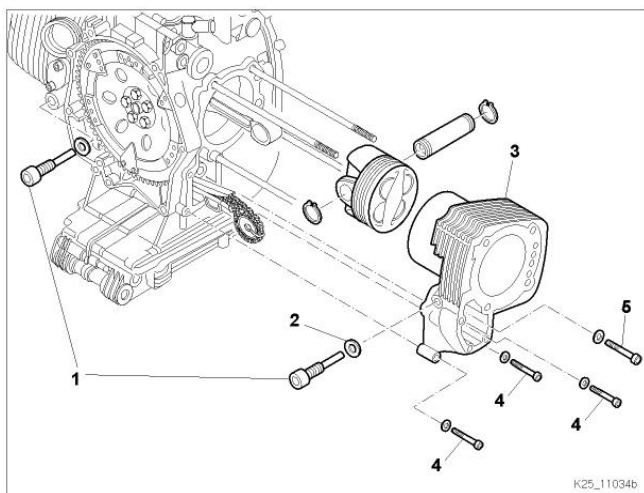
 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain



cavity, take care not to drop parts into the engine.

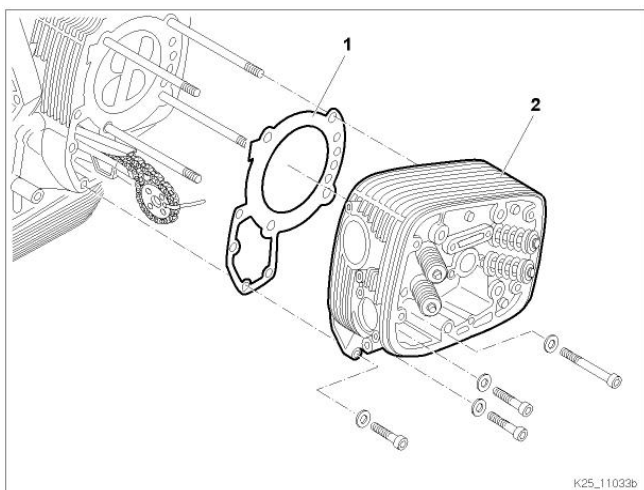
Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



⚠ Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

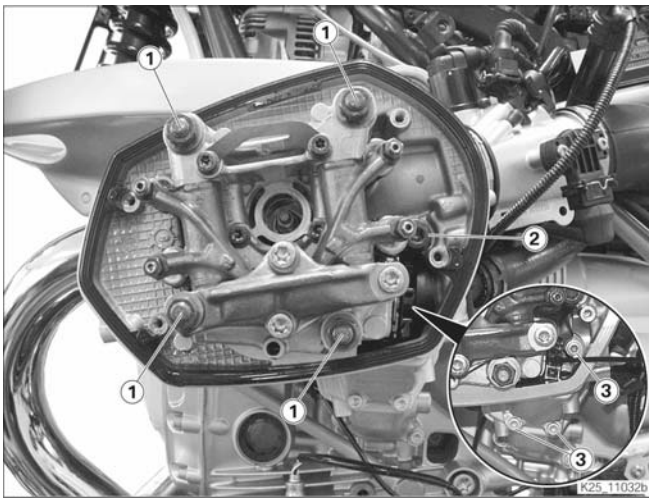
- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

⚠ Attention


Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mils at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.



Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

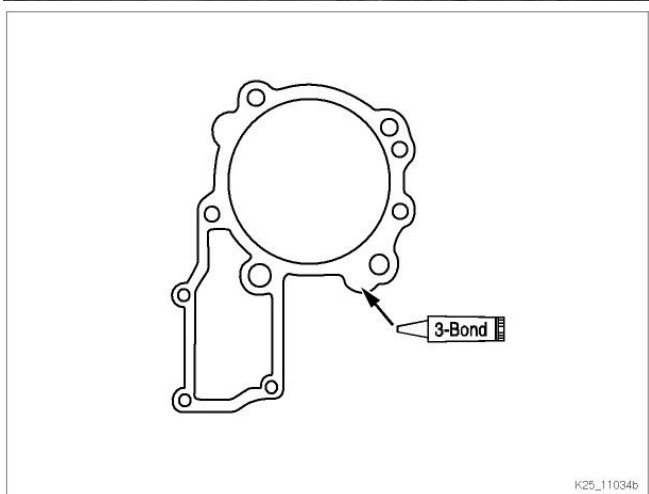
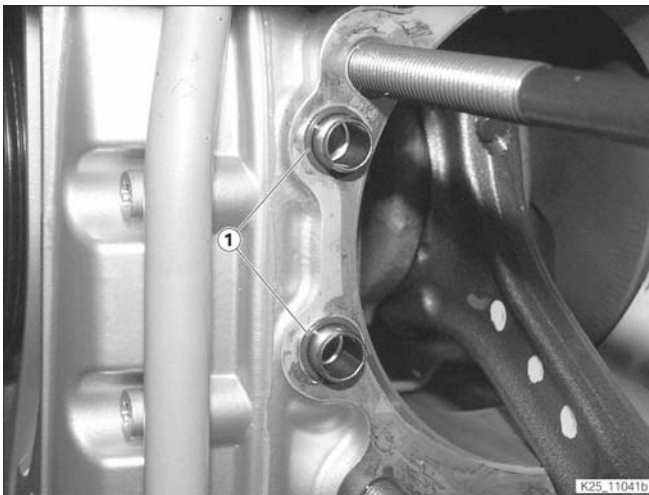
(-) Installing left cylinder

Precondition


- Crankshaft is locked at TDC.

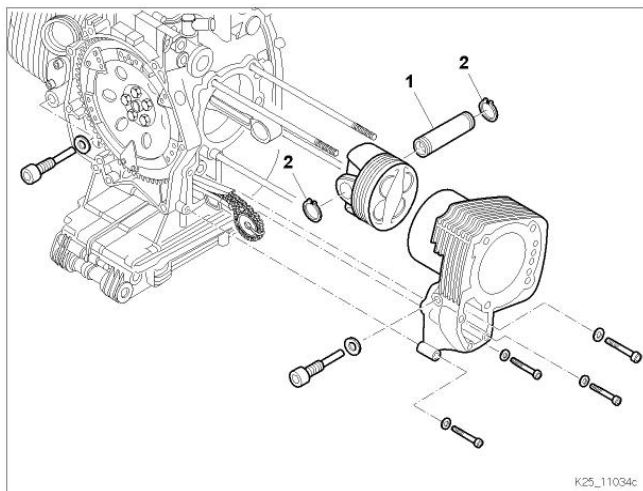


- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376



- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.



Consumables/lubricants

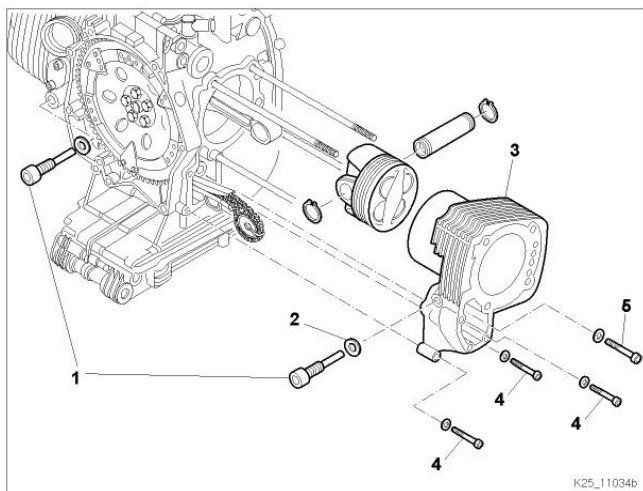
Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing left cylinder head

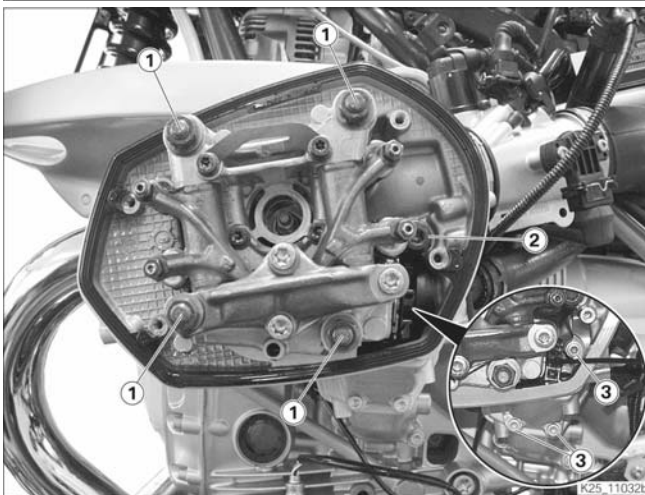
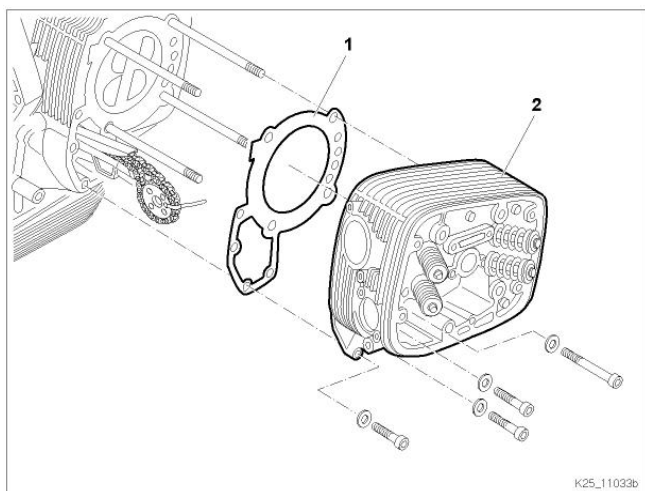
- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed



(firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

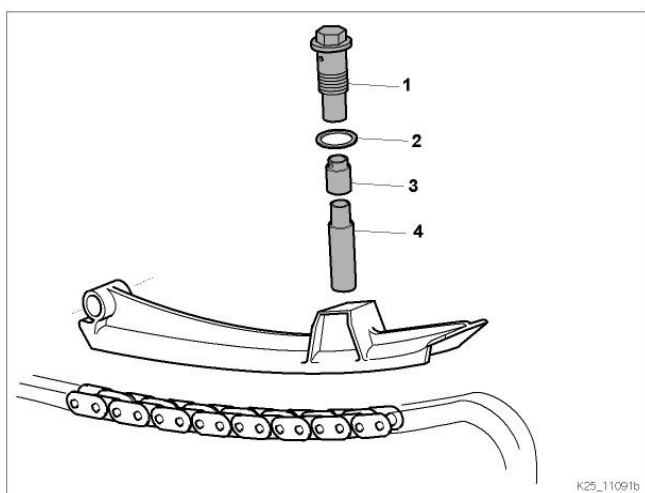
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Installing left timing chain tensioner


- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore up in the chain tensioner.
- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.

>>



The chain tensioner must slide onto the piston without tilting.

- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	

(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and that the screw is tightened hand-tight.



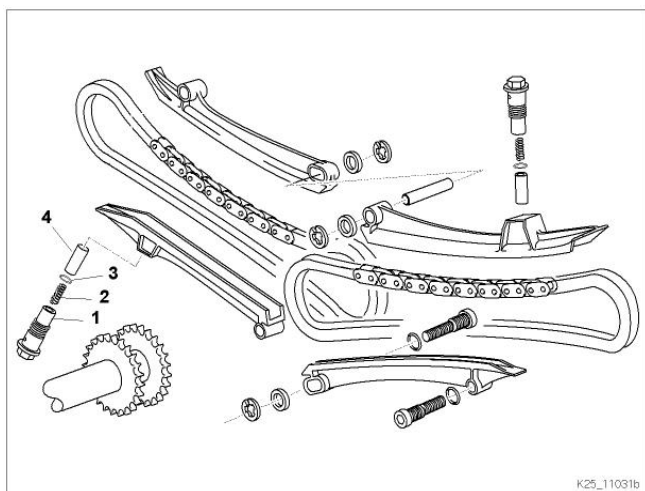
▶ Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.




- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.



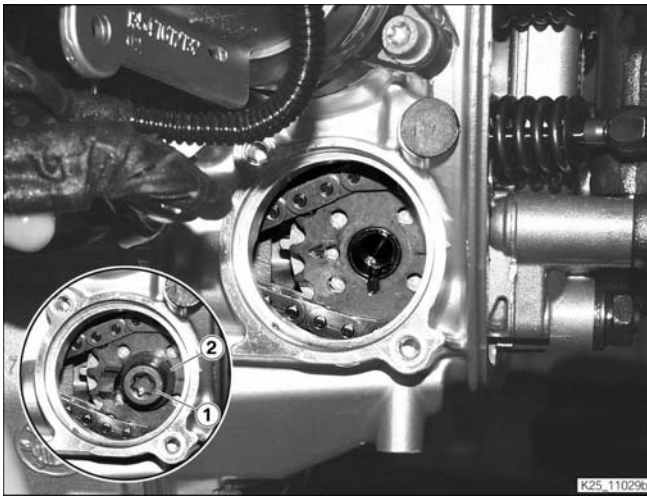
 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



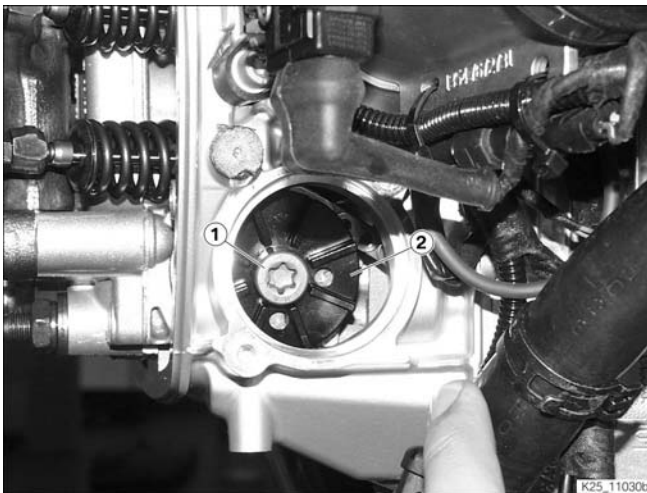
(-) Securing left camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).



Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

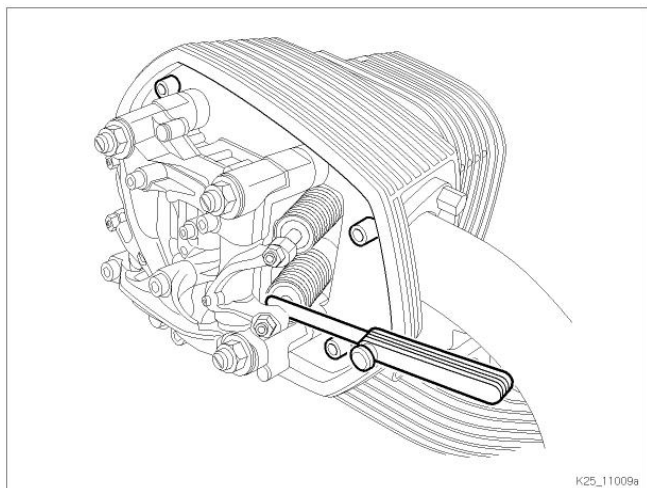
Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	

Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	
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Result: Valve clearance is out of tolerance.

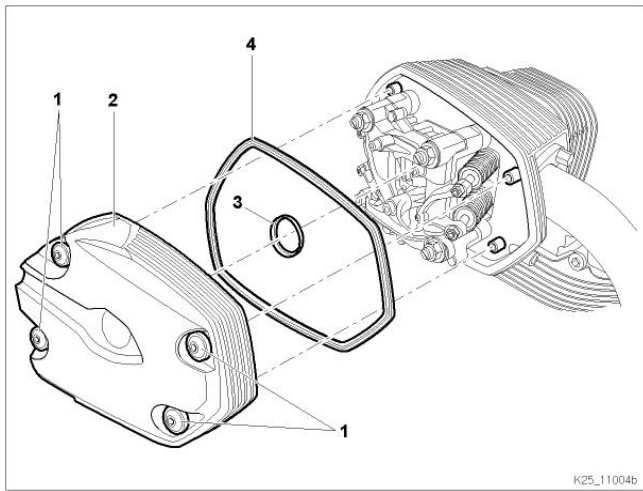
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.


 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

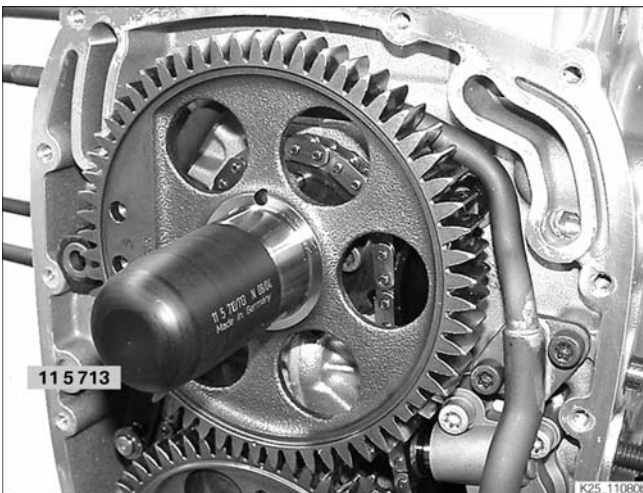
(-) Installing cylinder head covers



- Gaskets must be free from oil and grease, replace if damaged.
- Fit gaskets (3) on cylinder head covers.
- Fit gaskets (4) on cylinder heads.
- Install the cylinder head covers, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

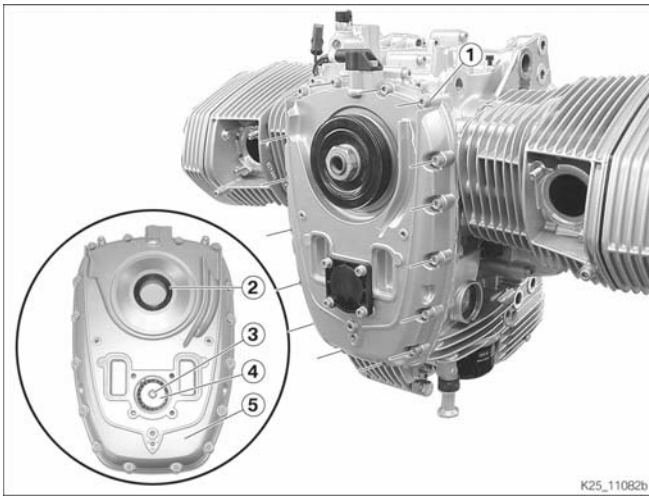
 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing timing case cover




- Install sliding sleeve (No. 11 5 713) .

- Make sure the sealing surface of the timing case cover is clean and free of grease and run a uniform bead of




sealant round the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

► **Securing crankshaft inductive sensor in timing case cover**

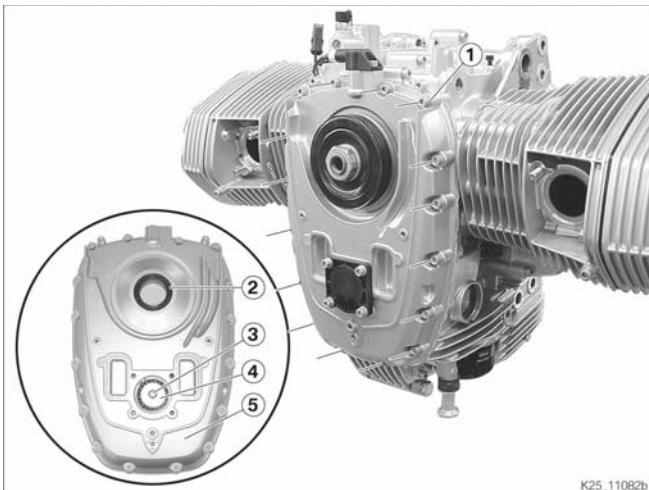
- Position inductive sensor for crankshaft (2) on the timing case cover and install the screw.




 Tightening torques		
Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	




- Place timing case cover (5) in position.
- Install screws (1).



 Tightening torques		
Timing case cover to crankcase, M6	8 Nm	


- Remove sliding sleeve (No. 11 5 713).
- Install screw (3) and washer (4).

 Tightening torques		
Gear wheel to balancing shaft, M8 x 50	19 Nm	

(-) Installing counter balance shaft cover

- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).

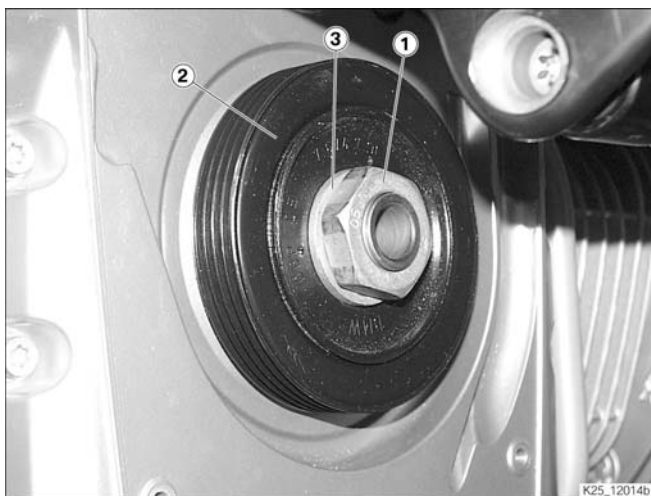


 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	


(-) Installing crankshaft belt pulley

Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

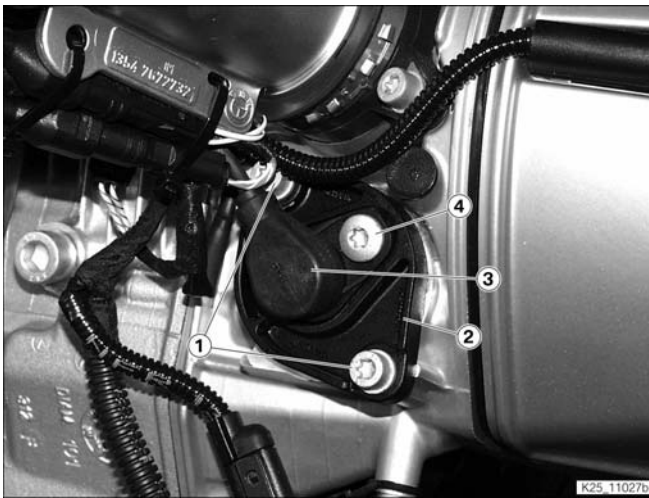
 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	



- Remove TDC locating pin (No. 11 2 650) .

(-) Installing right camshaft cover

 **Attention**



Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

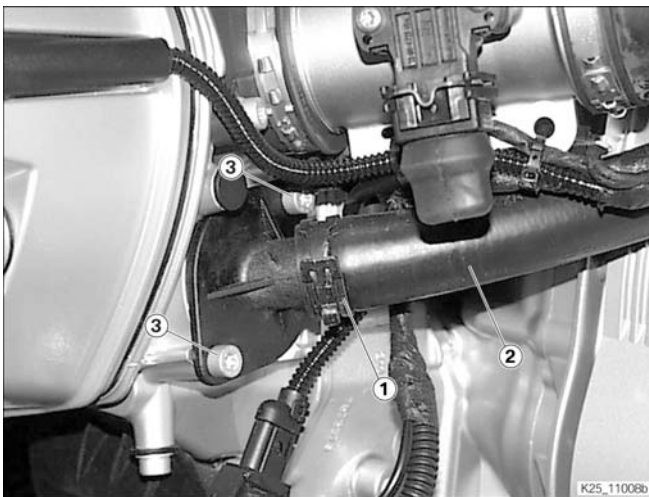
(-) Installing left camshaft cover



Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.



- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

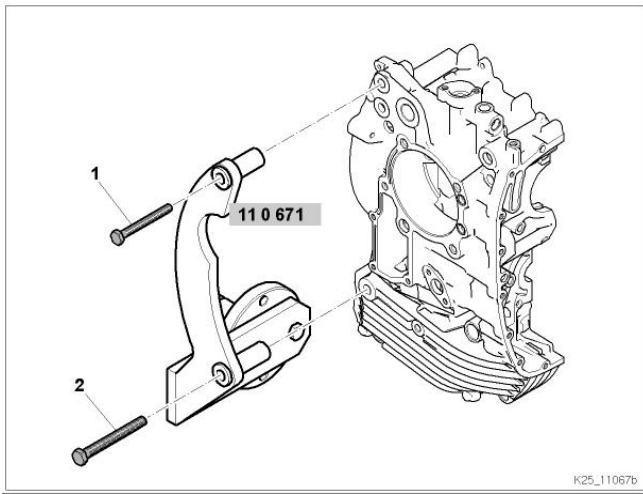
► Connecting hose for crankcase breather

- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



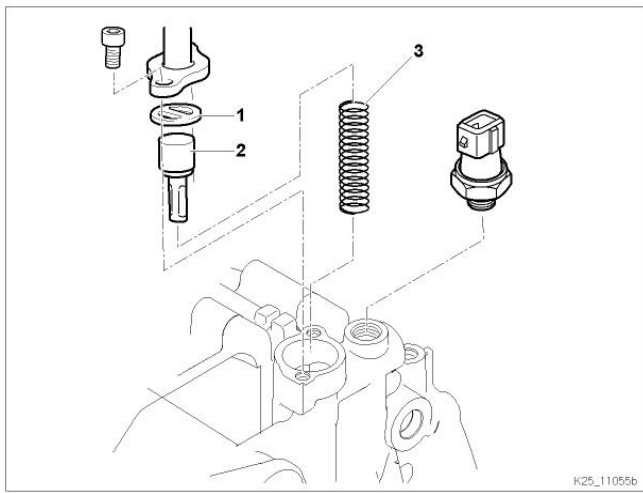
(-) Removing engine holder from right half of engine block

- Remove screws (1) and (2).
- Remove engine holder (No. 11 0 671) .



(-) Installing oil thermostat

- Install spring (3), control element (2), and supporting plate (1).



 **11 24 056 Replacing all conrod bearings**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

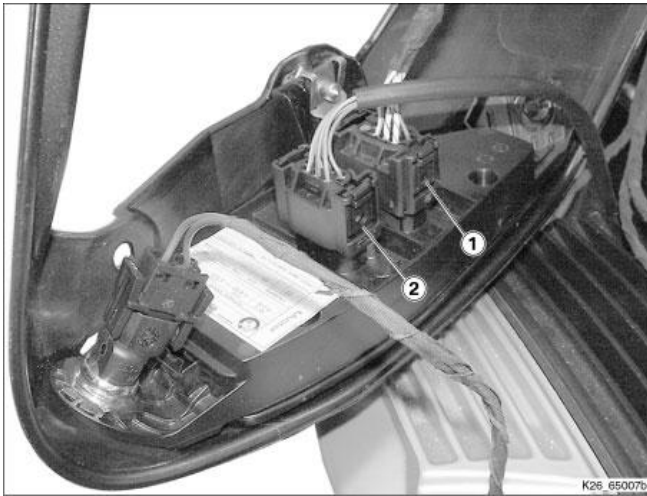


- Disconnect plug (1) from socket.

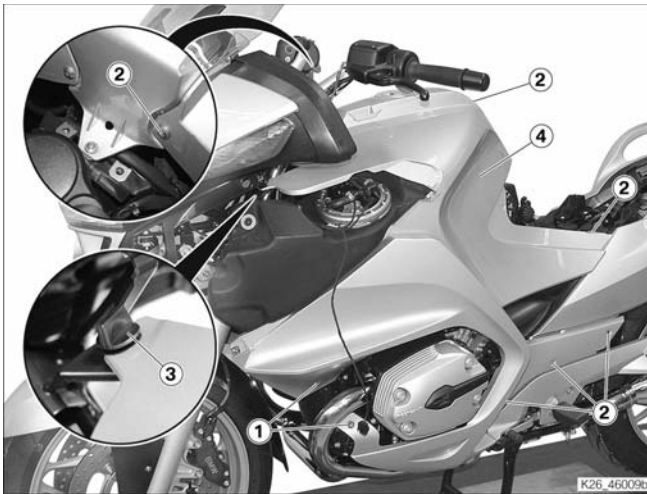


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

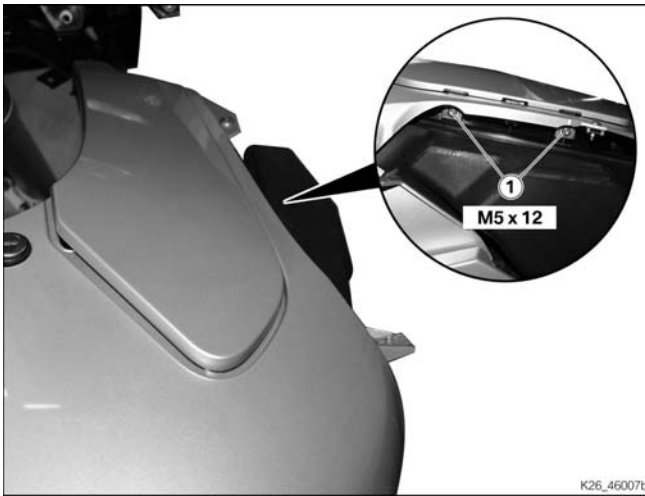
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



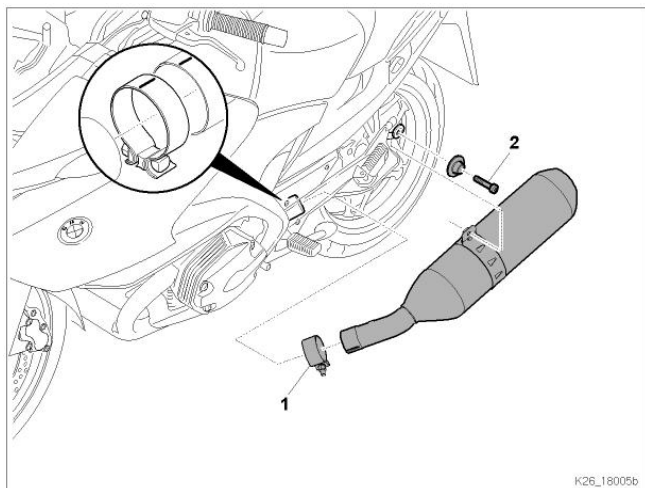
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

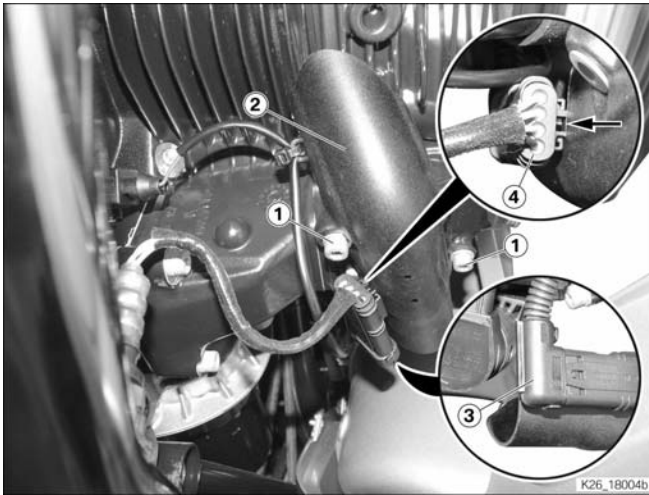
- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



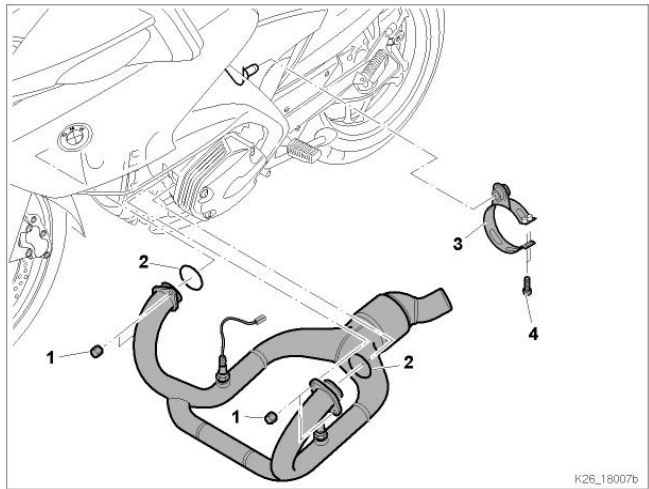
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.

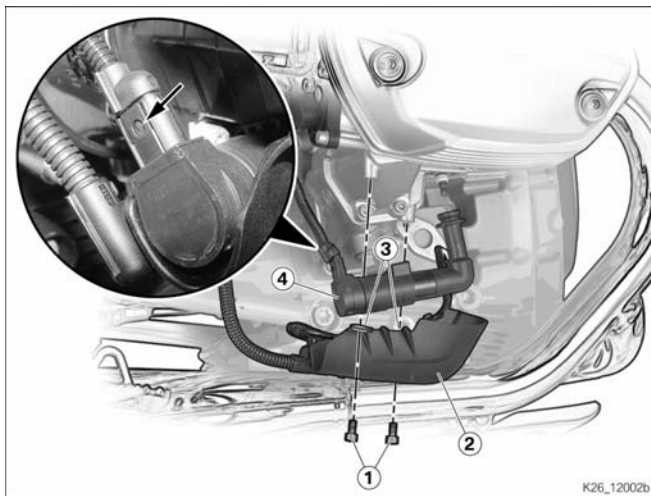
(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



- Slacken screws (1) and remove cover (2) with sleeves (3).



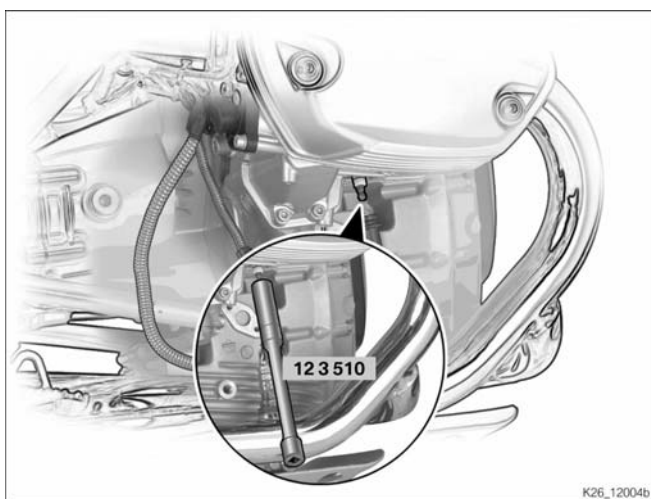
! Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug



- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.

(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

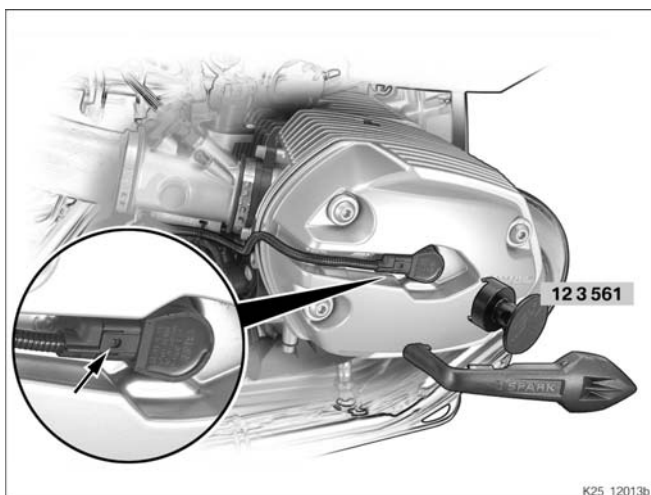


- Remove the primary spark plug cover.

! Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

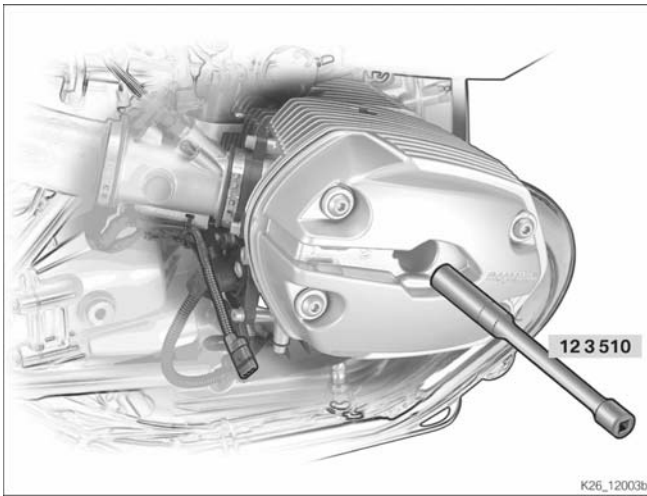
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

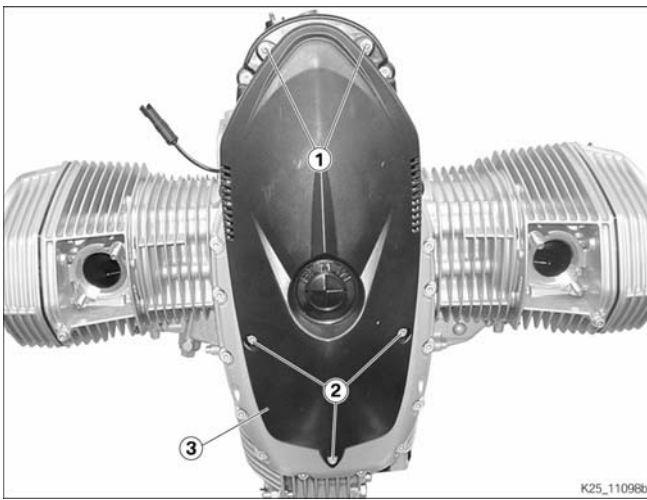
(-) Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the



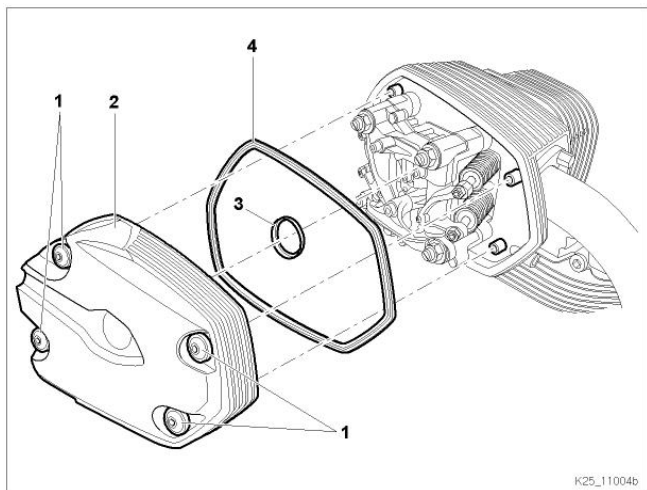
primary spark plug.

(-) Removing belt guard



- Remove screws (1) and (2).
- Remove belt guard (3).

(-) Removing cylinder head cover



- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

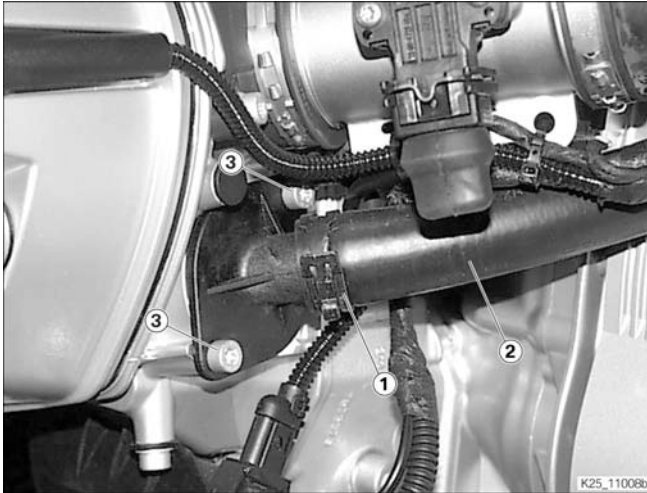
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

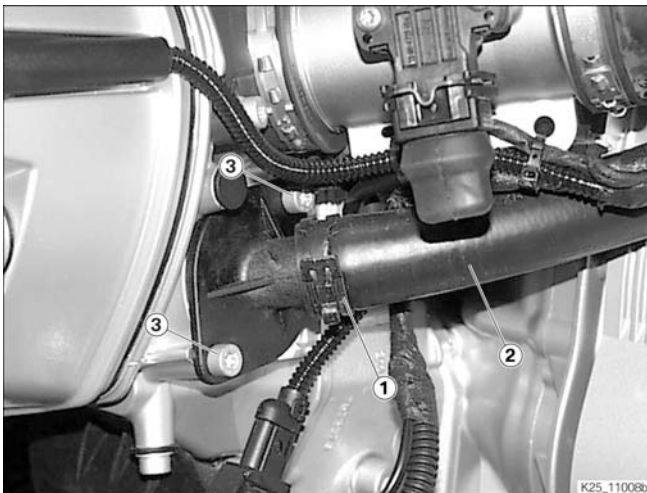
(-) Removing left camshaft cover

► Disconnecting hose for crankcase breather

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.

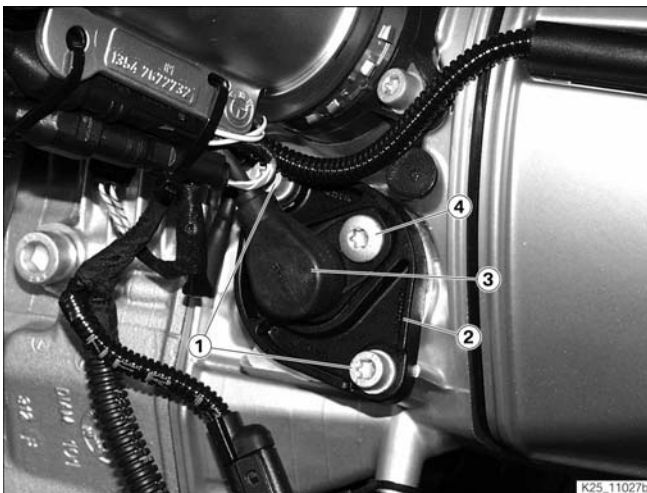


- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



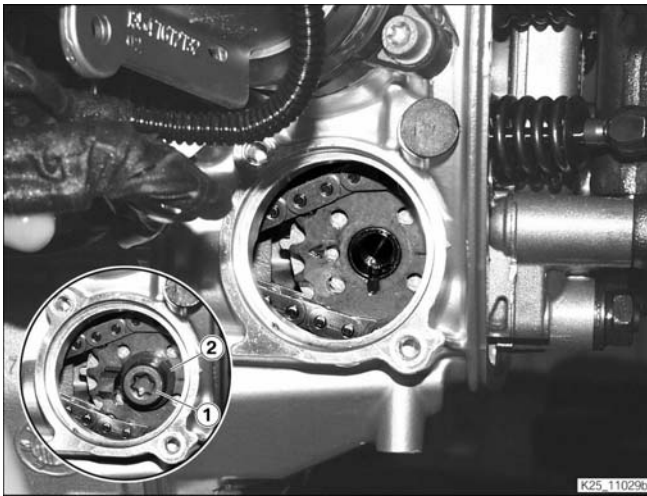
(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is



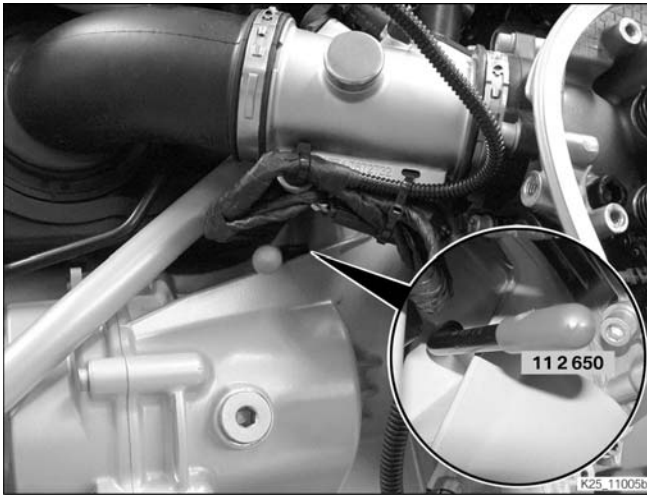
at firing TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.



- Insert locating pin (No. 11 2 650) to lock the engine in position.

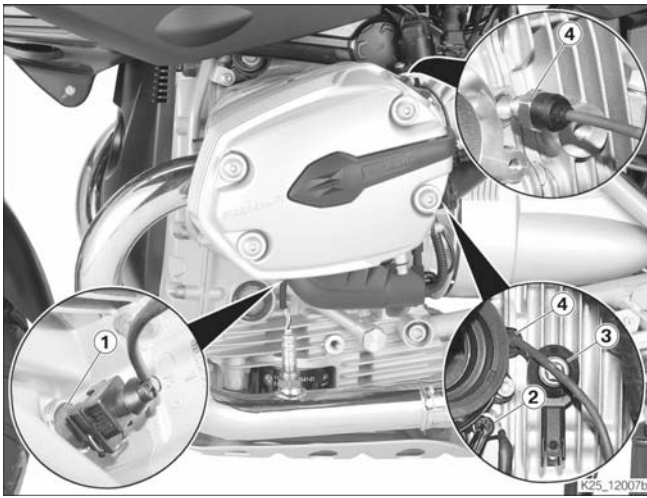


(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).

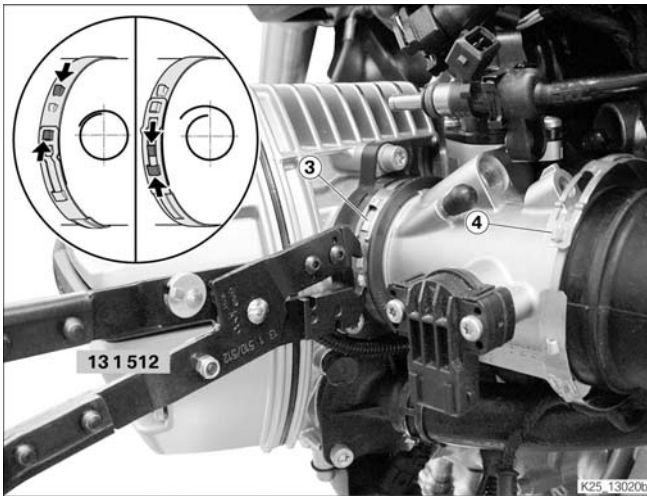
(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).



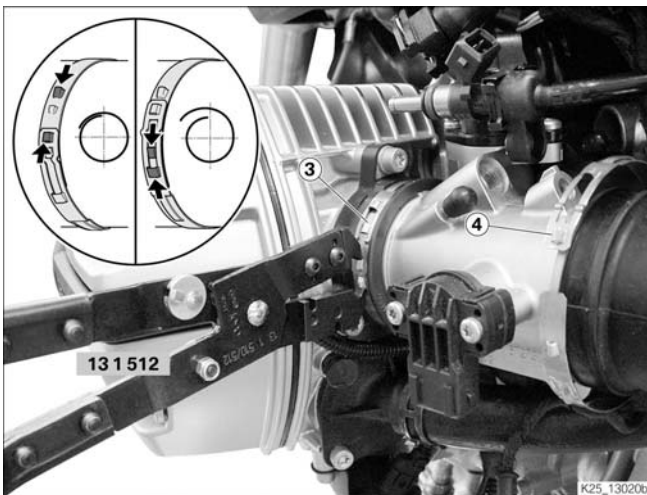
(-) Disconnecting intake air pipes from throttle-valve stubs

- Open clips (4) on left and right with pliers (No. 13 1 512) .

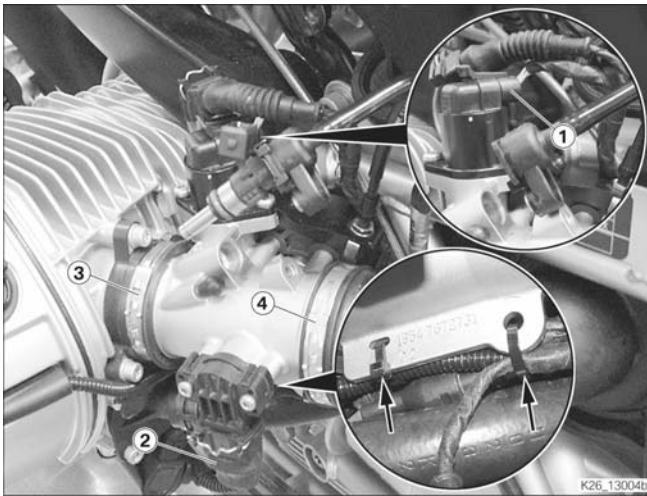


(-) Disconnecting both throttle-valve stubs

- Open hose clips (3) at right and left throttle valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrow) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Pull off the throttle-valve stub on the right and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and



- foreign matter from dropping into the engine.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the throttle-valve stub on the left and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

(-) Removing trigger for camshaft sensor

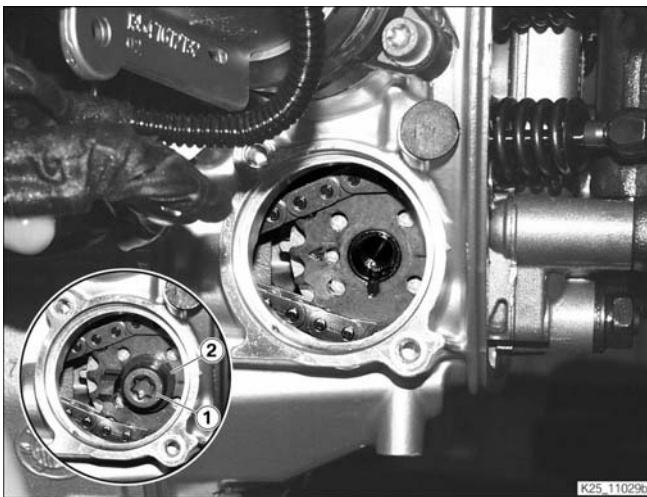
- Slacken screw (1).



Note

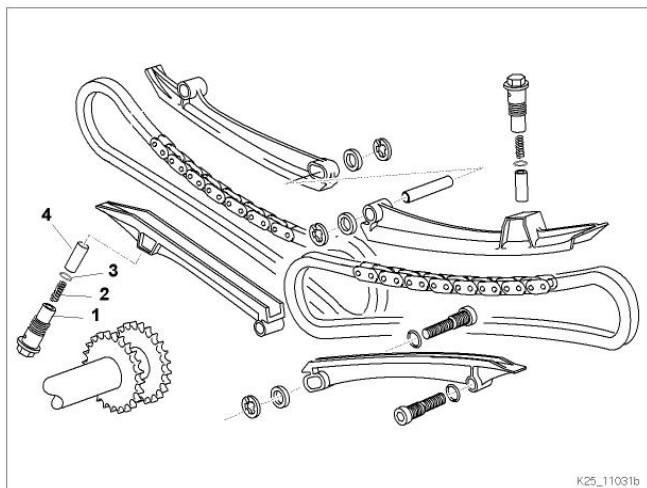
The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with trigger for camshaft sensor (2).



(-) Removing right chain tensioner

- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.



(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

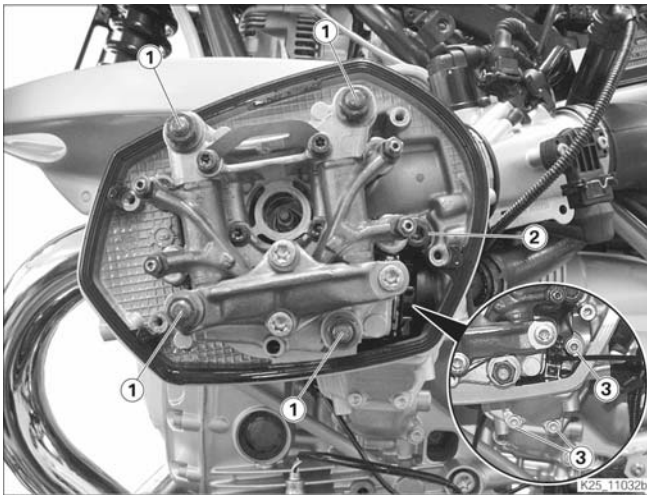
When the engine is being reassembled, it is easier to set

the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).

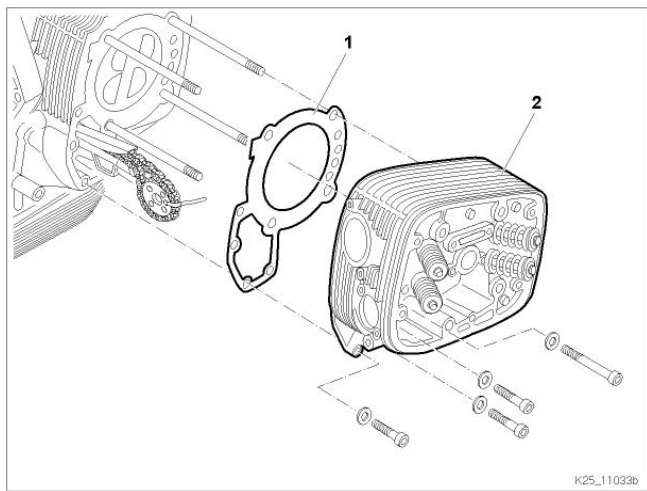


Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing right cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

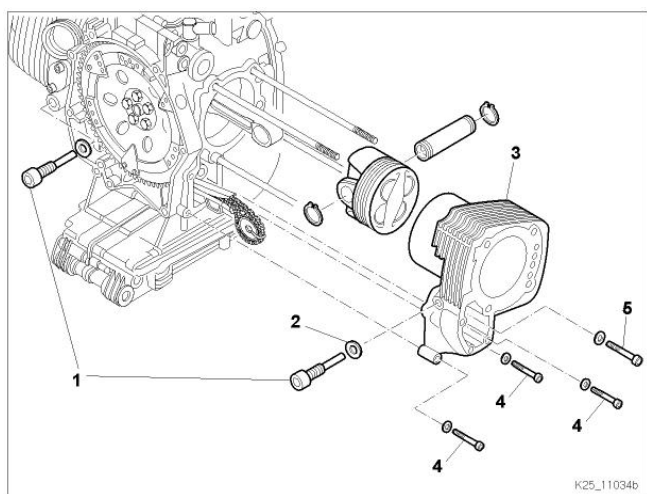
When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care



when laying down the assembly.

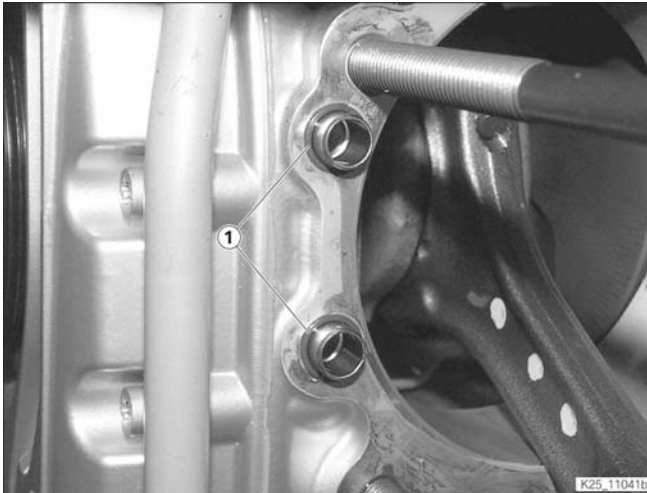
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Removing breather plate

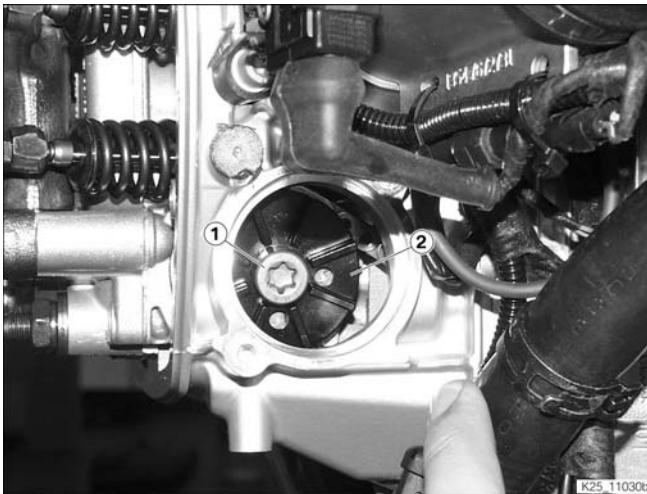
- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).



(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and

install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



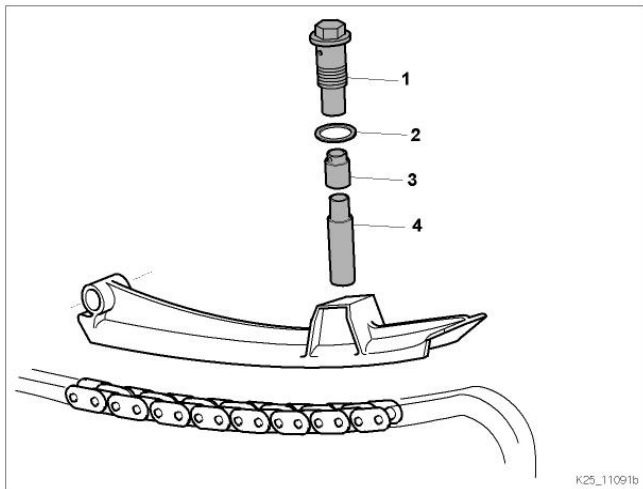
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



(-) Removing left cylinder head

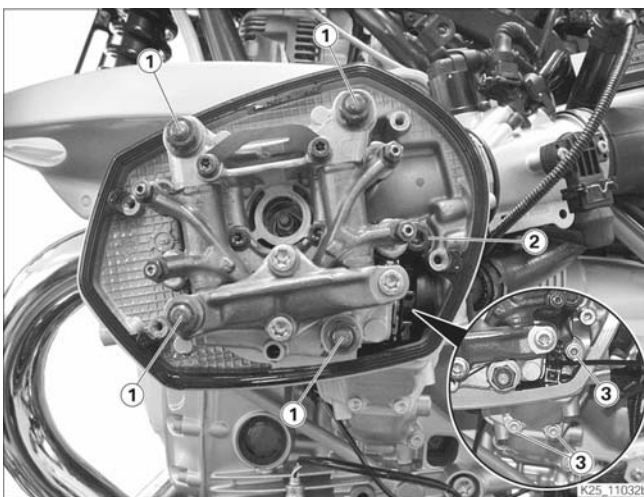
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



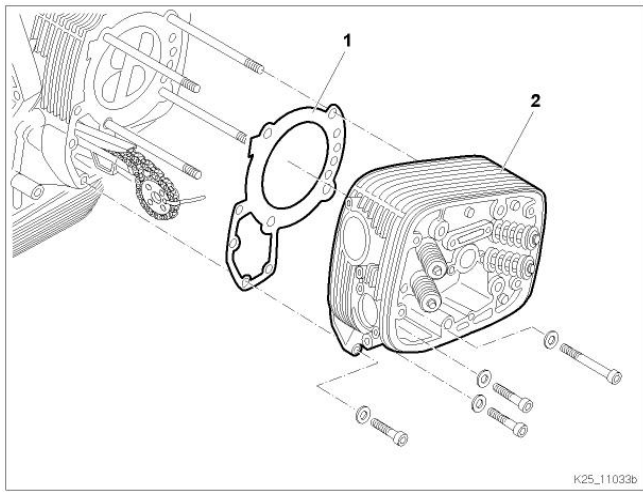
Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



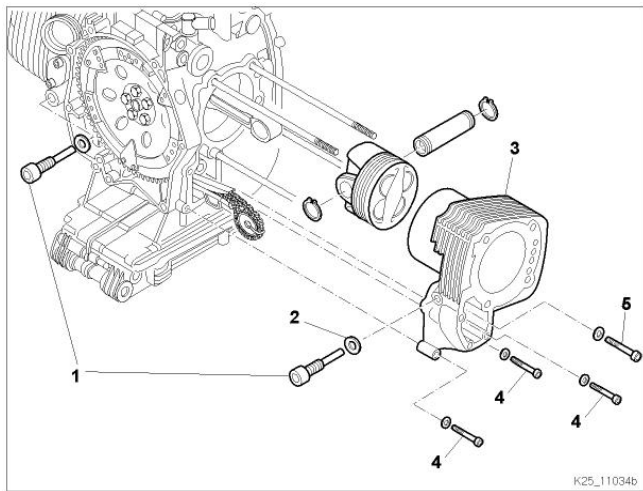
- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



K25_11033b

(-) Removing left cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



K25_11034b



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

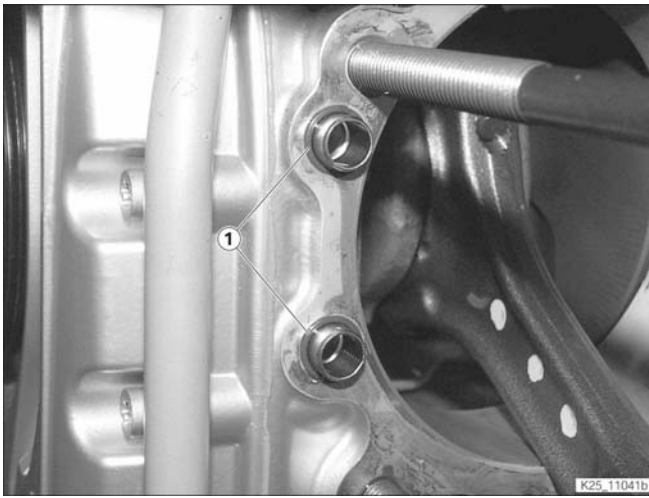
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Removing piston

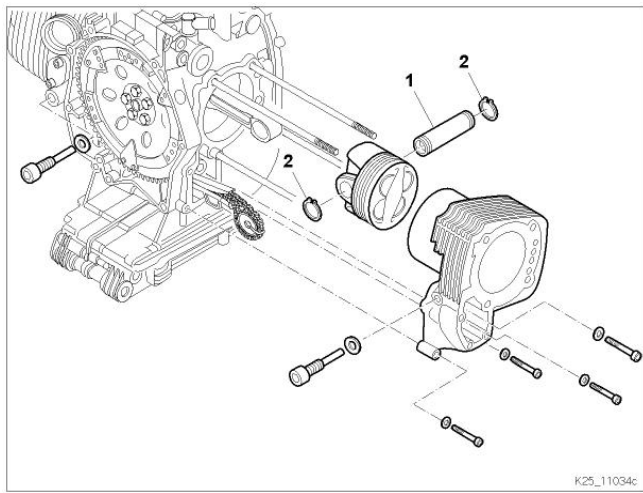
- Remove both circlips (2) from the piston pin.



Note

Remember to mark the exhaust side on the piston crown if you are going to reinstall the same pistons.

- Pull out piston pin (1) in the forward direction of travel until the piston can be separated from the conrod.
- Remove the piston.



(-) Cleaning sealing faces, cylinder base

- Remove all traces of old sealant from the cylinder base and the crankcase, paying particular attention to the grooves in the crankcase.
- Clean and degrease the sealing faces of the cylinder base and the crankcase.



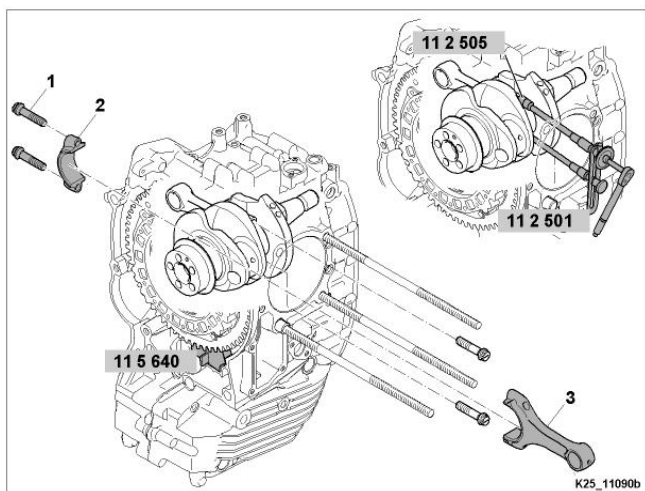
Consumables/lubricants

Brake cleaner	Cleaners	83 11 9 407 848
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(-) Removing conrods



Attention



Nature: Friction faces in the engine have to run in against each other. If components are mixed up they have to run in again.

Avoidance: Do not mix up conrods or bearing shells; always mark the components to ensure that they are reinstalled in their original positions.

- Use a felt-tipped pen to mark the installed positions of the conrods.
- Remove screws (1).
- Remove conrod cap (2) and conrod (3).

(-) Replacing conrod bearings



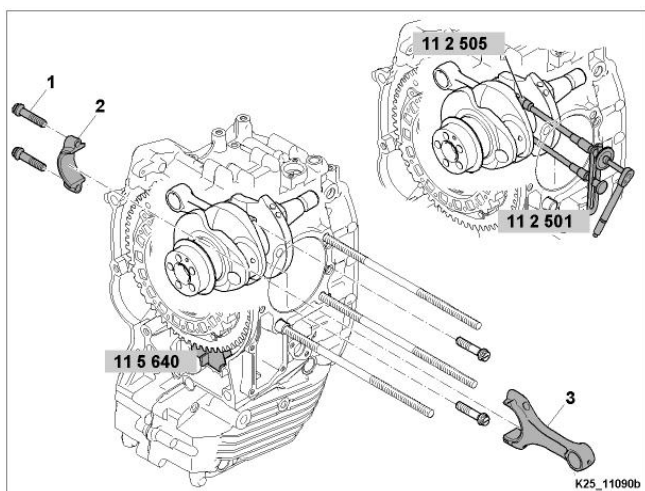
- Remove bearing shell (2) from conrod (1).
- Remove bearing shell (3) from conrod cap (4).
- Install new, oiled bearing shell (2) in conrod (1), making sure that the bearing shell with the **blue mark** is installed in the **conrod** and that the "lug" of the bearing shell engages the groove in the conrod.
- Install new, oiled bearing shell (3) in conrod cap (4), making sure that the bearing shell with the **red mark** is installed in the **conrod cap** and that the "lug" of the bearing shell engages the groove in the conrod cap.

(-) Installing conrods (crankshaft installed)

⚠ Attention

Nature: Friction faces in the engine have to run in against each other. If components are mixed up they have to run in again.

Avoidance: Do not mix up conrods or bearing shells; always mark the components to ensure that they are reinstalled in their original positions.



⚠ Attention

Nature: In order to ensure low-vibration, smooth engine operation, all the conrods must belong to the same weight class.

Avoidance: Make sure that the conrods all belong to the same weight group.

- Oil the friction faces and install conrod cap (2) and conrod (3), making sure that the marks are matched.

**Attention**

Nature: Conrod cap screws are stress bolts; when tightened, these fasteners are subjected to loads in excess of the proof stress and they can shear off if they are retightened.

Avoidance: Never re-use the conrod cap screws.

- Install new, oiled conrod cap bolts (1) and tighten with angle-of-rotation gauge, (No. 11 2 501) and socket wrench insert (No. 11 2 505).

**Tightening torques**

Conrod bearing cap screws, M10 x 1.25, Replace screws	Threads and underside of head lightly oiled	
	Closing torque, 5 Nm	
	Initial torque, 20 Nm	
	Final torque, 90 °	

(-) Installing piston in cylinder

K25_110406

**Attention**

Nature: There is only one tolerance group (A/B) for replacement pistons and cylinders. There are two other tolerance groups (A and B) for components installed ex-works. Piston and cylinder must belong to the same tolerance group.

Avoidance: Always replace piston and cylinder as a paired set.

**Attention**

Nature: In order to ensure low-vibration, smooth engine operation, all the pistons must belong to the same weight class.

Avoidance: Always use pistons of the same weight class in any one engine.

- Determine the correct weight class (1) of the piston and use a piston of the appropriate weight class.

**Note**

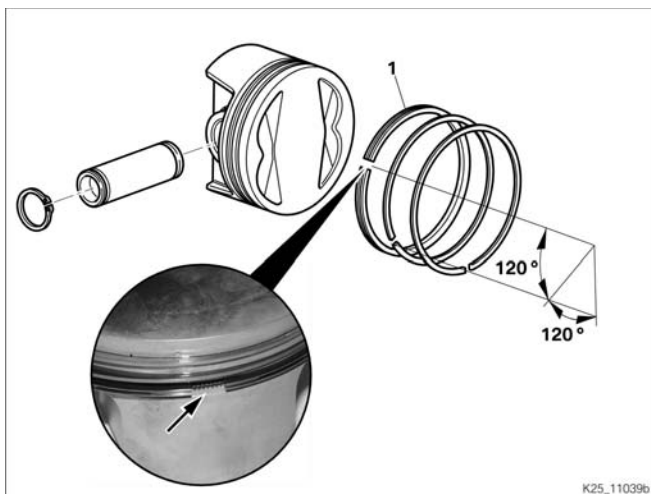
The weight class is stamped on the piston crown and is legible only if the piston is new.

If the symptoms are such that only one replacement cylinder with piston has to be installed, the weight of the other piston has to be ascertained by weighing.



Technical data

Difference in weight within a weight class (weight classes + and -) Value definition: Complete with piston pin and piston rings		max. 10 g	



► **Positioning piston rings**

- Position oil wiper ring (1) with the end faces (arrow) up in the installed position.
- Position the other rings with the end gaps offset by the specified angle.



Technical data

Installed direction of piston rings		"Top" marking uppermost	
Offset of piston-ring gaps		120 °	



- ◀ Coat the friction face of the cylinder and the friction face of the piston skirt with oil.



Consumables/lubricants

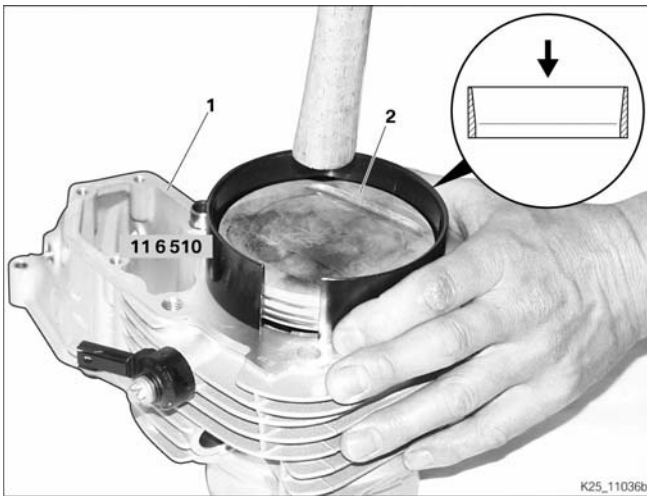
Engine oil, 20W-50	Engine oil	81 22 9 407 685
--------------------	------------	--------------------

- Place the cylinder, base down, on a smooth, level and firm working surface.
- Set sliding sleeve for piston rings (No. 11 6 510) with the tapered end up on the cylinder.
- Insert the piston with the cast nose (arrow) pointing toward the exhaust side into sliding sleeve (No. 11 6 510) and carefully press it through the taper and into the cylinder.

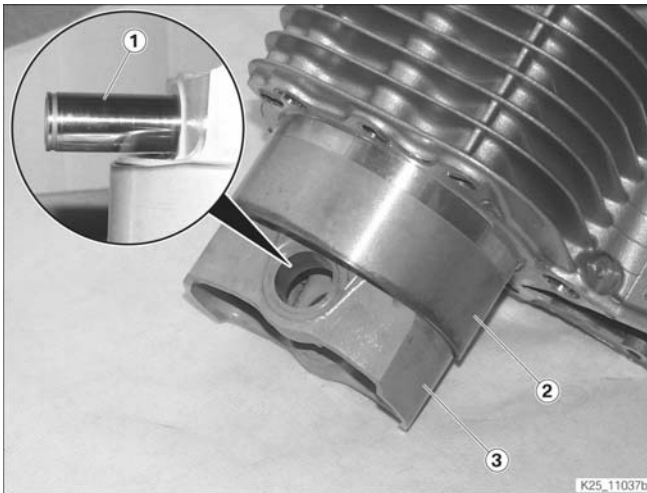


Technical data

Installation direction of piston		Arrow on piston crown and/or cast lug pointing to exhaust side	
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- » The piston rings are preloaded.
- » The piston skirt is held in position by the cylinder.
 - Press sliding sleeve (No. 11 6 510) against the cylinder and carefully tap the piston into the cylinder.
- » The piston is full inserted into the cylinder.
 - Remove sliding sleeve for piston rings (No. 11 6 510) .



- Push piston (3) through cylinder (2) just far enough to allow piston pin (1) to be inserted. Make sure that the piston rings do not project past the end of the cylinder liner.

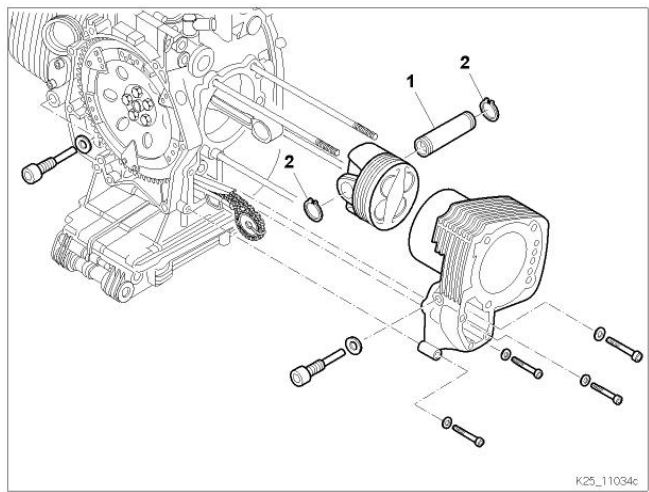
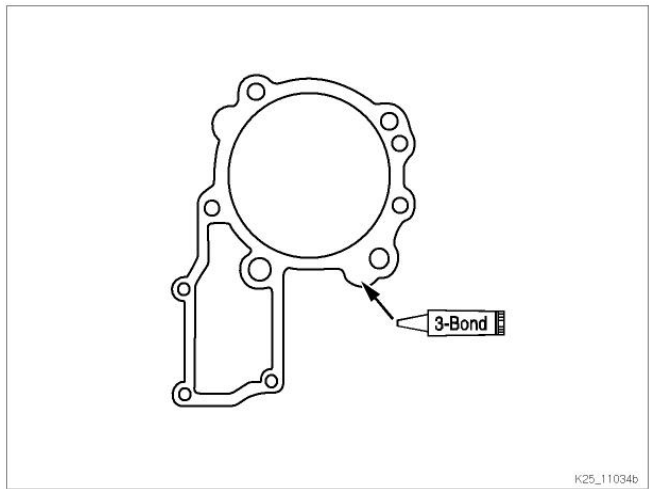
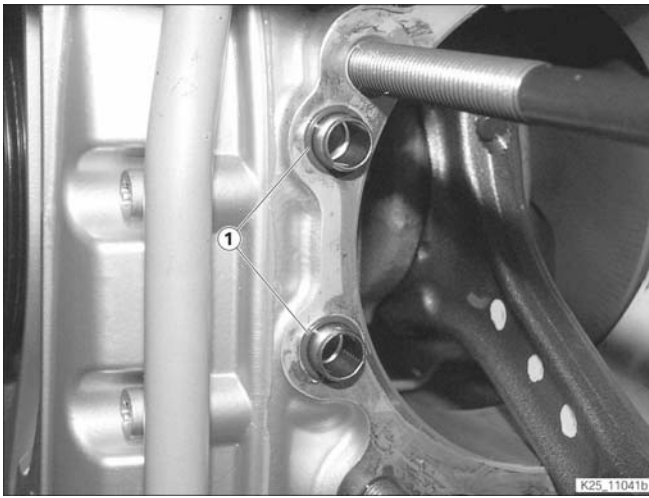
(-) Installing right cylinder

Precondition

- Crankshaft is locked at TDC.



- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.



Consumables/lubricants

3 - Bond 1209	Surface sealant	07 58 9 062 376
---------------	-----------------	--------------------

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.



Consumables/lubricants

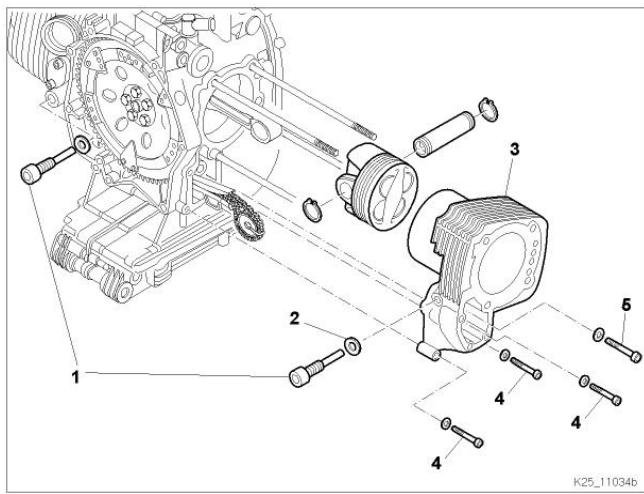
Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



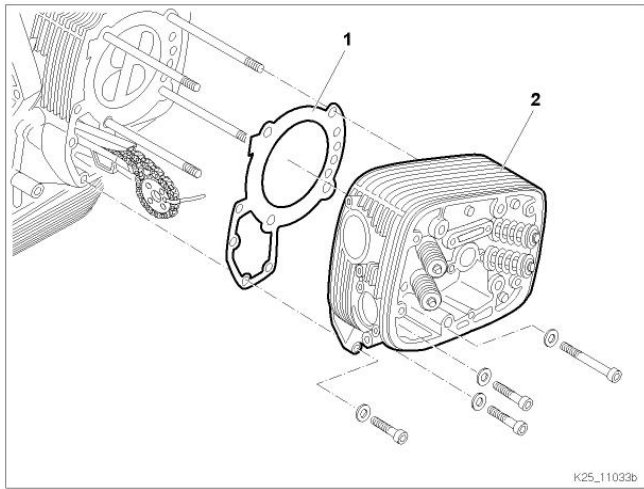
Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain side rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



⚠ Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

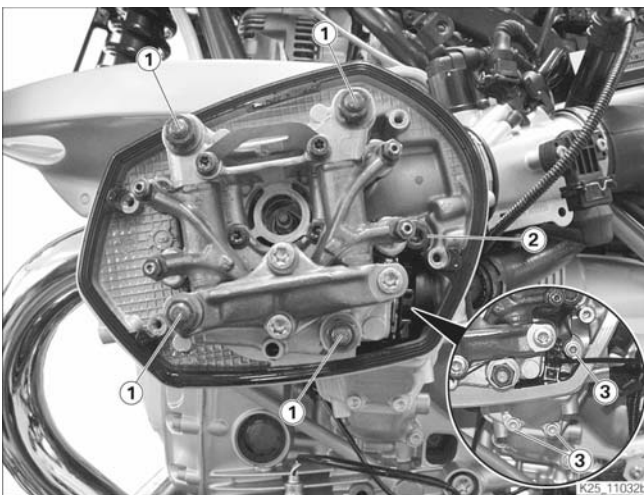
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.


⚠ Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

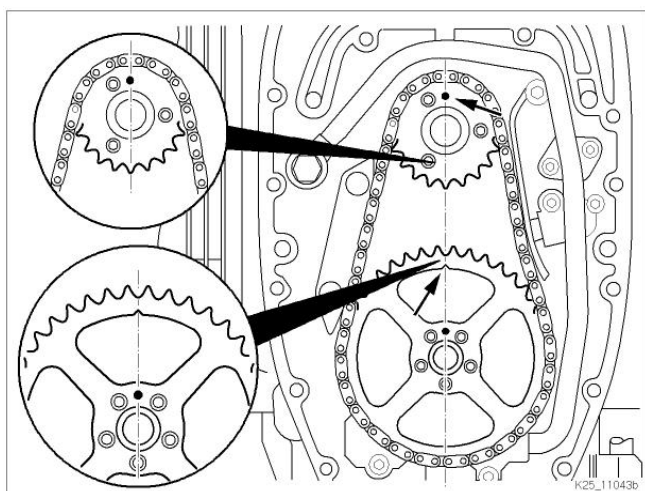
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



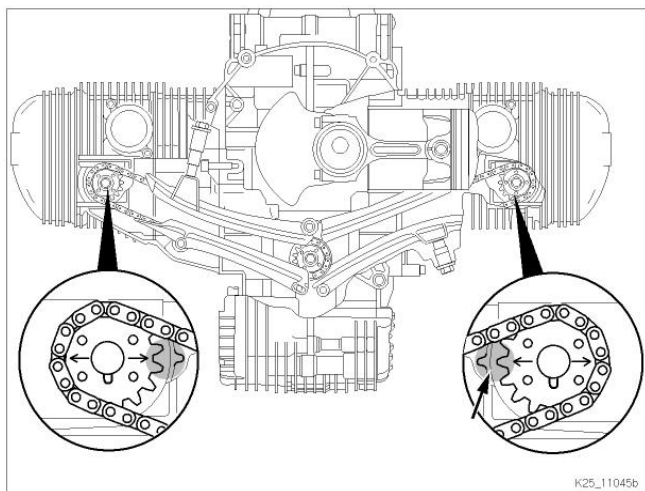
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, right (cylinder No. 1)



- Make sure that the crankshaft and countershaft are in the **"firing TDC, right cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

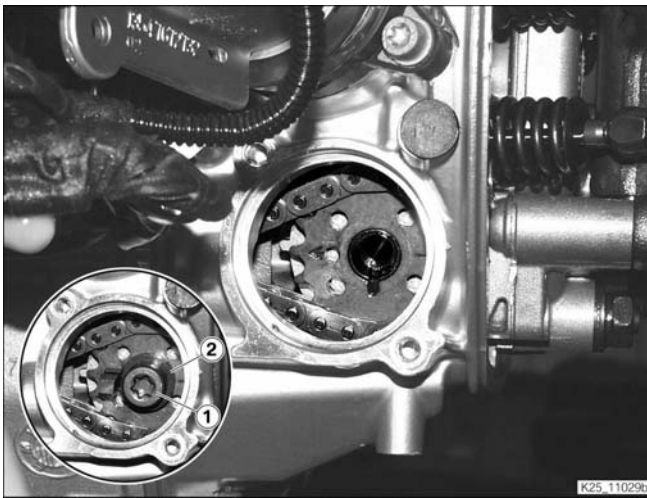
- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.





- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



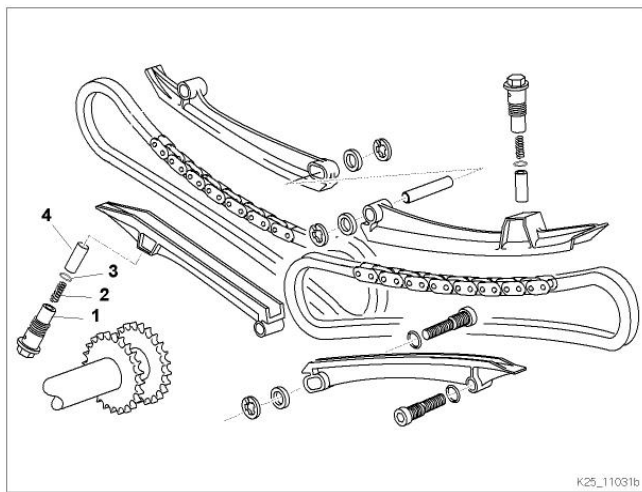
▶ Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.




- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.



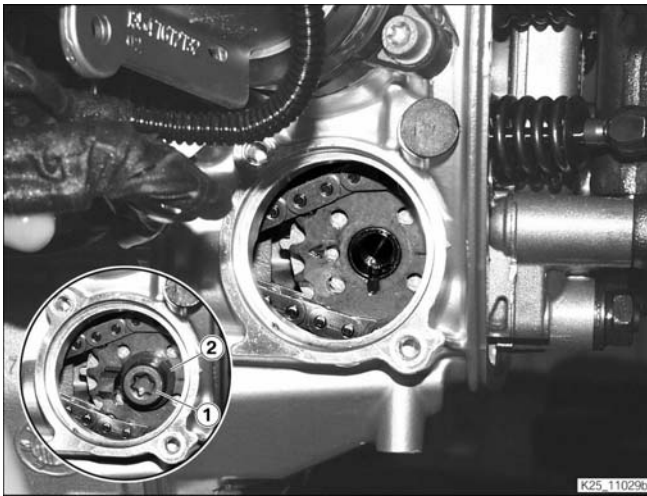
 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



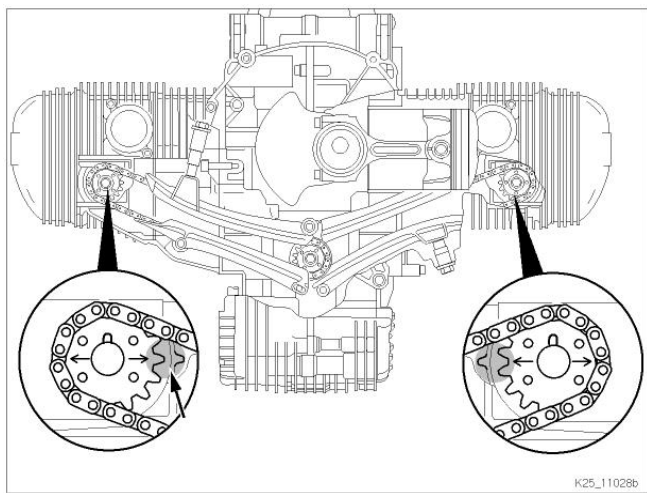
(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.



- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



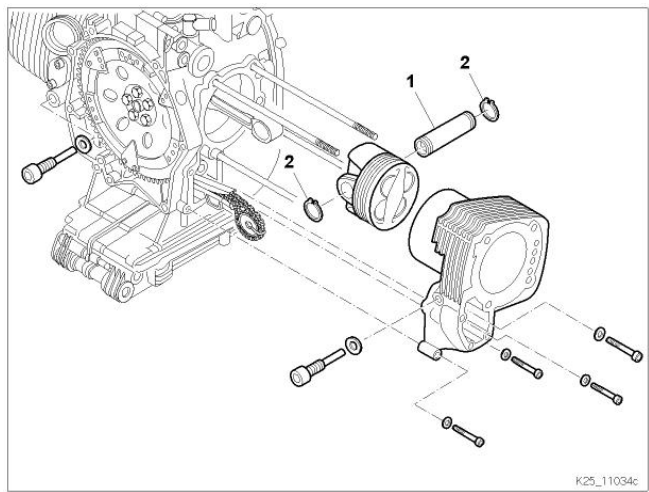
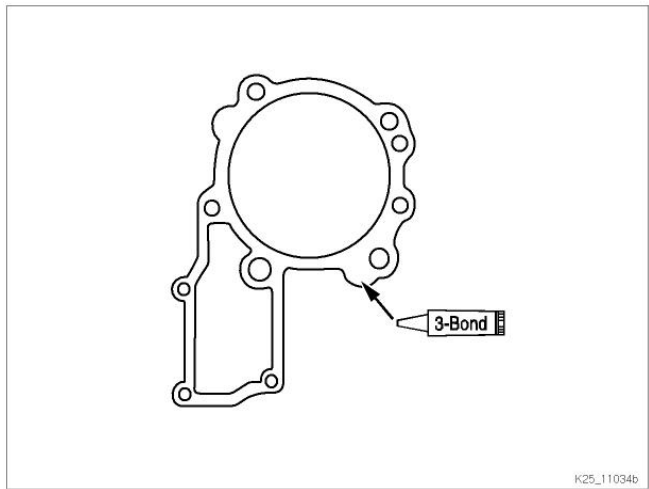
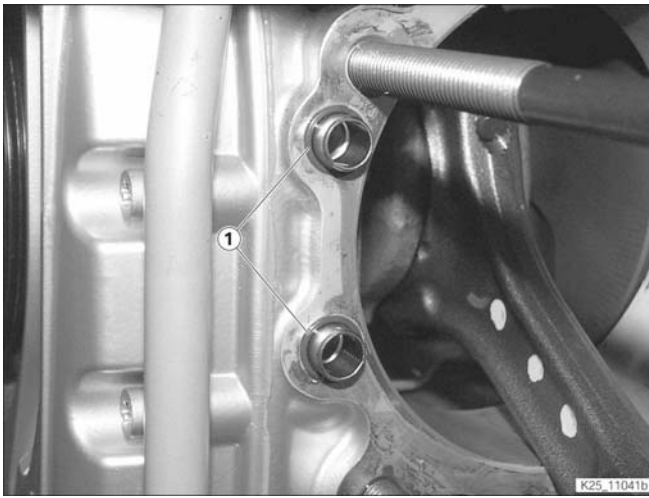
(-) Installing left cylinder

Precondition


- Crankshaft is locked at TDC.




- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.

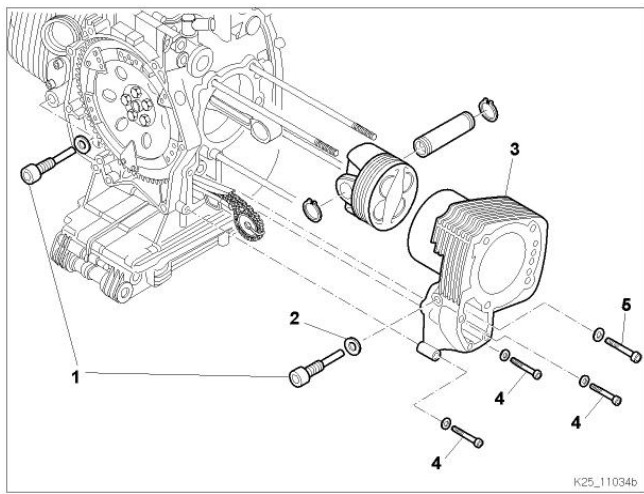
 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685


- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).




Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



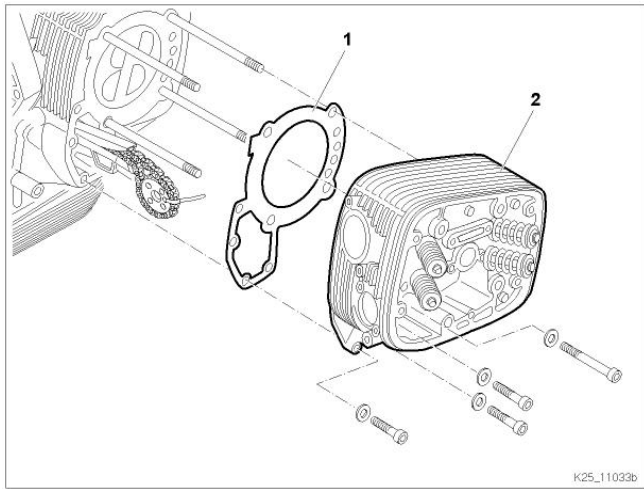
 Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain side rail (1) with new seal (2).

 Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing left cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

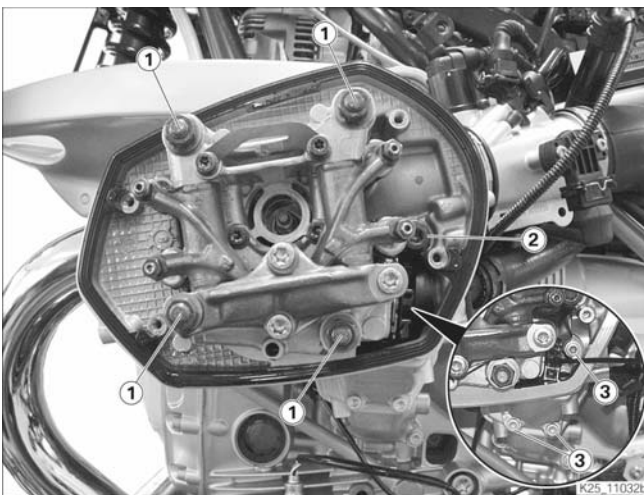
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.


Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

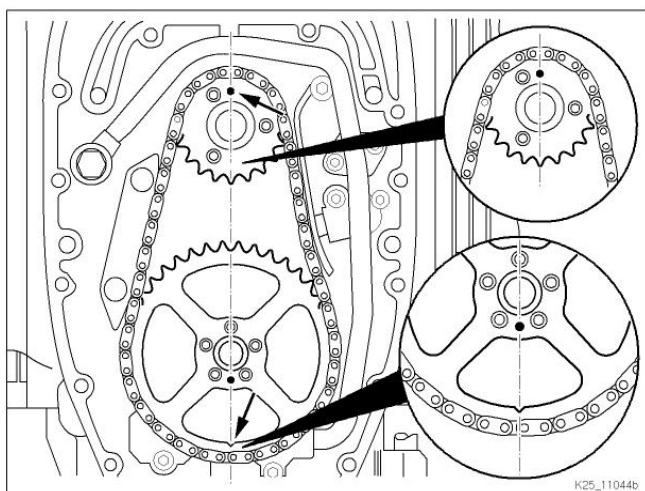
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



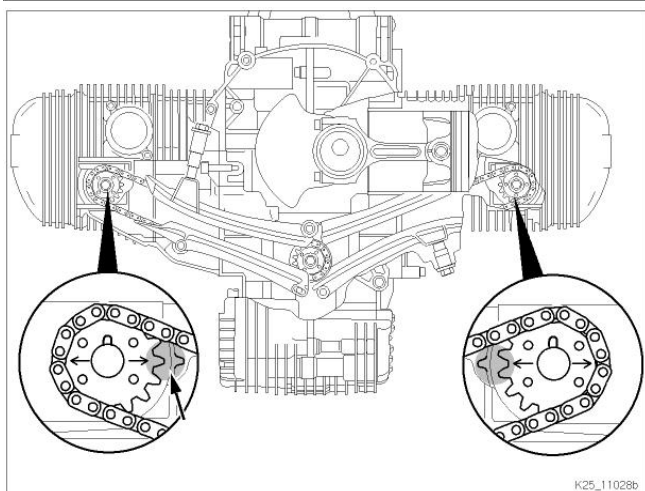
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, left (cylinder No. 2)



- Make sure that the crankshaft and countershaft are in the **"firing TDC, left cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the sprocket for the timing chain of the countershaft is **down** and at the top the split line between the two halves of the crankcase is between two teeth.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **up**.
- » The valves in the left-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

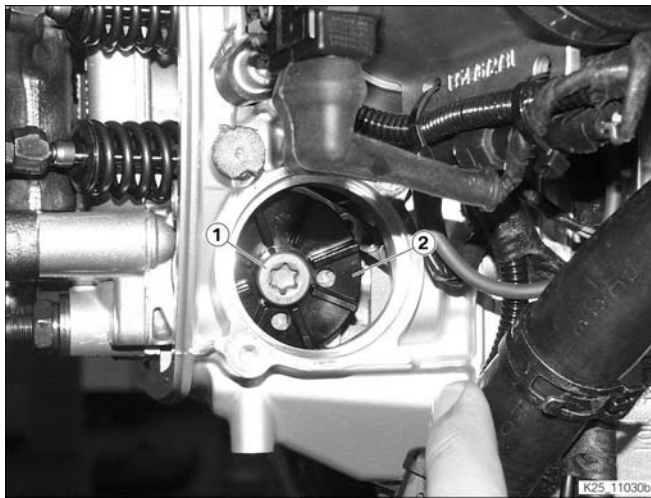
- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.





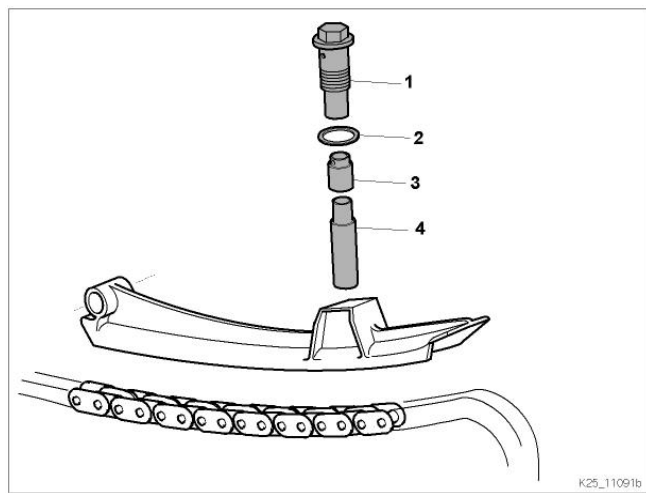
- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.




Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

(-) Installing left timing chain tensioner



- Install piston (4) in the cylinder.
 - Install piston (3) with chamfered side with the oil bore up in the chain tensioner.
 - Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.
- » The chain tensioner must slide onto the piston without tilting.
- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	


(-) Securing left camshaft sprocket

Precondition

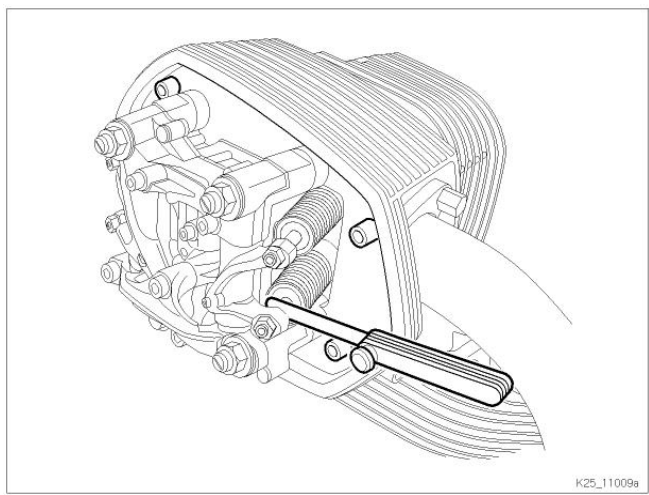
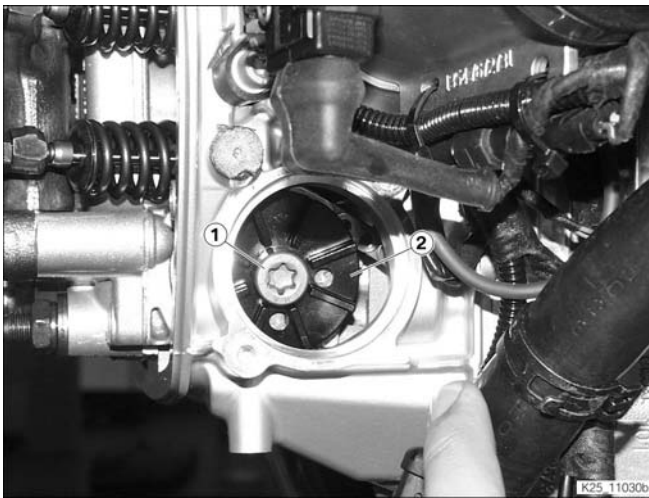
- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance


Test

- Measure valve clearance with feeler gauge.



Note


You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.

 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

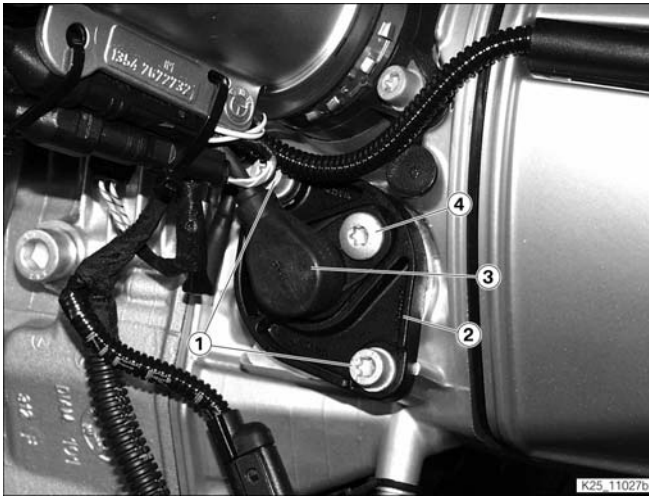
 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



Attention



Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

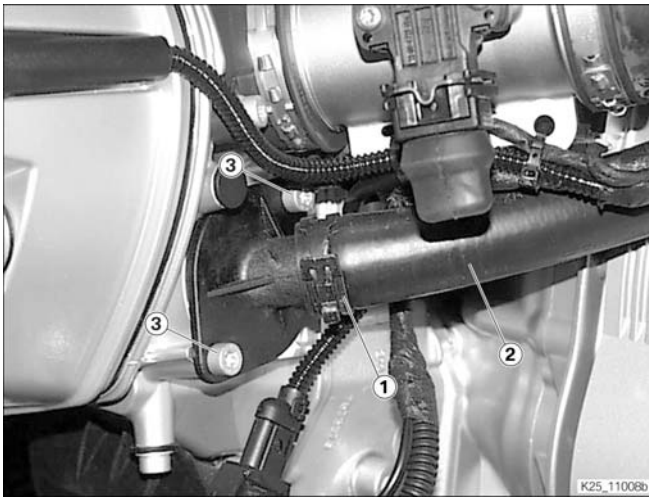
(-) Installing left camshaft cover



Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

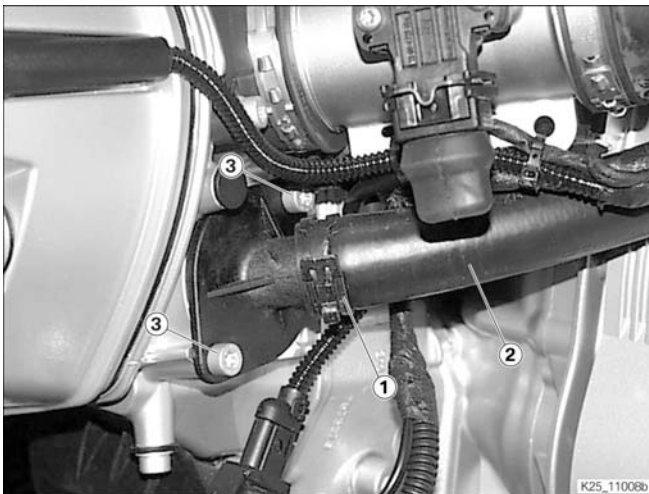
Avoidance: Deburr sharp edges of the housing.



- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

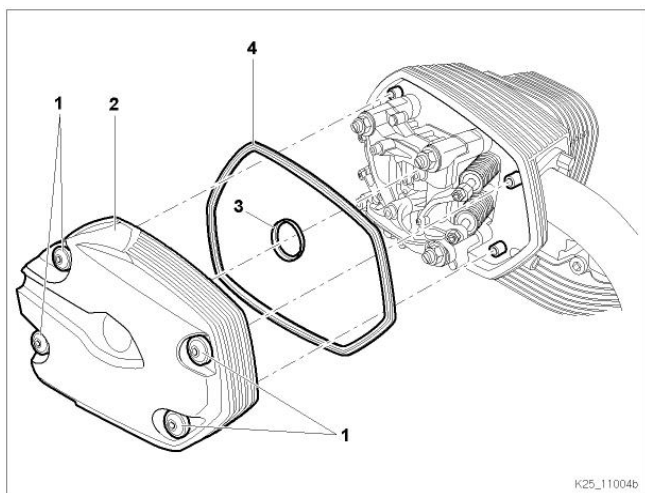
► Connecting hose for crankcase breather

- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.




(-) Installing cylinder head cover

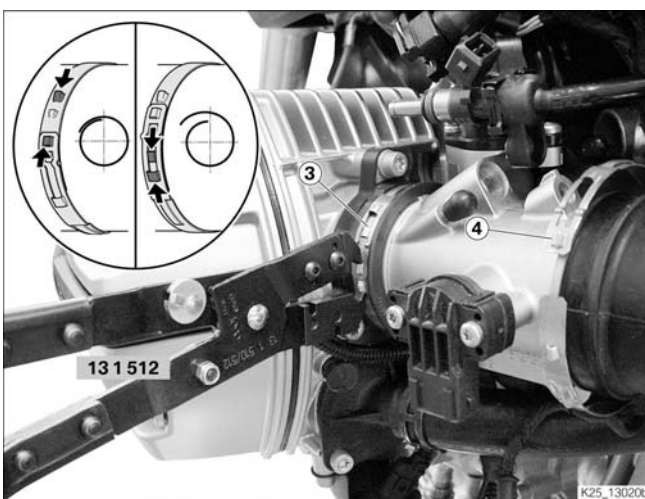
- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.



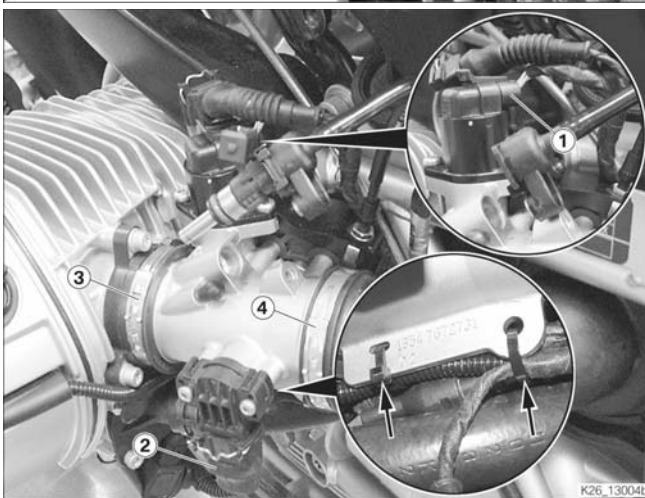
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing both throttle-valve stubs



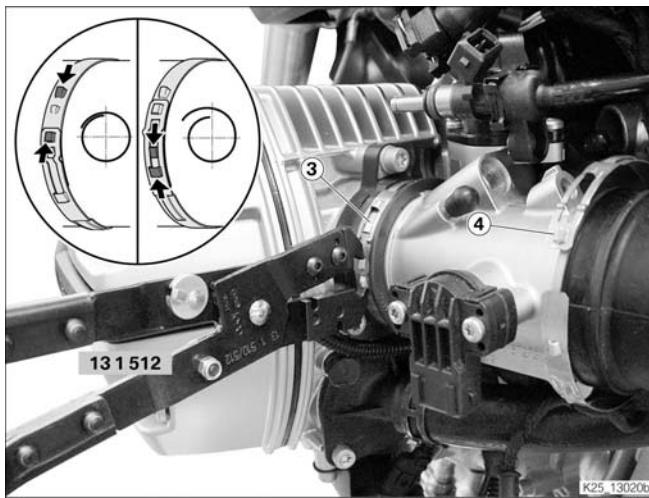
- Remove the covers from the intakes.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamps (3) and close them with pliers (No. 13 1 512) .



- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.


(-) Installing air intake pipe

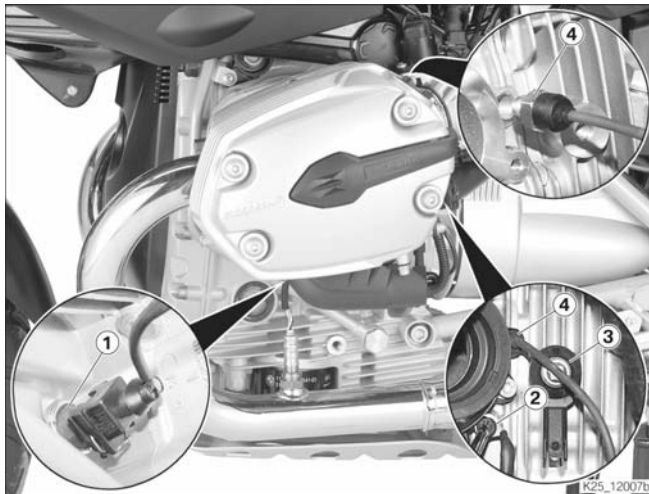
- Position hose clamps (4) on the throttle-valve stubs in such a way that the rider's equipment cannot be damaged by the eyes of the hose clamps.
- Close hose clips with pliers (No. 13 1 512) .



(-) Connecting plugs of engine sensors and switches, left

- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.


 Tightening torques		
left and right, M6 x 10	8 Nm	



- Connect knock sensor (3).
- Connect temperature sensor (4).

(-) Connecting plugs of engine sensors, right

- Secure earth lead (1) to the cylinder head.

 Tightening torques		
left and right, M6 x 10	8 Nm	

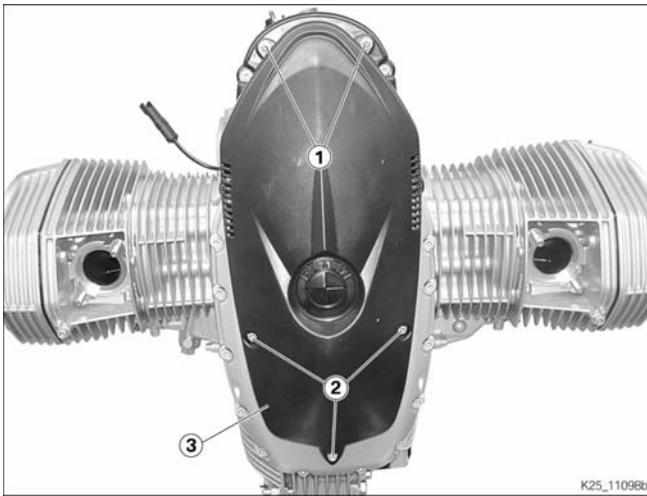



- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).

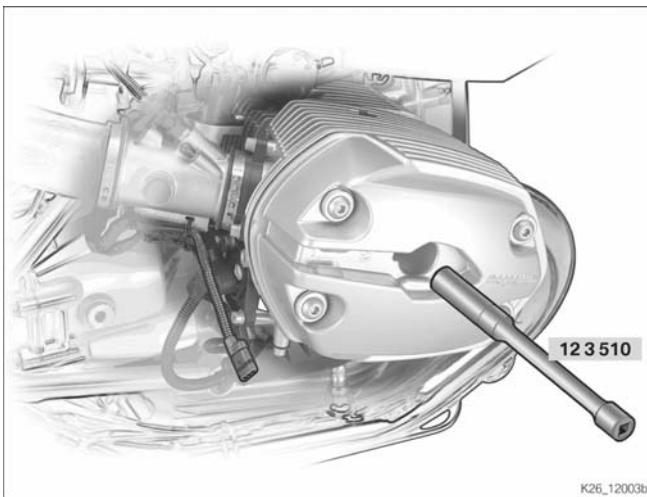
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 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing primary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.

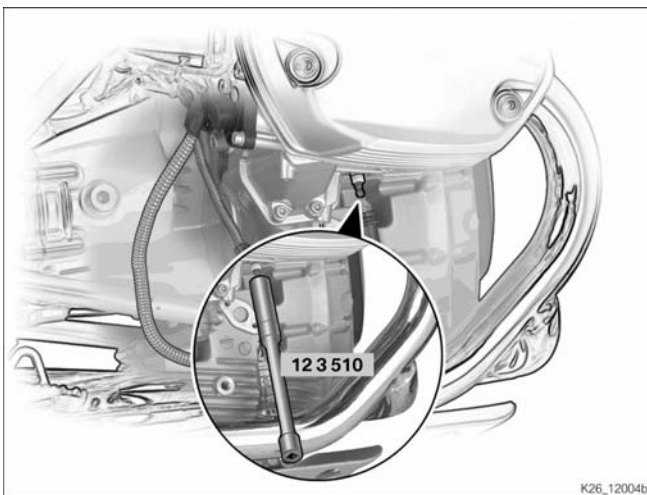



 Tightening torques		
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	


 Technical data			
Spark plug, manufacturer and designation		Bosch YR 5 LDE	

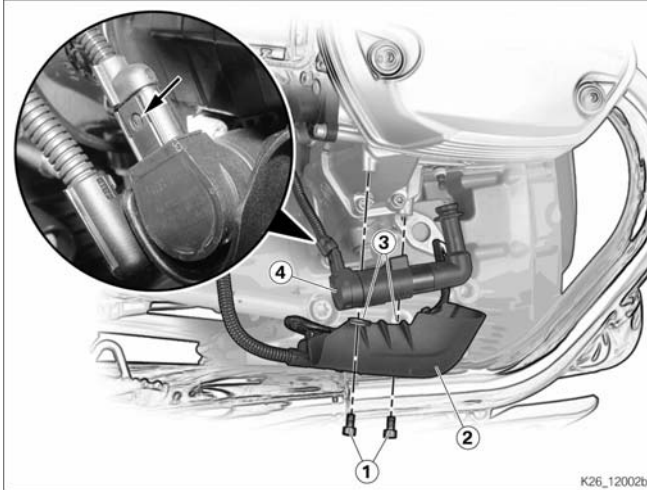
(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.




 Tightening torques		
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	

 Technical data			
Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE	




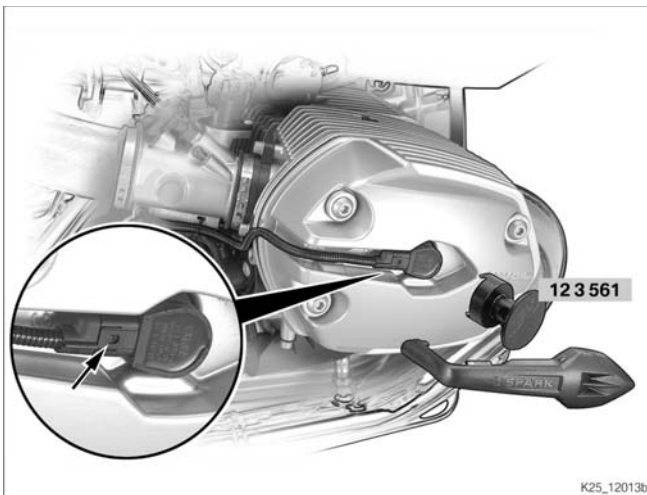
(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.

 Consumables/lubricants		
Talcum powder	Assembly aid	

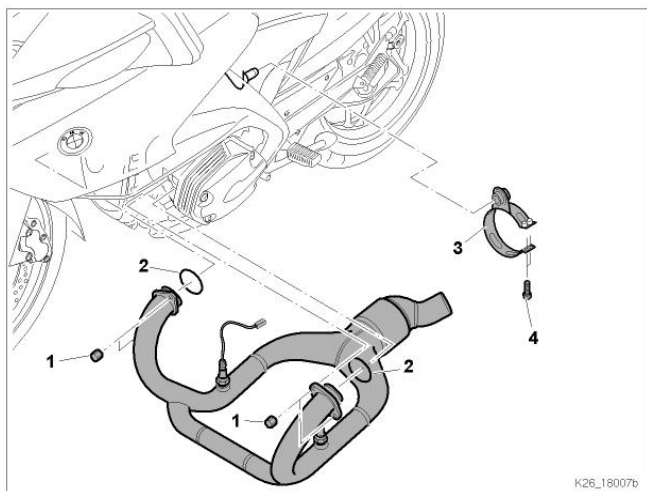
- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	




(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.



(-) Installing exhaust elbow

- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).



Tightening torques

Manifold to cylinder head, Acorn nut M8	21 Nm	
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- Align the clamp (arrow) on the manifold and tighten screws (1).



Tightening torques

Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	
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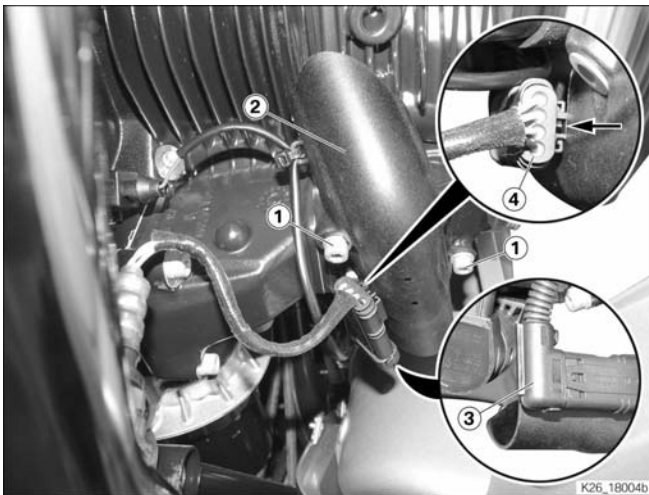
► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).



Tightening torques

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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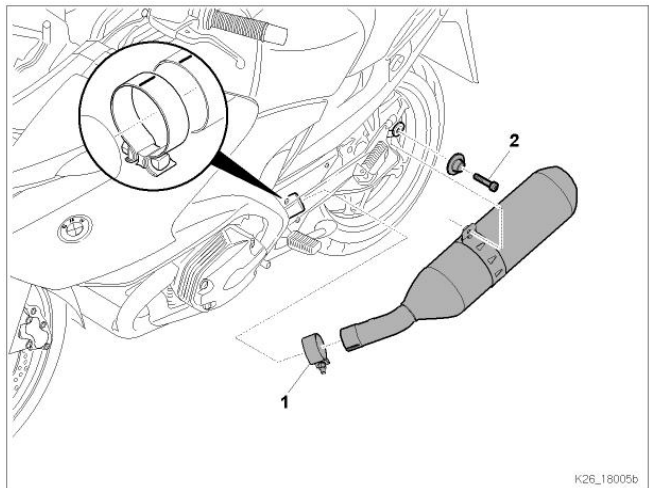



- Install front screw (1) in both bottom sections of the fairing.




◀ (-) Installing silencer

- Grease the inner face of Torca clamp (1).




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

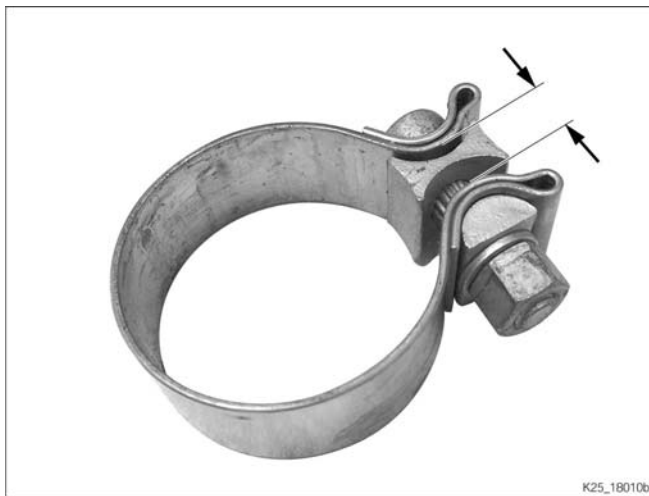
 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


▶ Checking Torca clamp on silencer



- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

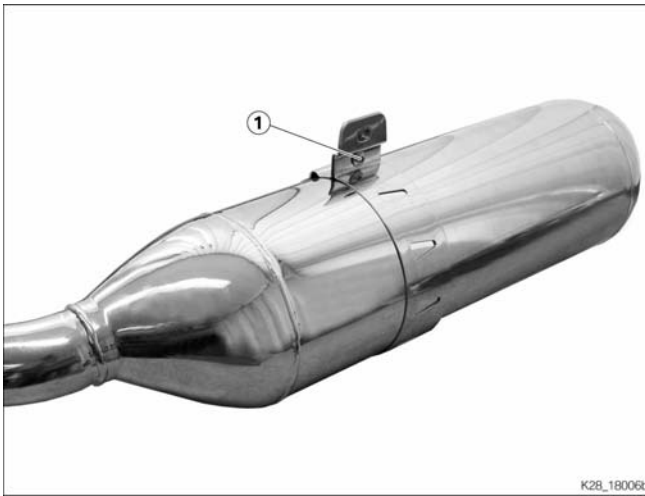


Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.



- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	--------------------

- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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Checking Torca clamp on silencer

- Tighten the Torca clamp.

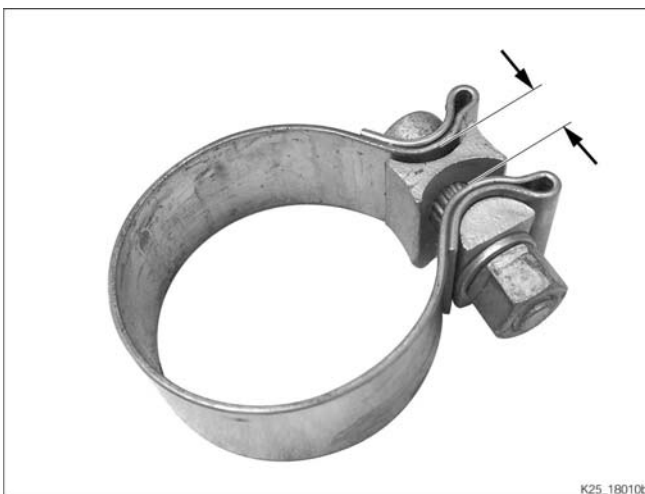
Test

- Check that a gap is visible at the clamp seat before final torque is applied.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
---	-------	--



Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.



Technical data

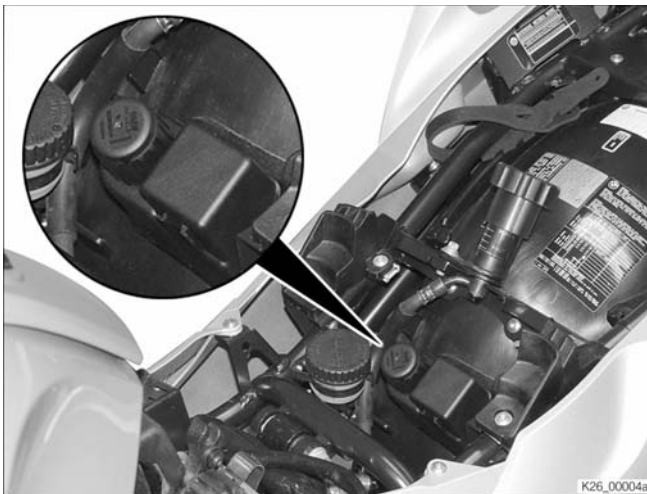
Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

◀ (-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

◀ (-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are


synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

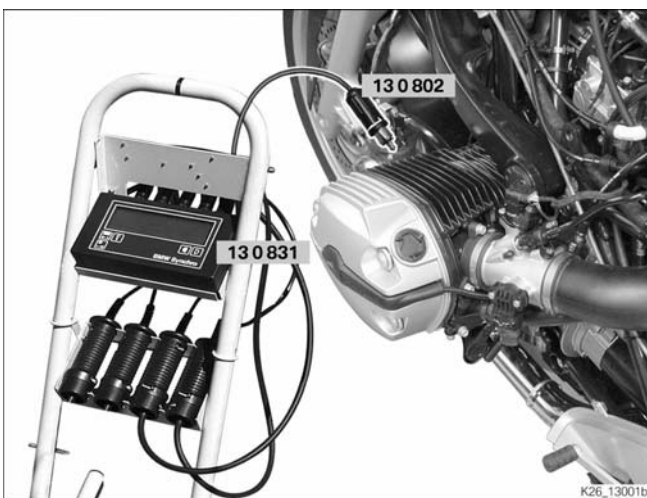
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

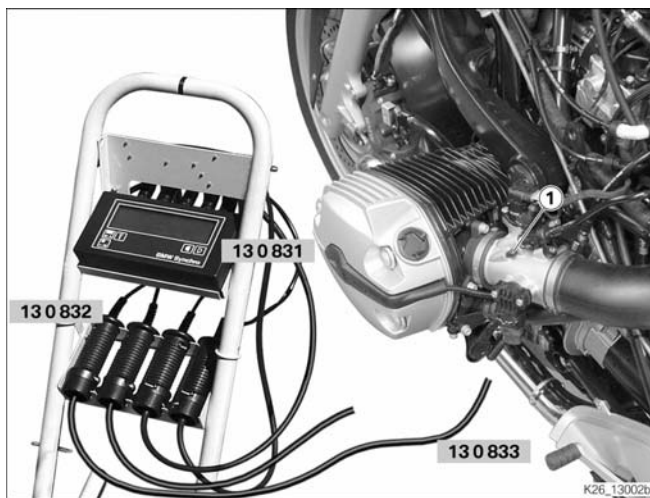


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- » The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



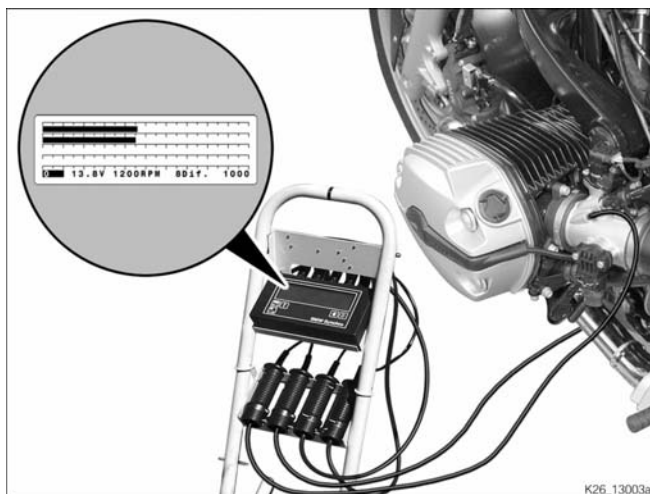
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

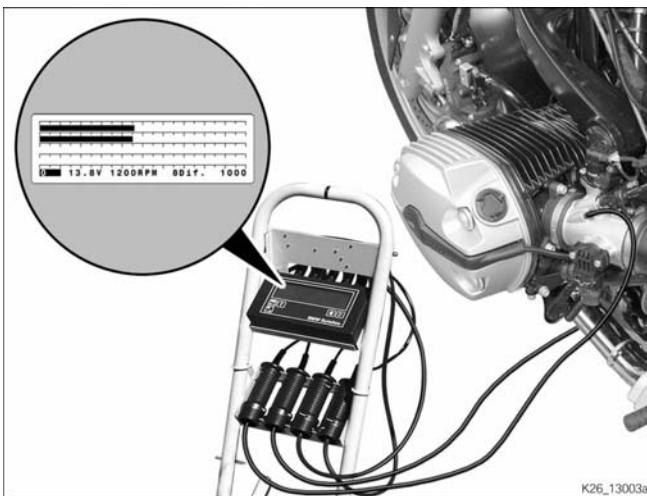
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

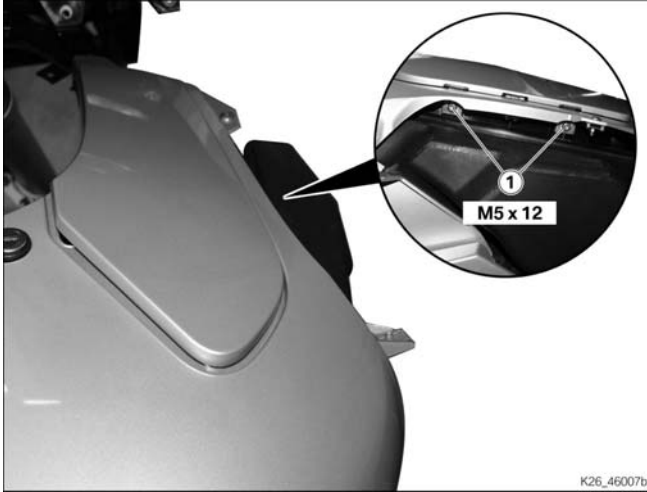
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).





(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



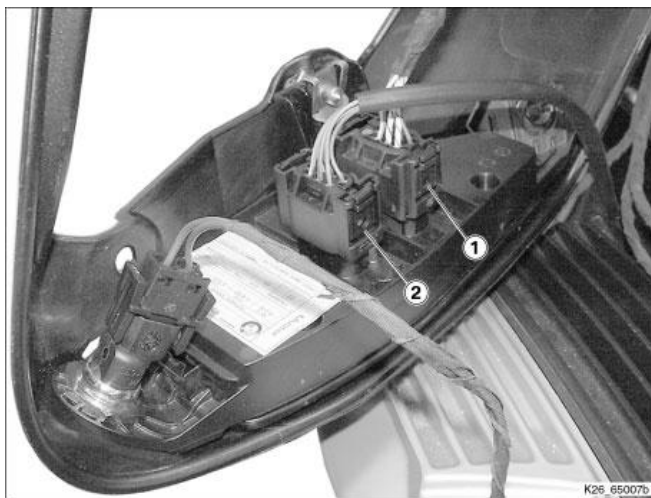
(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



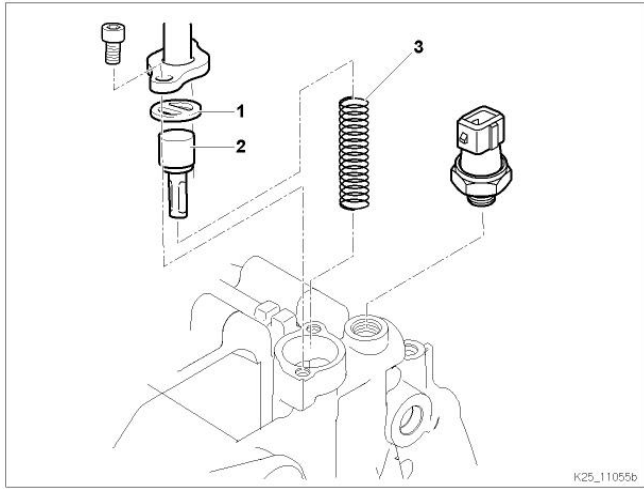
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



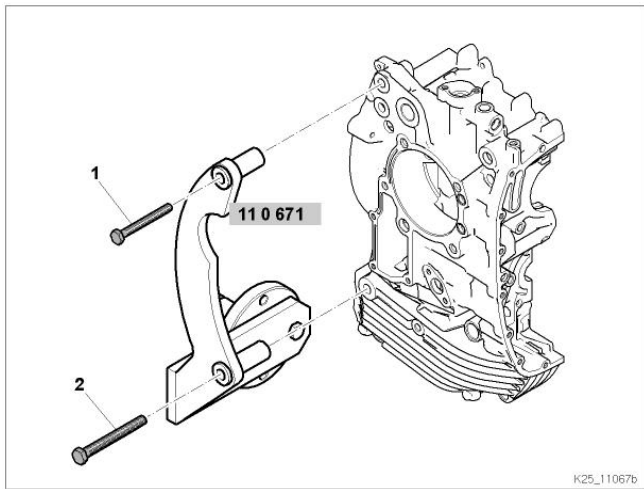
11 26 607 Replacing countershaft (engine removed)

(-) Removing oil thermostat



- Remove supporting plate (1), control element (2), and spring (3).

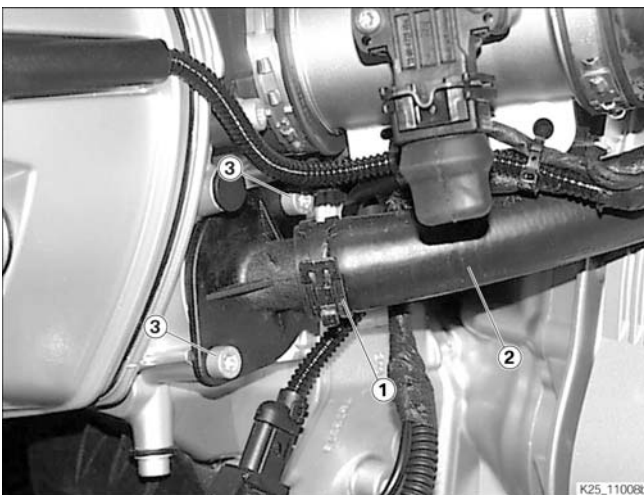
(-) Securing engine holder to right half of engine block



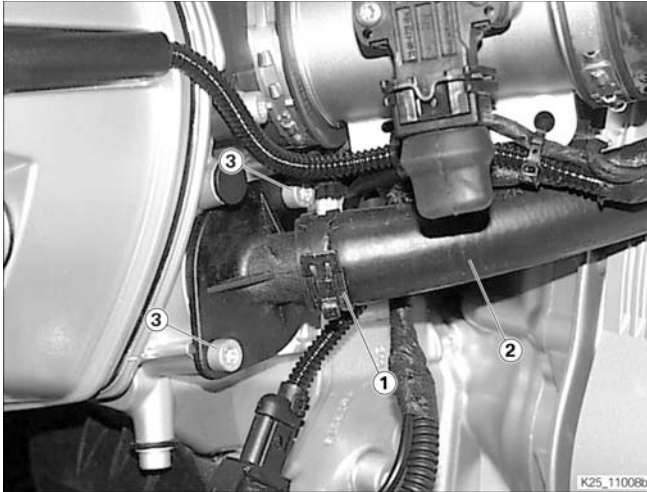
- Position engine holder (No. 11 0 671) at the right half of the engine block.
- Install screws (1) and (2).

(-) Removing left camshaft cover

► Disconnecting hose for crankcase breather

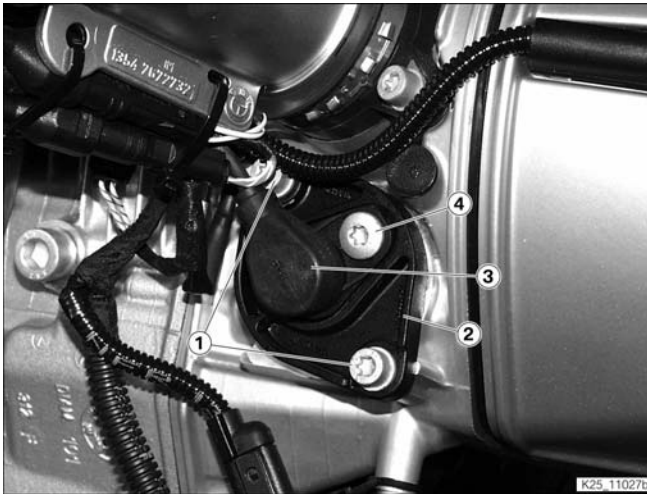


- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



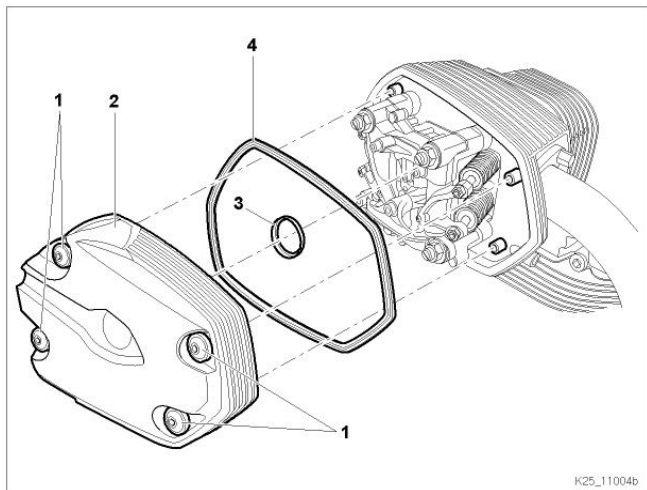
- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.

(-) Removing right camshaft cover



- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.

(-) Removing cylinder head covers




- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head covers (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

 Technical data			
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	

- Remove gaskets (3) and (4).

(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



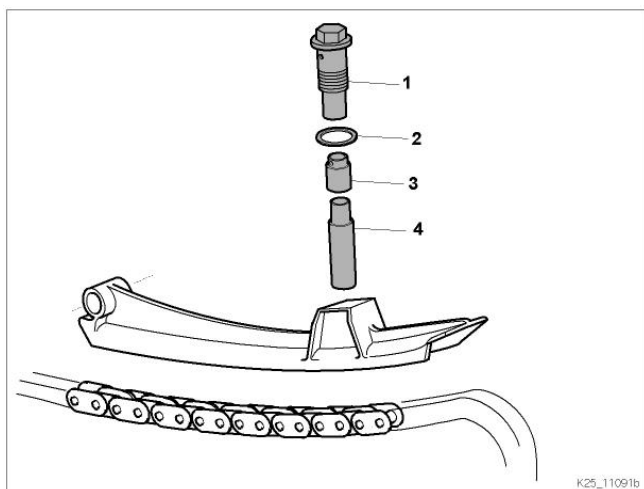
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

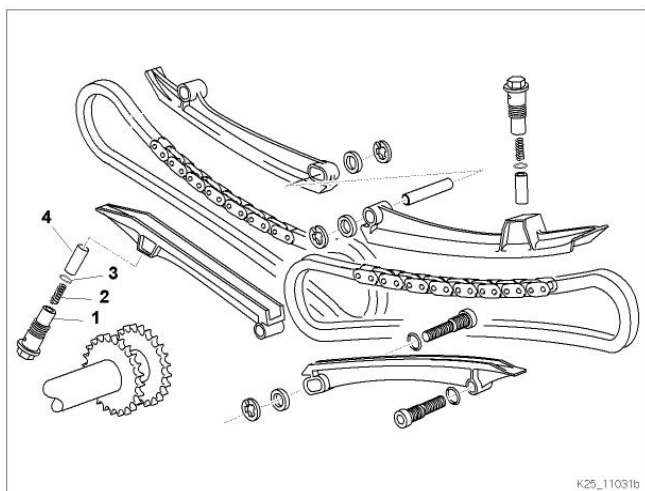
(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



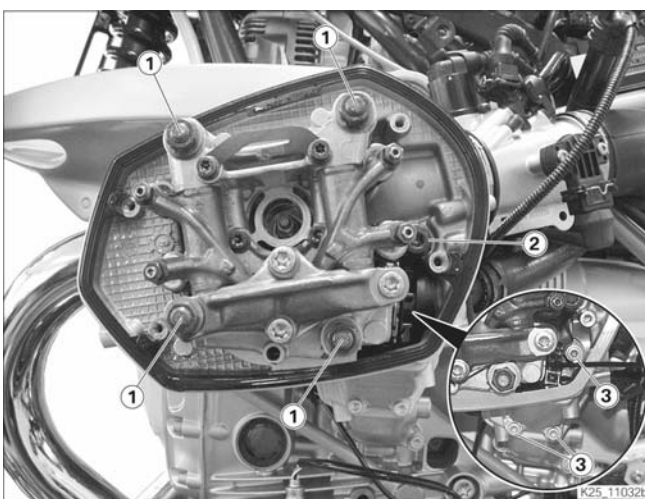
(-) Removing right chain tensioner

- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.



- manner.
- Remove spring (2) and piston (4) from the cylinder.

(-) Removing left cylinder head



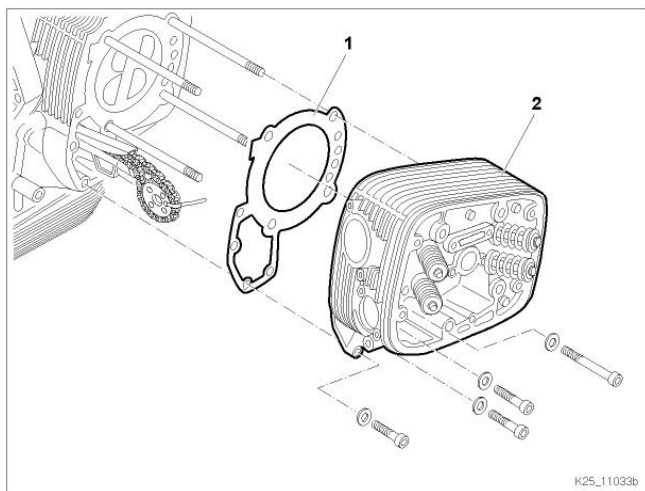
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.

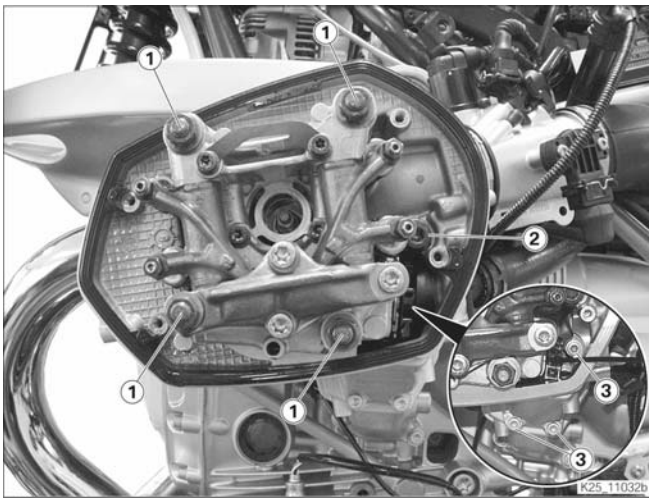
(-) Removing right cylinder head

- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



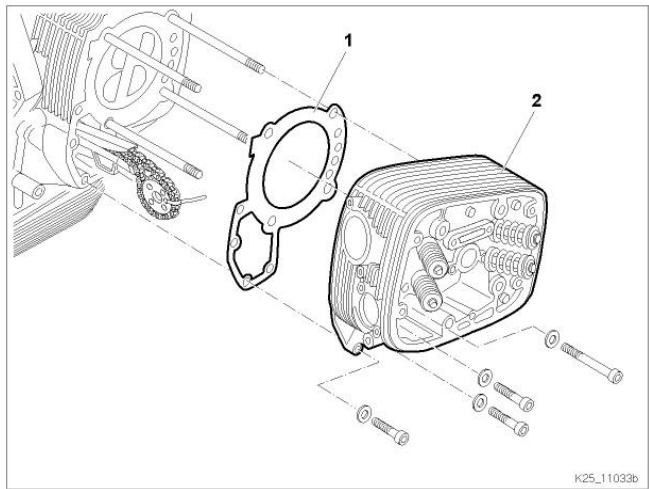
Note

When removing and installing the screws in the chain

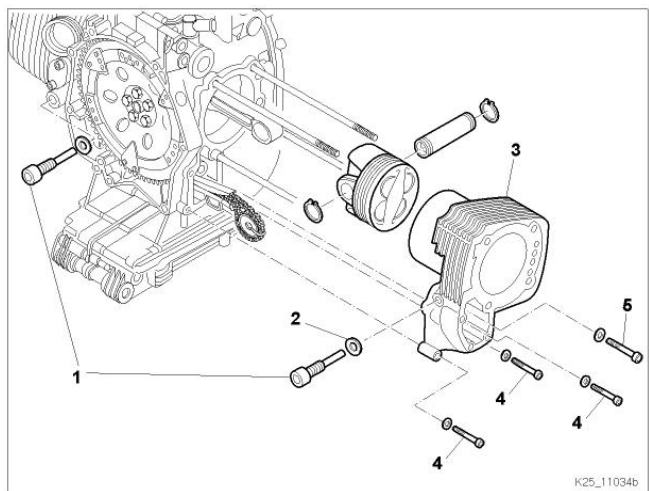


cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing left cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

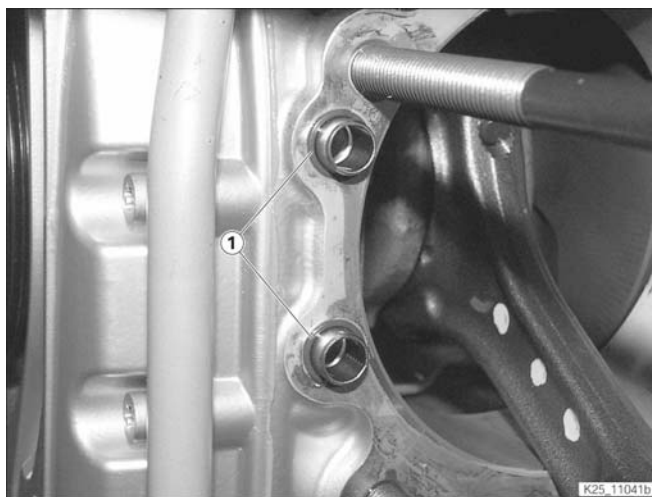
Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

- Pull the cylinder outward to remove.

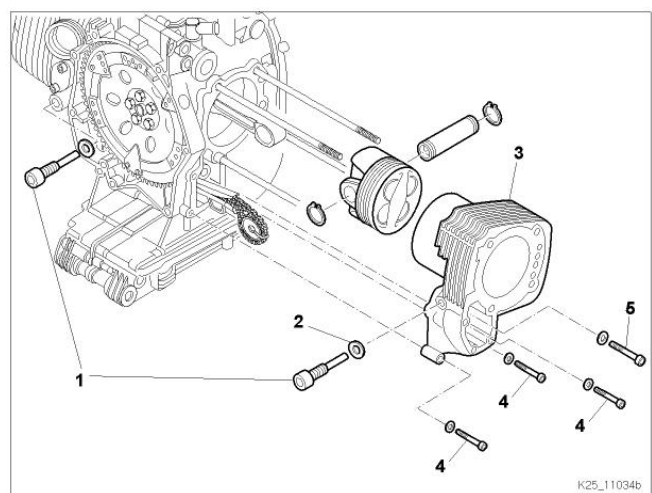


Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.



- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Removing right cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

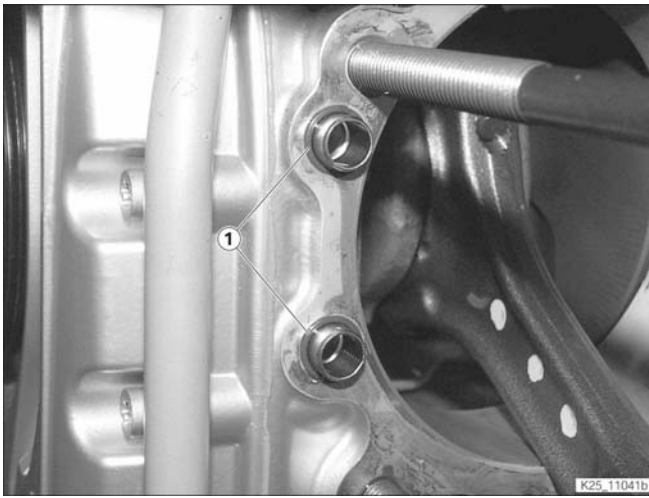
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



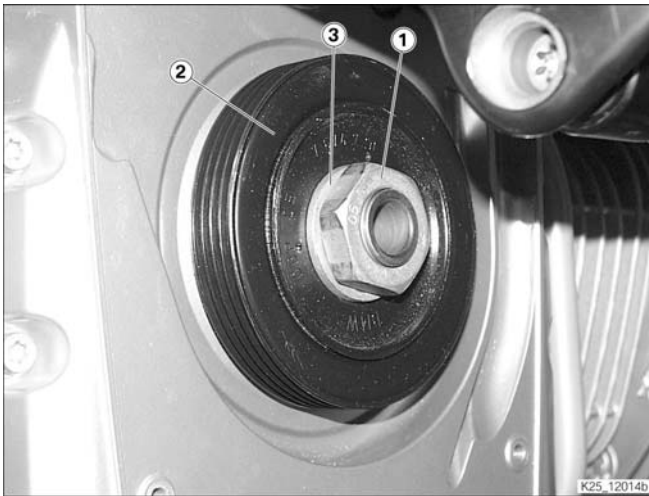
(-) Removing crankshaft belt pulley

Precondition

- Engine locked.



- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.



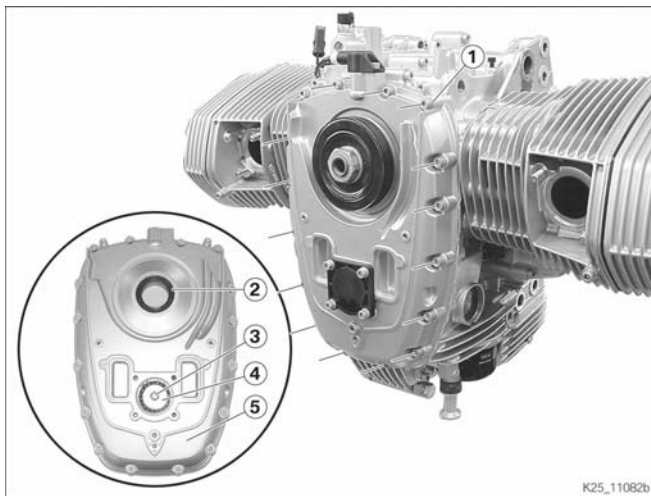
(-) Removing cover for counterbalance shaft

- Remove screws (1) and remove cover.

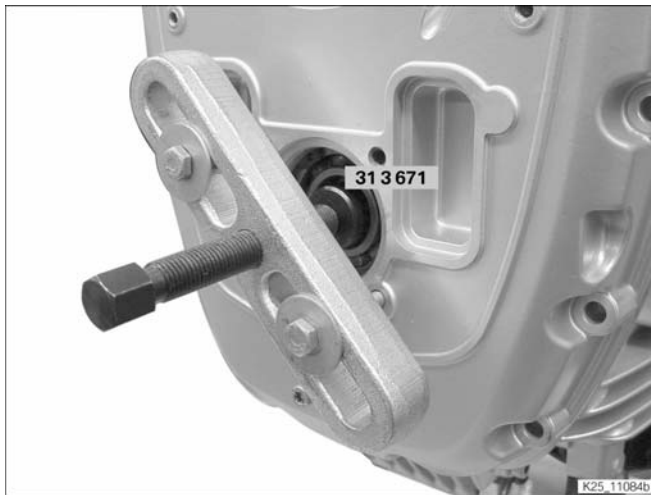


(-) Removing time case cover

- Remove screw (3) and washer (4).



- Remove screws (1).



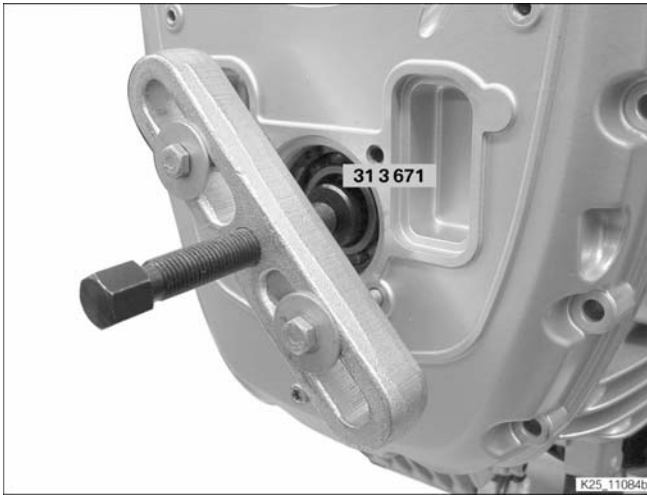
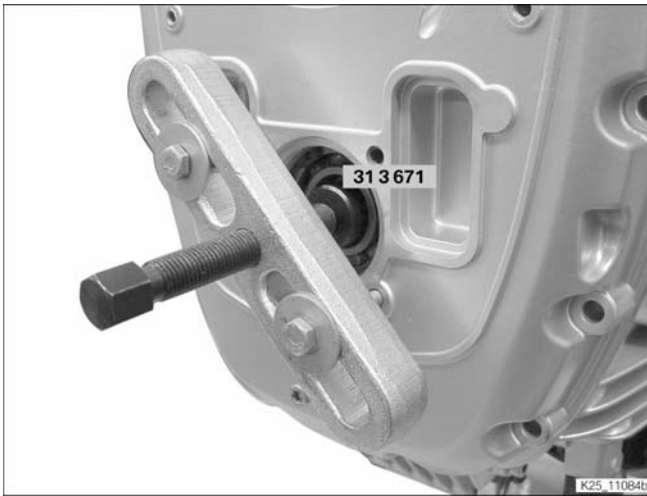
- Install the puller and thrust piece (No. 31 3 671) .
- Remove the timing case cover, noting the inductive sensor of the crankshaft, which is still fixed in position.



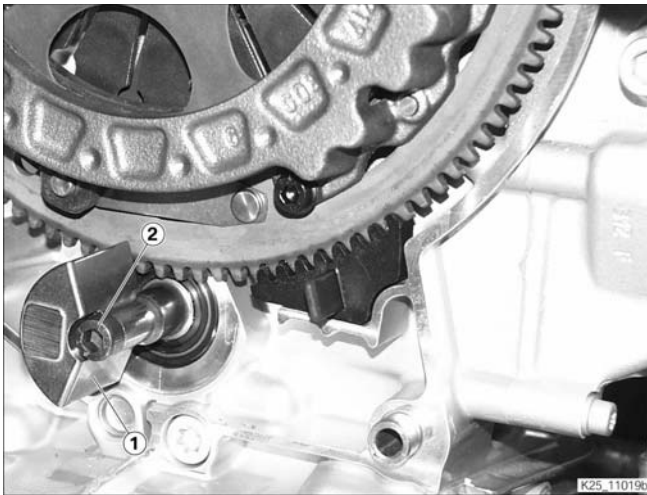
► **Releasing crankshaft inductive sensor from timing case cover**

- Remove screw and remove crankshaft inductive sensor (2) from the timing case cover.





- Remove puller and thrust piece (No. 31 3 671) .

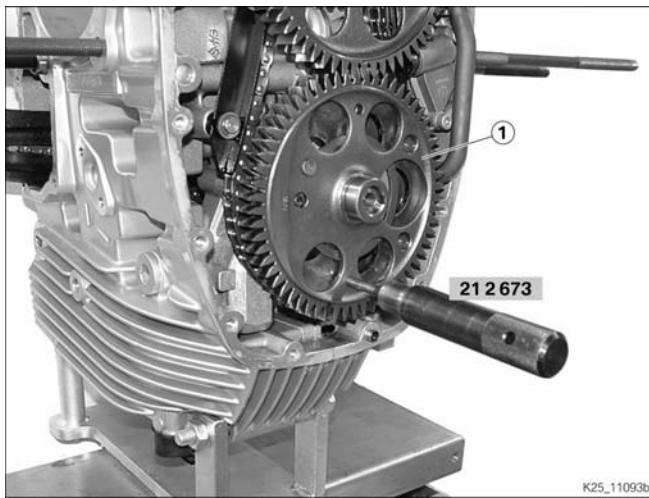


(-) Removing balance weight

- Remove screw (2) from the balance weight.
- Pull balance weight (1) back and off the counterbalance shaft.

(-) Removing tensioning wheel

- Use clutch centring pin (No. 21 2 673) to fix the tensioning wheel in position.
- Remove tensioning wheel (1).



(-) Removing counterbalance shaft

- Pull balancing shaft (1) to the rear to remove.



(-) Removing drive gear on counterbalance shaft

- Tighten nut (1) until hand-tight.



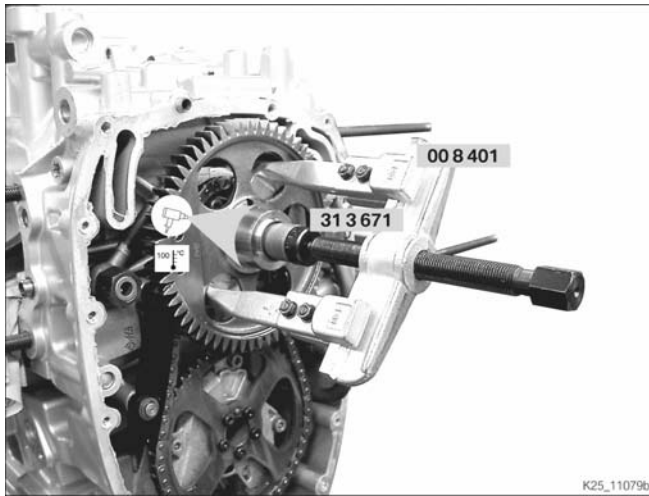
- Install puller (No. 00 8 401) and thrust piece (No. 31 3 671) and pretension.



Attention

Nature:

Once the gear has been heated it can



work loose suddenly and damage components in the vicinity.

Avoidance: Cover components in the vicinity and protect them against damage.

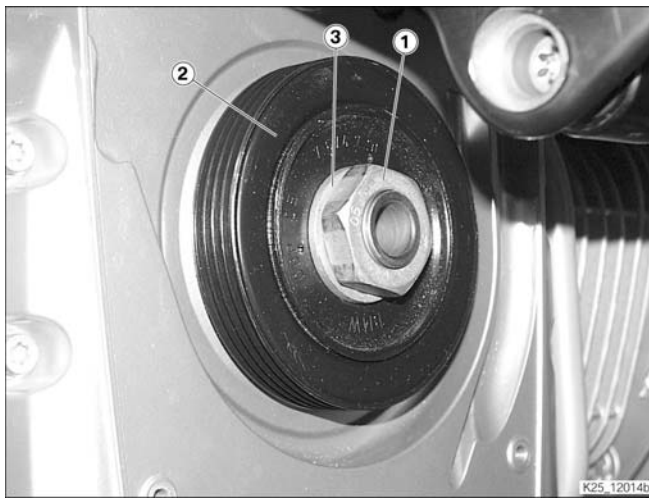
- Heat the drive gear for the balancing shaft at the crankshaft and tap it to release.



Technical data

Release temperature, drive gear for balancing shaft on crankshaft

80 °C



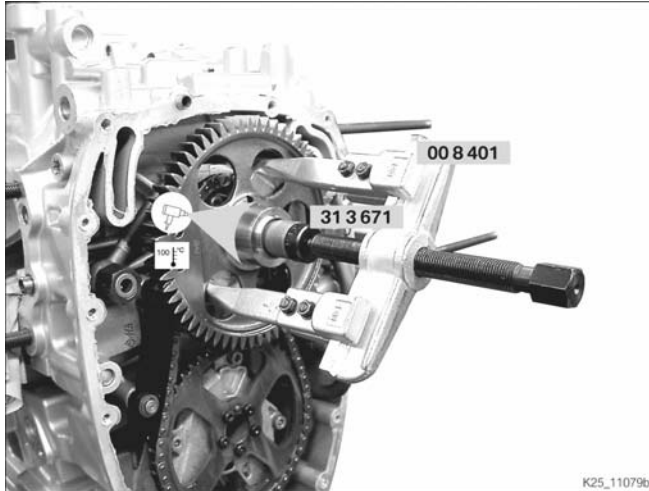
- Remove nut (1).



Warning

Nature: Heated/hot parts can cause burns.

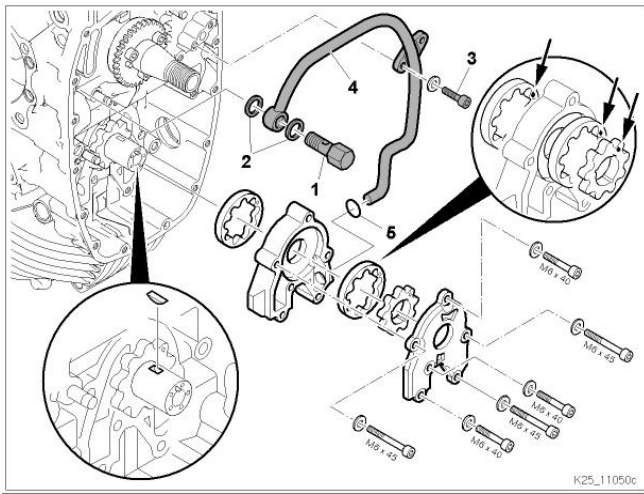
Avoidance: Wear protective gloves when handling heated parts.



- Remove the drive gear for the balancing shaft and remove puller (No. 00 8 401) and thrust piece (No. 31 3 671).

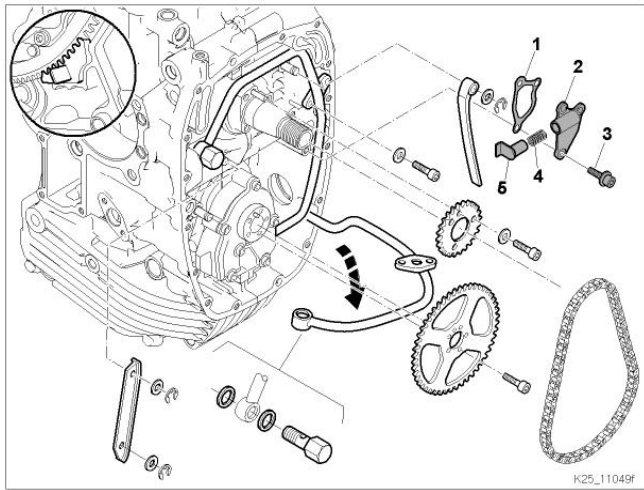
(-) Removing cooling oil line

- Remove banjo bolt (1) with sealing rings (2).
- Remove screws (3).
- Swing cooling oil line (4) forward and remove.
- Remove O-ring (5).



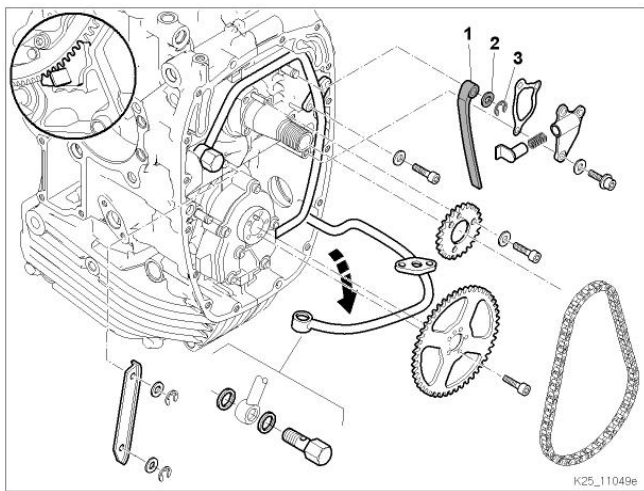
(-) Removing timing chain tensioner, crankshaft/auxiliary shaft

- Remove screws (3).
- Remove housing (2) with spring (4) and piston (5).
- Remove seal (1).



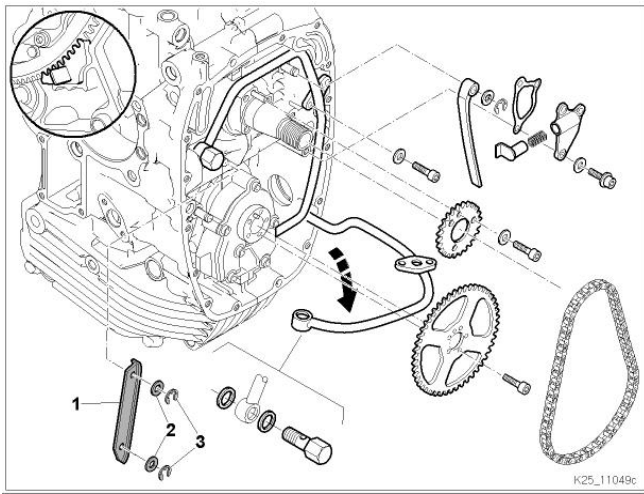
(-) Removing timing chain tensioner rail, crankshaft/auxiliary shaft

- Remove retaining washer (3) and lift off spacer (2).
- Remove timing-chain tensioning rail (1).



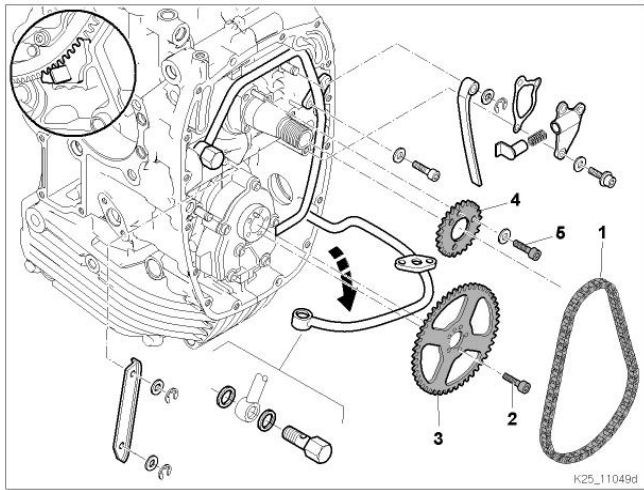
(-) Removing timing chain guide rail, crankshaft/auxiliary shaft

- Remove retaining washers (2) and lift off spacers (3).
- Remove timing-chain guide rail (1).



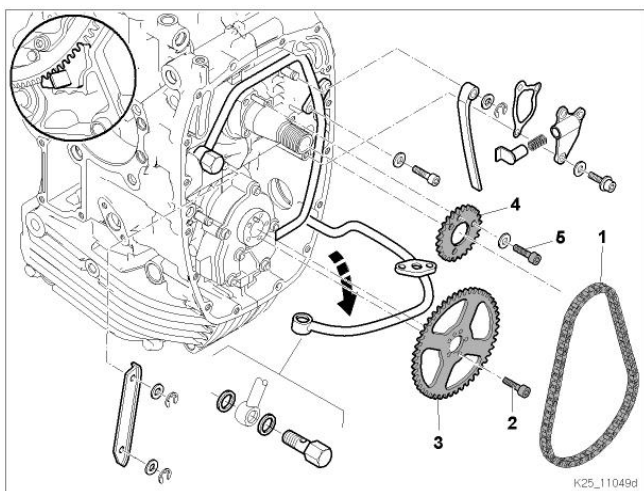
(-) Removing timing chain, crankshaft/auxiliary shaft

- Remove screws (2).
- Remove timing chain (1) with sprocket of countershaft (3).



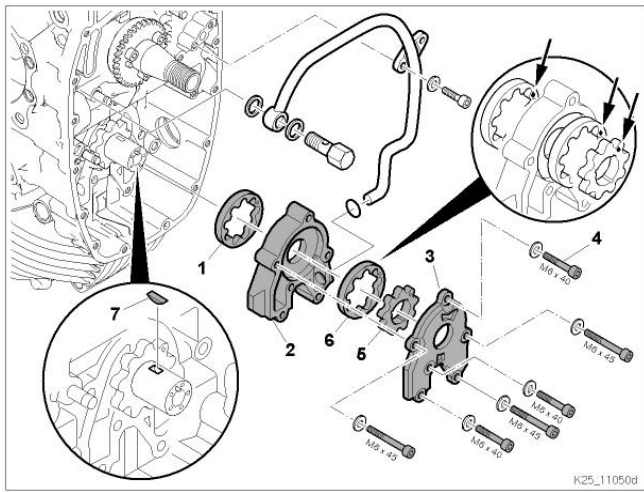
(-) Removing timing-chain pinion from crankshaft

- Remove screws (5).
- Remove timing-chain pinion (4).



(-) Removing oil pump

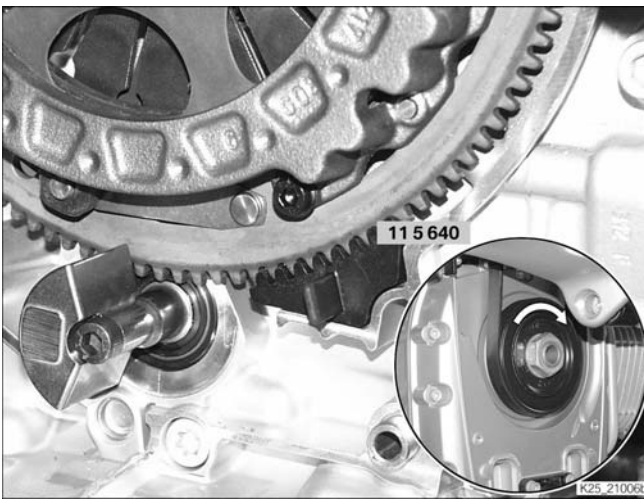
- Remove screws (4).
- Remove oil-pump cover (3).
- Remove outer rotor for cooling oil (6) and inner rotor



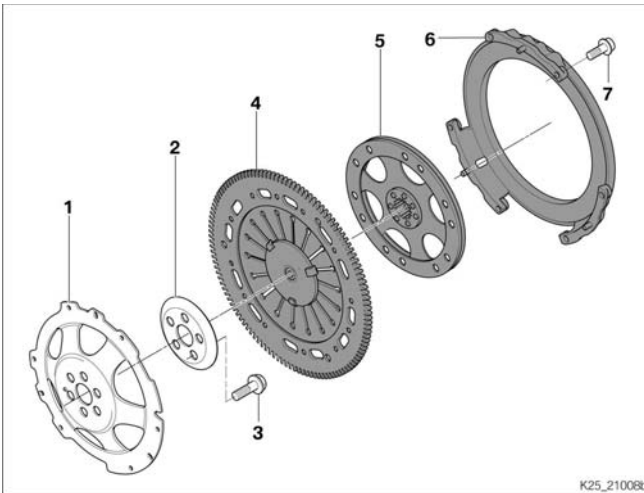
for cooling oil (5).

- Remove oil-pump housing (2) with outer rotor for lube oil (1).

(-) Removing clutch



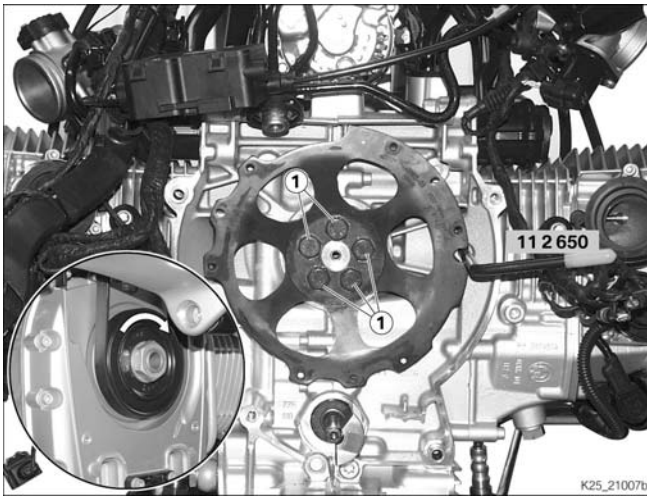
- By means of the belt pulley, turn the engine in the normal direction of rotation until the engine locking device can be inserted.
- Insert engine locking device (No. 11 5 640) .



- Working in diagonally opposite sequence, loosen screws (7) in stages.
- Remove engine locking device (No. 11 5 640) .
- Remove the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6).

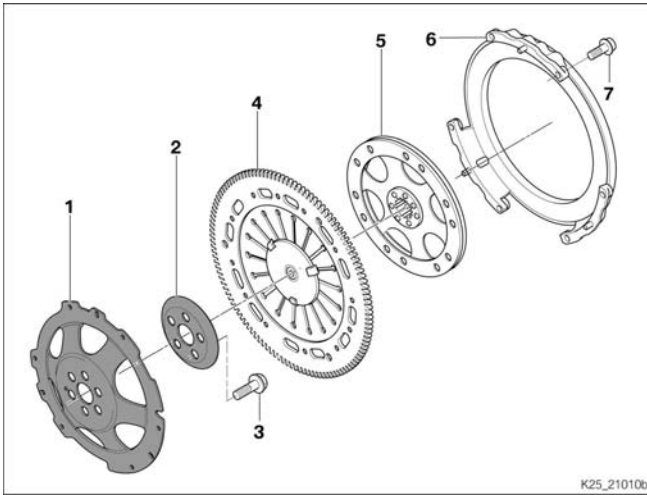
(-) Removing clutch housing

- By means of the belt pulley, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .



K25_21007b

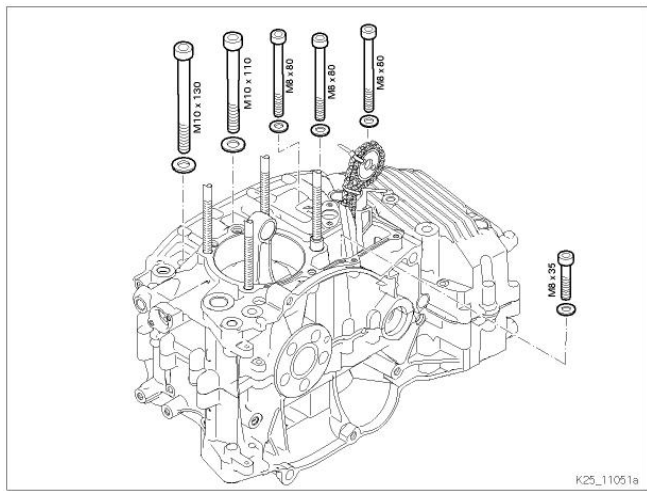
- Remove screws (3).
- Remove clutch housing (1) and reinforcing plate (2).
- Remove TDC locating pin (No. 11 2 650) .



K25_21010b

(-) Removing left half of engine casing

- Turn engine to side position.
- Remove the screws on the right-hand side.



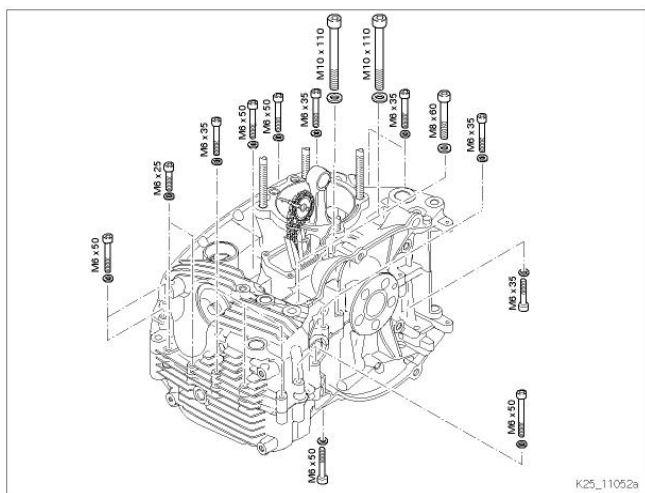
K25_11051a

- Turn engine to side position.
- Remove the screws on the left-hand side.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs



or other parts of the crankcase.

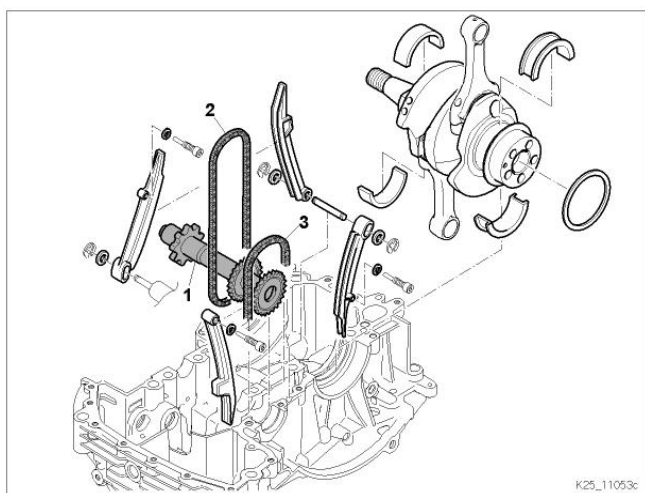
⚠ Attention

Nature: If the engine block is not kept straight during removal and installation, the bearing shells can be damaged.

Avoidance: Do not tilt the engine block when removing and installing.

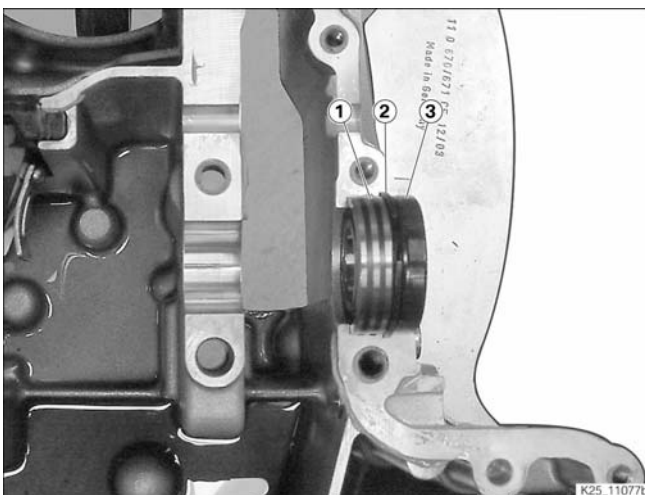
- Remove left half of engine casing.

(-) Removing auxiliary shaft



- Remove auxiliary shaft (1) with both timing chains.
- Remove left timing chain (2) and right timing chain (3).

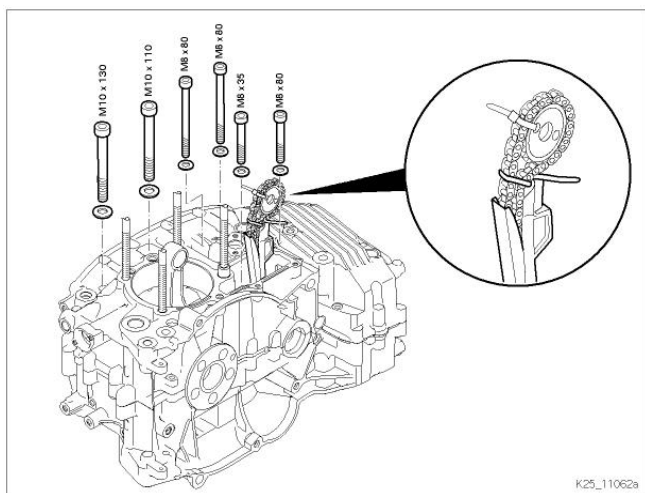
(-) Removing counterbalance shaft on clutch side




- Remove deep groove ball bearing (1).
- Remove circlip (2).


(-) Removing rotary shaft seal, counterbalance shaft

- Remove rotary shaft seal (3).




 Tightening torques		
Engine block, M6 x 35	8 Nm	
Engine block, M6 x 50	8 Nm	
Engine block, M6 x 25	8 Nm	
Engine block, M8 x 60, Bolted with sealing ring, A8 x 13 Al	19 Nm	
Engine block, M8 x 35	19 Nm	
Engine block, M10 x 110/130	Initial torque, 25 Nm	
	Final torque, 90 °	

- Turn engine to side position.
- Install the screws on the right-hand side.

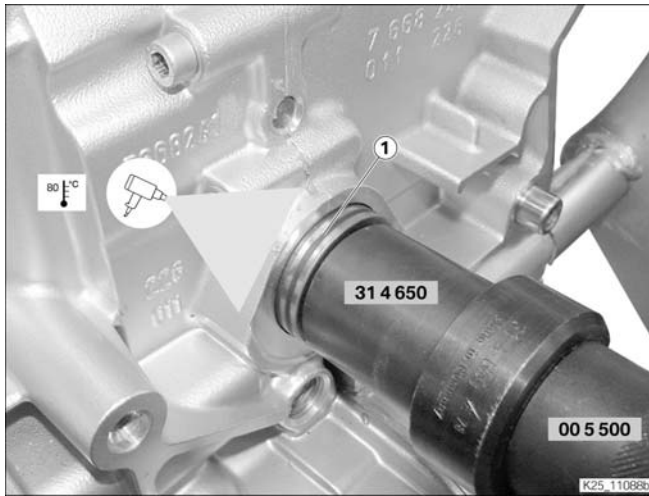
 Tightening torques		
Engine block, M6 x 35	8 Nm	
Engine block, M6 x 50	8 Nm	
Engine block, M6 x 25	8 Nm	
Engine block, M8 x 60, Bolted with sealing ring, A8 x 13 Al	19 Nm	
Engine block, M8 x 35	19 Nm	
Engine block, M10 x 110/130	Initial torque, 25 Nm	
	Final torque, 90 °	

(-) Installing counterbalance shaft on clutch side

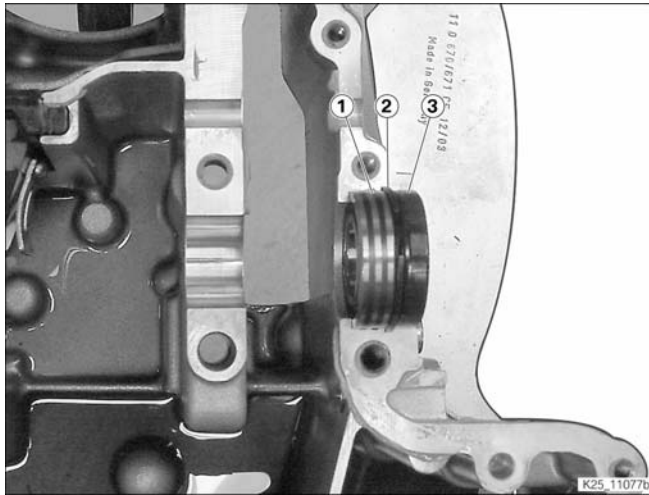
- Heat up engine casing in area of deep groove ball bearing.

 Technical data			
Release/mating temperature		80 °C	

- Fit deep groove ball bearing (1) with handle (No. 00 5 500) and drift (No. 23 4 660) .

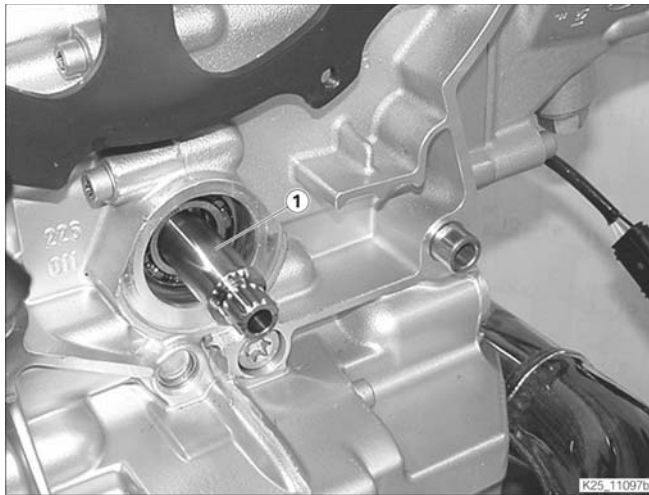


- Install circlip (2).



(-) Installing counterbalance shaft

- Install balancing shaft (1) from behind.



(-) Installing rotary shaft seal, counterbalance shaft



Attention

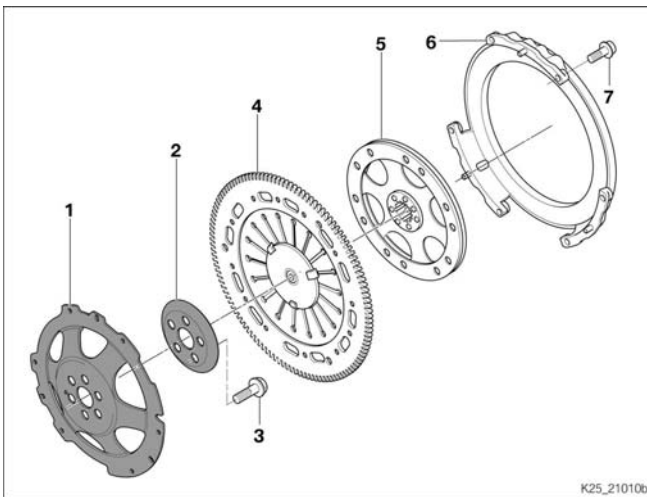
Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.



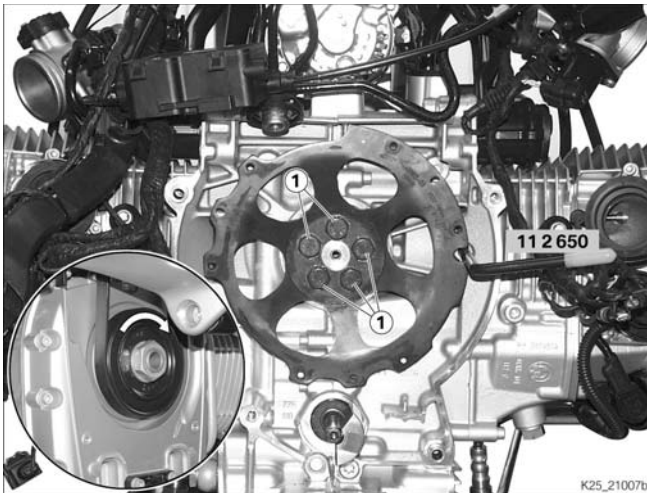
Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.

- Using handle (No. 00 5 500) and drift (No. 23 1 770) , drive the rotary shaft seal into the crankcase.


(-) Installing clutch housing



- Install clutch housing (1) with the locating lug engaged in the locating bore of the crankshaft.
- Install reinforcing plate (2) and install screws (3) to hold it in position.



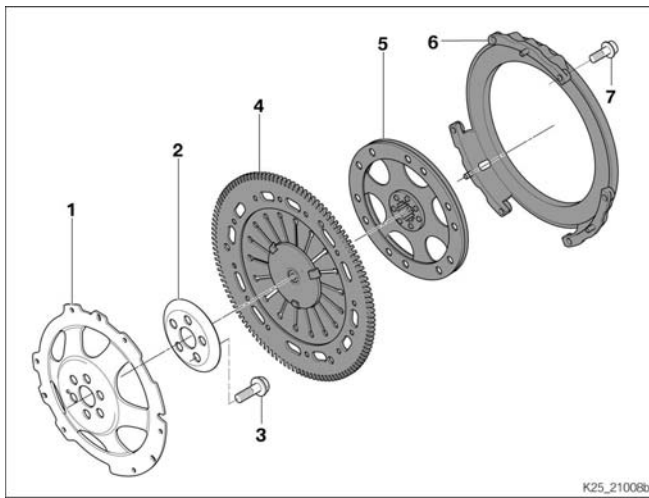
- By means of the clutch housing, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .
- Install new screws (1) and tighten in correct tightening sequence.

 Tightening torques		
Never re-use the original screws, M11 x 1.5 12.9	Threads and underside of head lightly oiled	
	Initial torque, 40 Nm	
	Final torque, 40 °	

- Remove TDC locating pin (No. 11 2 650) .

(-) Installing clutch

- Install the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6) in clutch




housing (1).



Note

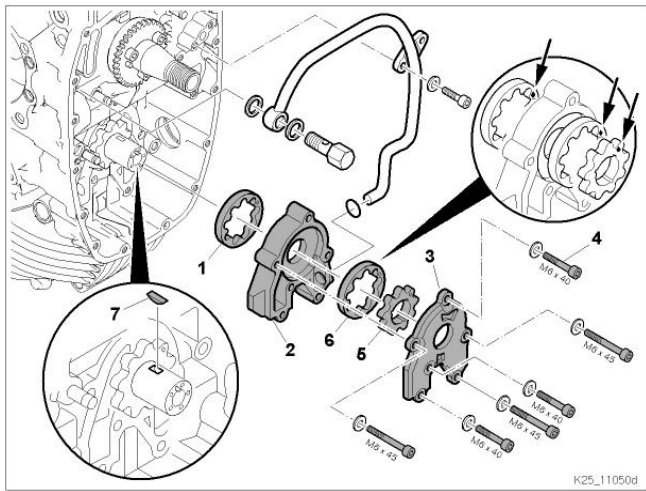
The clutch components are all precision-balanced. It is not necessary to check for identification marks when assembling.

- Insert screws (7).
- Use centering pin for clutch (No. 21 2 673) to centre the clutch plate.
- Insert engine locking device (No. 11 5 640) .
- Install screws (7) and tighten in correct tightening sequence.


 Tightening torques		
Never re-use the original screws, M6 x 20, in diagonally opposite sequence and stage by stage	12 Nm	

- Remove engine locking device (No. 11 5 640) and centering pin for clutch (No. 21 2 673) .

(-) Installing oil pump

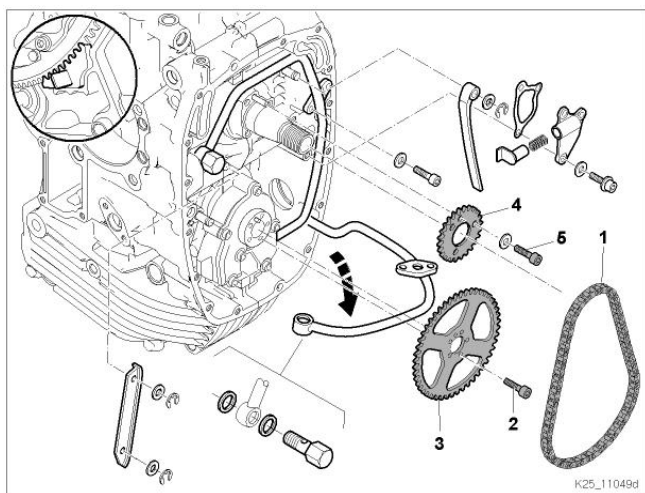


- Ensure Woodruff key (7) is seated correctly.
- Install outer rotor for lube oil (1) in the oil pump housing with the mark (arrow) facing forward. Take care not to mix up the outer rotors.
- Hold oil pump housing (2) in position.
- Install rotor for cooling oil (6) with the mark (arrow) facing forward.
- Install inner rotor for cooling oil (5). Make sure that the groove in the inner rotor is in line with Woodruff key (7) of the countershaft and that the mark (arrow) is pointing forward.
- Install new screws (4), noting the different lengths of the screws.

 Tightening torques		
Never re-use the original screws, M6 x 40	Initial torque, 4 Nm	
	Final torque, 90 °	
Never re-use the original screws, M6 x 45	Initial torque, 4 Nm	
	Final torque, 90 °	


(-) Installing timing-chain pinion on crankshaft

- Install timing chain pinion (4), making sure that the



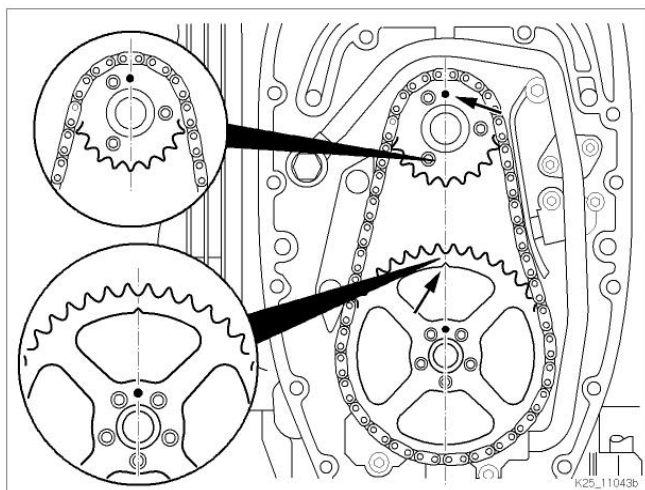
locating pin for the crankshaft engages the hole in the timing chain pinion.

- Install screws (5).

 Tightening torques		
Chain sprocket to crankshaft, M6 x 16	8 Nm	

(-) Adjusting crankshaft and auxiliary shaft to ignition TDC

- Make sure that the crankshaft and countershaft are in the **"firing TDC, right cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



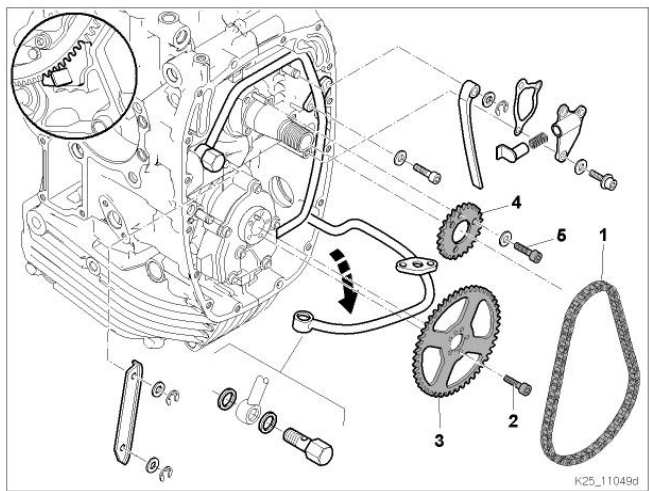
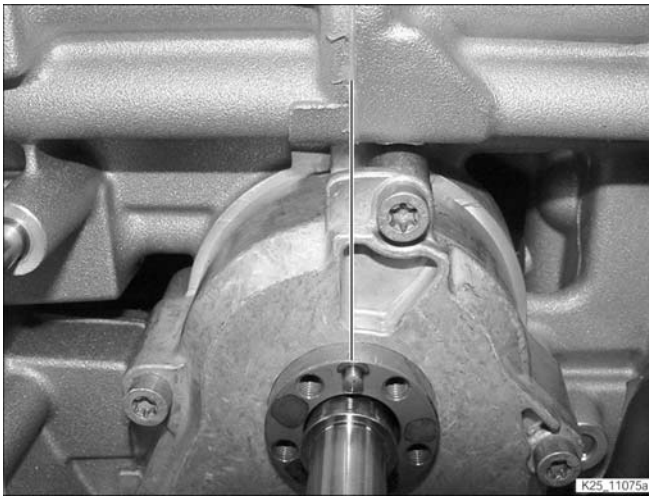
(-) Installing timing chain, crankshaft/auxiliary shaft

Precondition

- The countershaft is at firing TDC for right-hand cylinder, the locating pin of the countershaft is at the top, at the split line between the two halves of the crankcase.



- If necessary, turn the countershaft to firing TDC for the right-hand cylinder, so that the locating pin of the countershaft is at the top, at the split line between the two halves of the crankcase.




! Attention

Nature: Installing the timing chain in the wrong position will result in poor engine performance or cause parts to collide because the valve timing is off

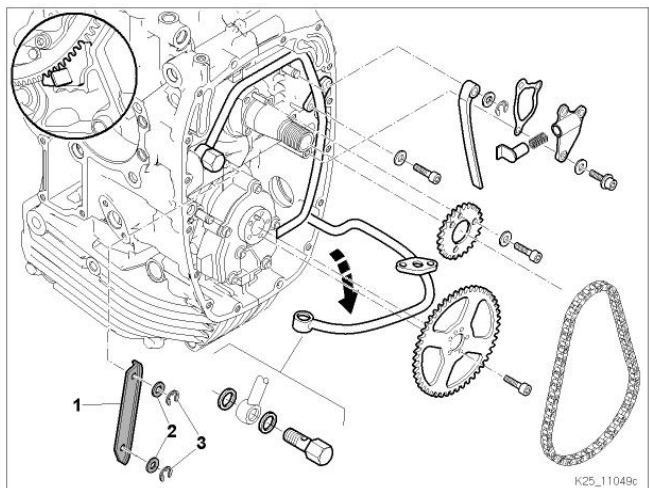
Avoidance: When turning the crankshaft, make sure that the timing chain does not come away from the crankshaft pinion (keep the timing chain taut).

- Install timing chain (1) with countershaft sprocket (3), making sure that the locating pin for the countershaft engages the hole in the countershaft sprocket.
- Install new screws (2).

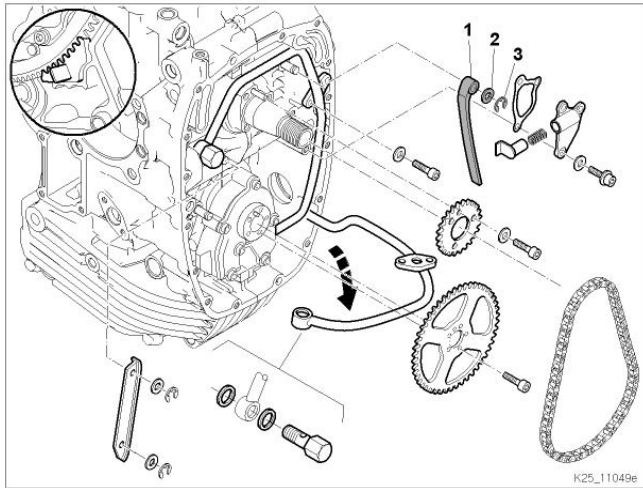
 Tightening torques	
Sprocket to auxiliary shaft, M5 x 16, Replace screws	8 Nm

(-) Installing timing chain guide rail, crankshaft/auxiliary shaft

- Install timing-chain guide rail (1).
- Install spacers (2) and retaining washers (3).



(-) Installing timing chain tensioner rail,

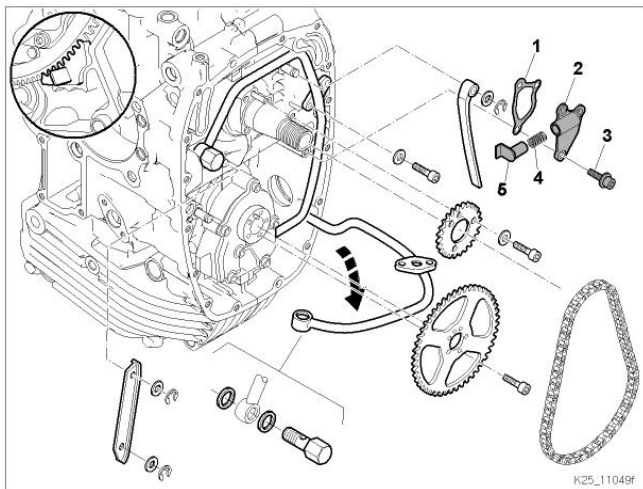



crankshaft/auxiliary shaft

- install timing-chain tensioning rail (1).
- Install spacer (2) and retaining washer (3).

(-) Installing timing chain tensioner, crankshaft/auxiliary shaft

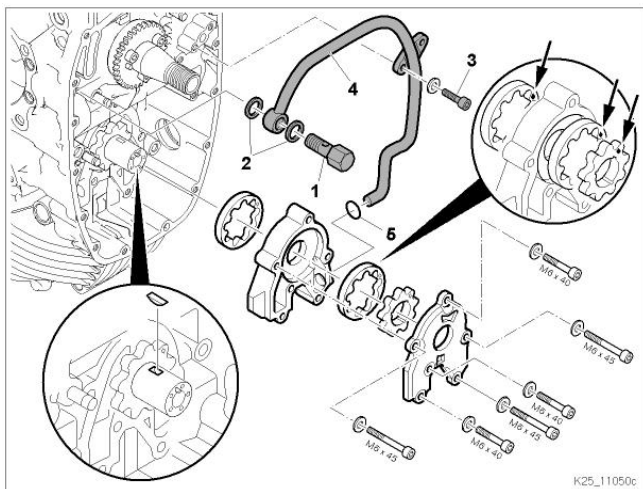
- Check gasket (1) for damage; replace if necessary.
- Install seal (1).
- Place housing (2) in position together with spring (4) and piston (5), making sure that the piston is angled toward the rear.
- Install screws (3).




 Tightening torques		
Housing for chain tensioner to crankcase, M6 x 25	8 Nm	


(-) Installing cooling oil line

- Install new O-ring (5).
- Install cooling oil line (4) and pivot it up.
- Install screws (3).



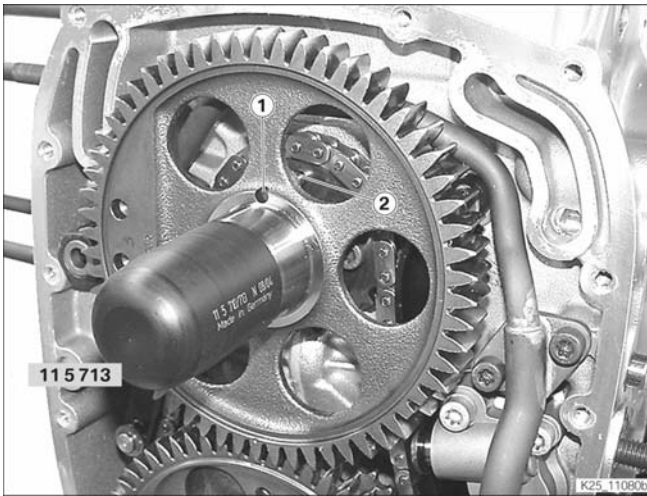
 Tightening torques		
Cooling oil line (inside engine) to crankcase, left, M6 x 16	8 Nm	

- Install banjo bolt (1) with new sealing rings (2).

 Tightening torques		
Banjo bolt, M14 x 4.5	25 Nm	

(-) Installing counterbalance shaft drive gear

- Clean inner taper of counterbalance drive gear and outer taper of crankshaft, **both must be free of oil**



and grease.

- Install the drive gear for the balancing shaft, making sure that straight pin (2) of the crankshaft engages hole (1) in the drive gear.
- Install a suitable tool for holding the drive gear and preventing it from turning.

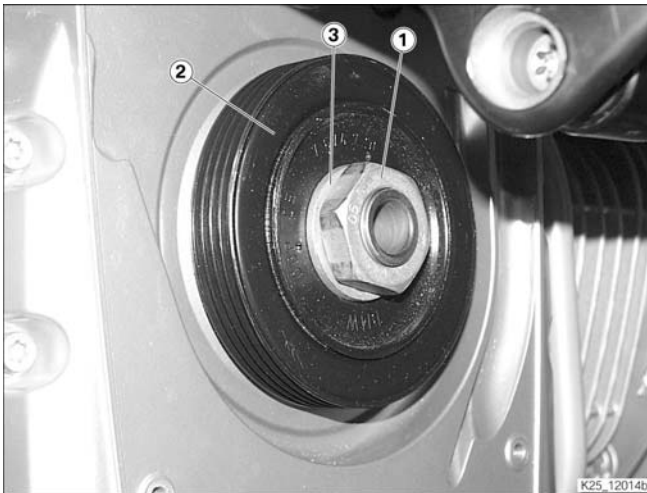
► **Installing crankshaft belt pulley**


Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.



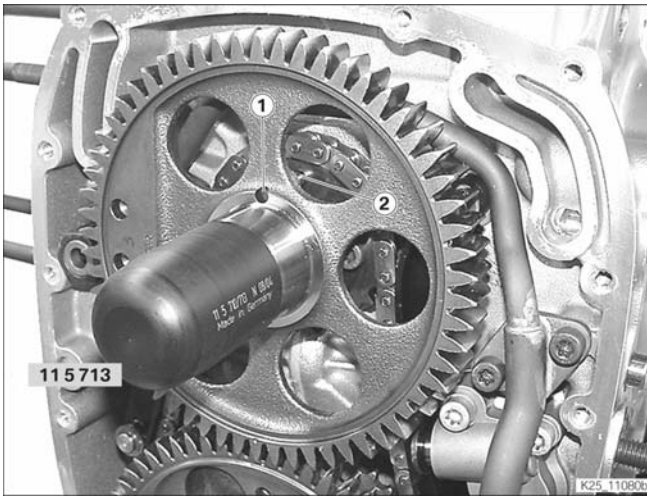
 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	



- Remove TDC locating pin (No. 11 2 650) .



- Remove the tool for holding the drive gear and preventing it from turning.



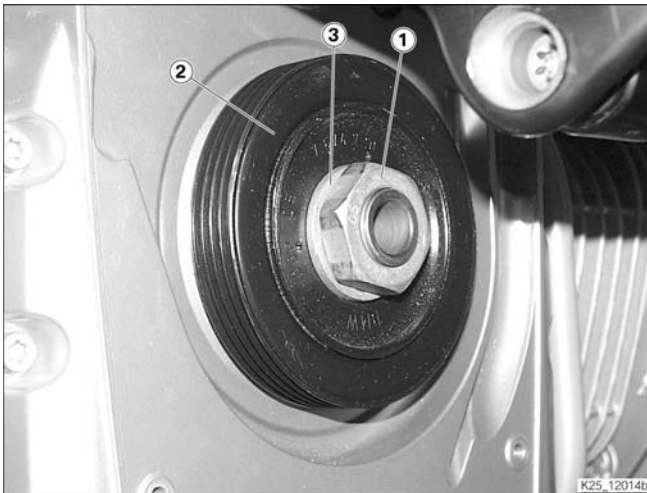
► **Removing crankshaft belt pulley**

Precondition

- Engine locked.

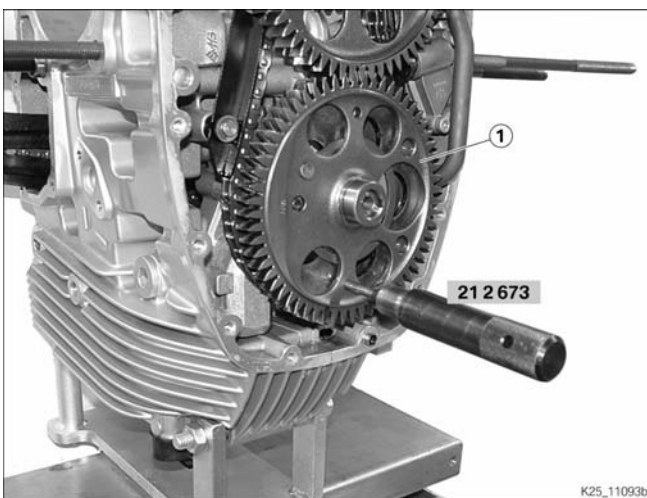


- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

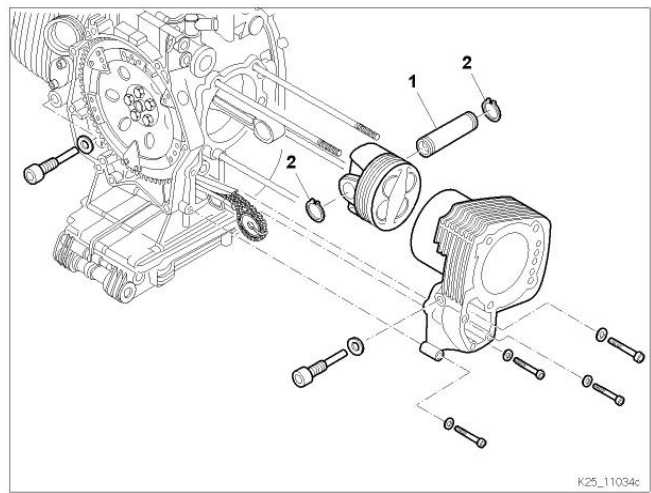
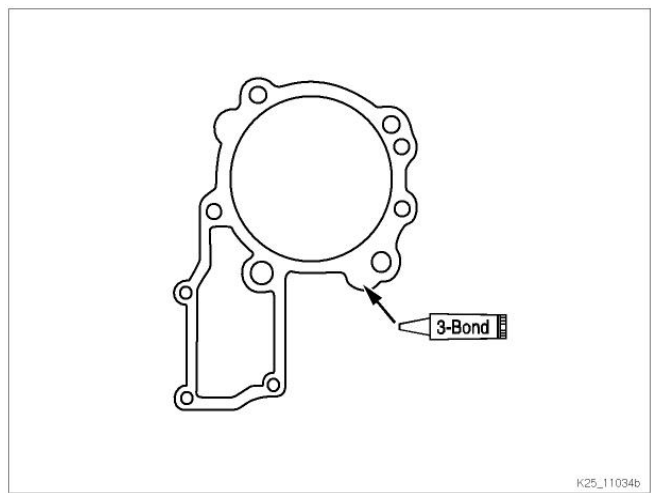
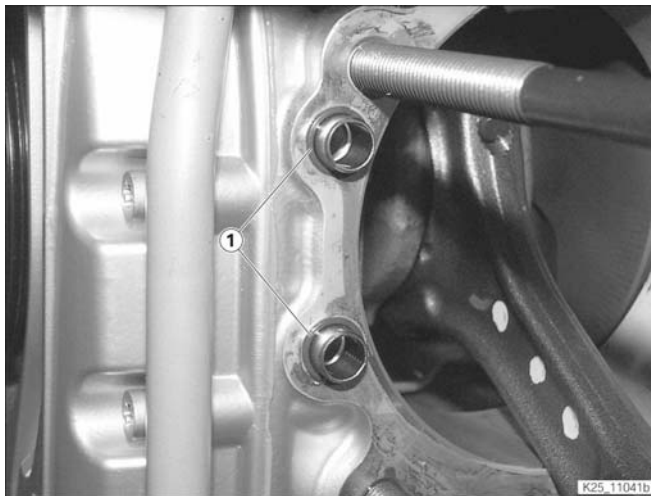


◀ **(-) Installing tensioning wheel**

- Install tensioning gear (1), if necessary noting the feather key in the balancing shaft.
- Remove clutch centring pin (No. 21 2 673) .



(-) Installing right cylinder




Precondition

- Crankshaft is locked at TDC.




- Slip new O-rings (1) over the reamed sleeves and into the crankcase.

- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.

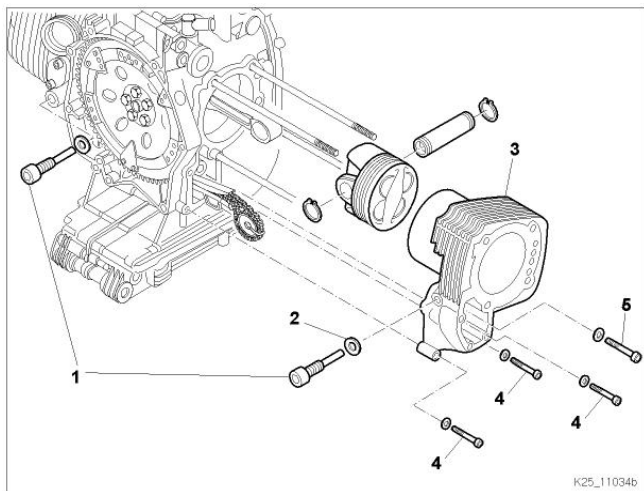
 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain



cavity, take care not to drop parts into the engine.

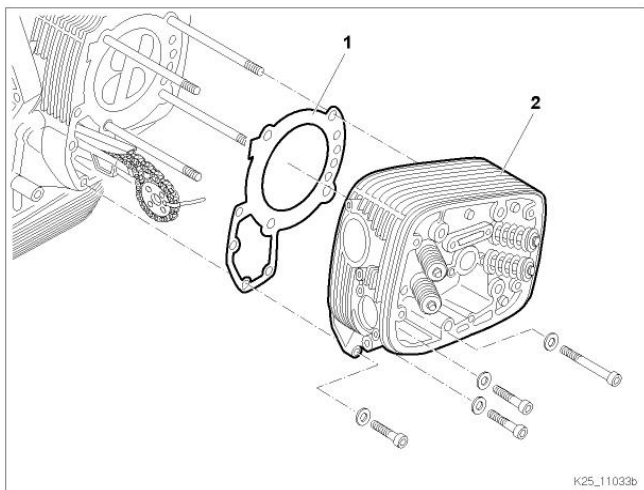
Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



⚠ Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

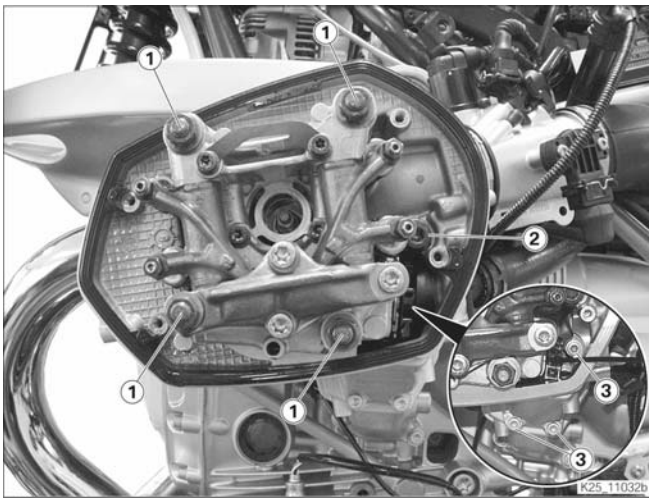
- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

⚠ Attention


Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mils at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.



Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

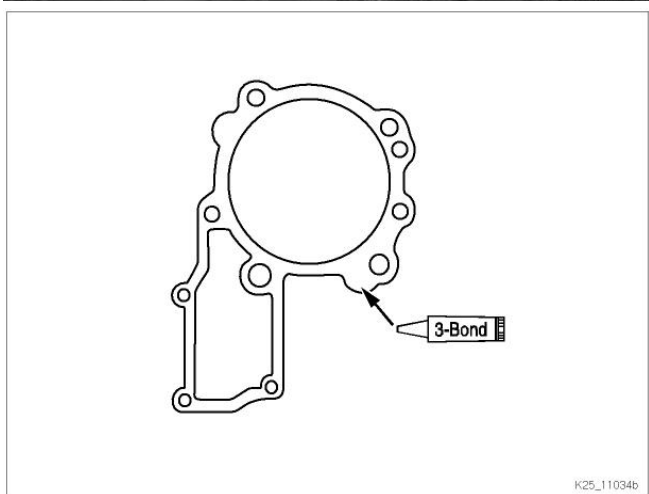
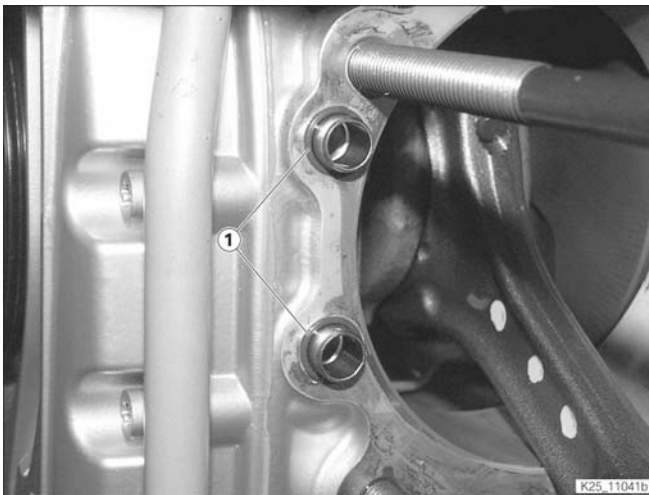
(-) Installing left cylinder

Precondition


- Crankshaft is locked at TDC.

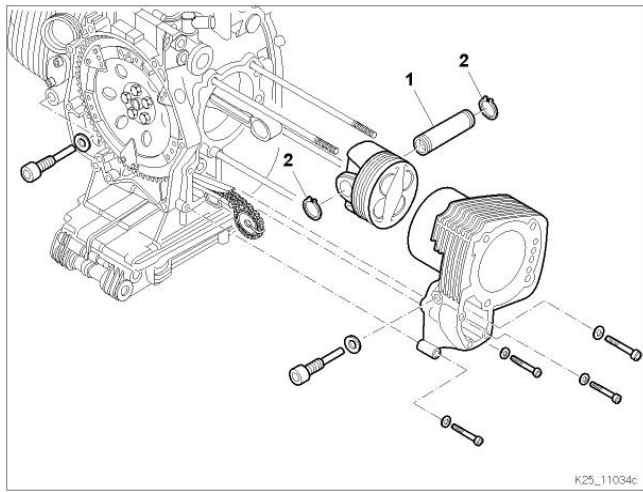


- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376



- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.



Consumables/lubricants

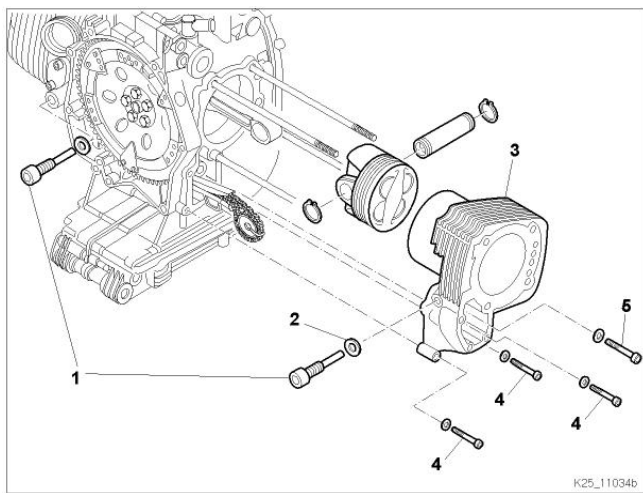
Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing left cylinder head

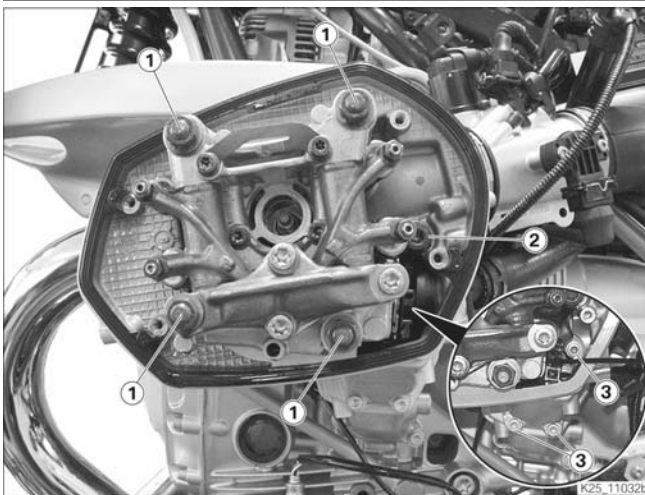
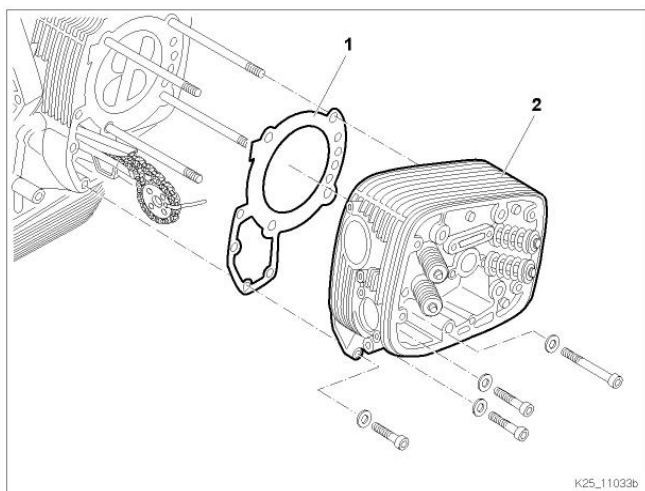
- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed



(firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.


- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

! Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

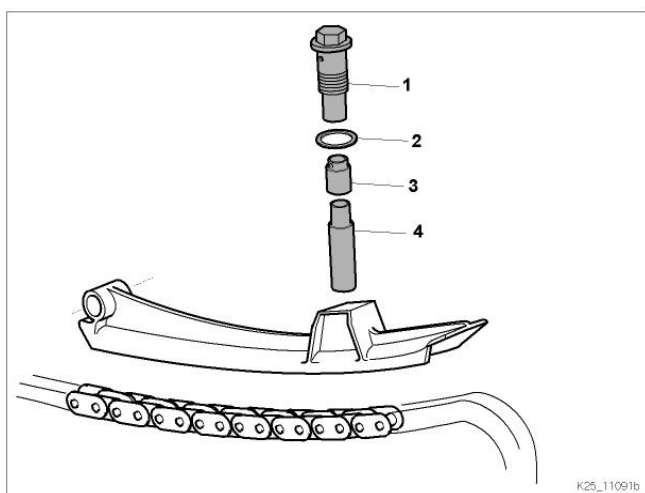
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Installing left timing chain tensioner


- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore up in the chain tensioner.
- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.

>>



The chain tensioner must slide onto the piston without tilting.

- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	

(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and that the screw is tightened hand-tight.



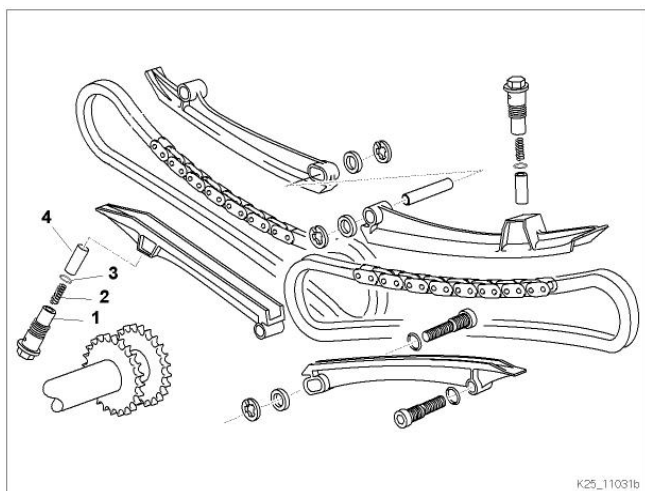
▶ Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.




- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.



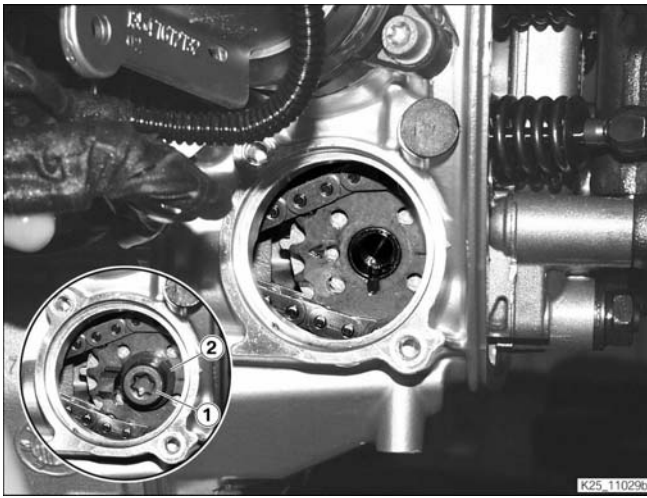
 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .



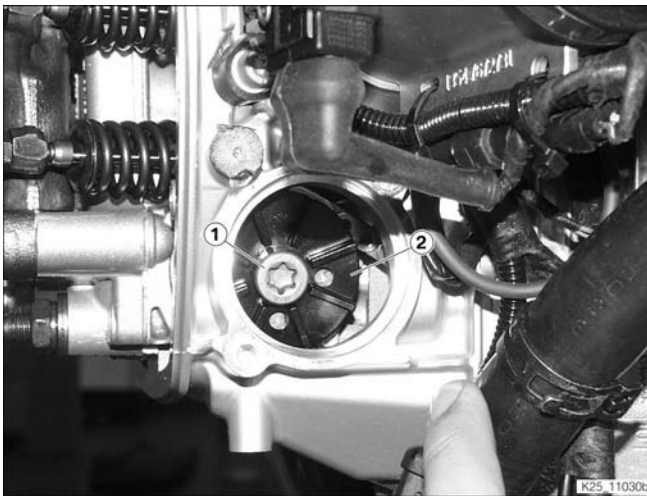
(-) Securing left camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).



Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

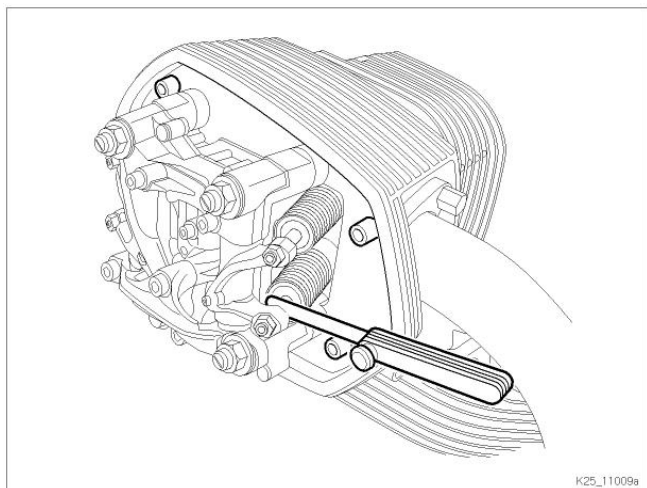
Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	

Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	
--------------------------------	------------------------	--------	--

Result: Valve clearance is out of tolerance.

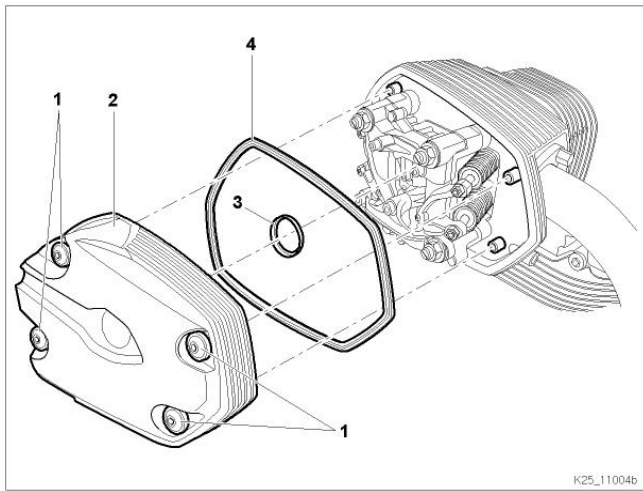
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.


 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

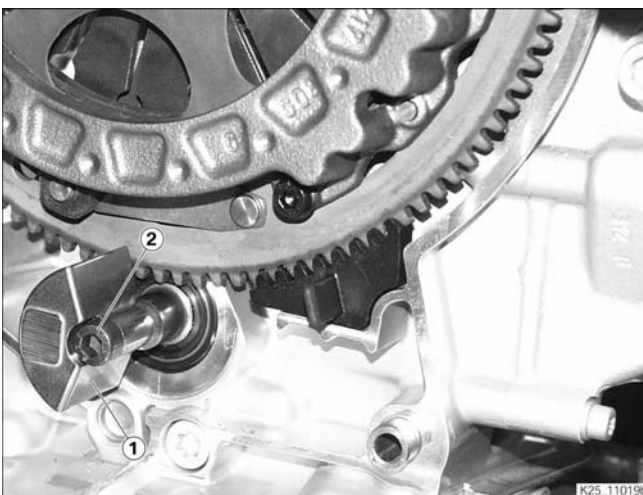
(-) Installing cylinder head covers




- Gaskets must be free from oil and grease, replace if damaged.
- Fit gaskets (3) on cylinder head covers.
- Fit gaskets (4) on cylinder heads.
- Install the cylinder head covers, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing balancing weight



- Lightly coat the friction face of the rotary shaft seal on balance weight (1) with engine oil.


 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

 **Attention**

Nature: When the timing case cover is removed, the balancing shaft can be pushed forward in the engine and damage the sealing lip of the shaft sealing ring.

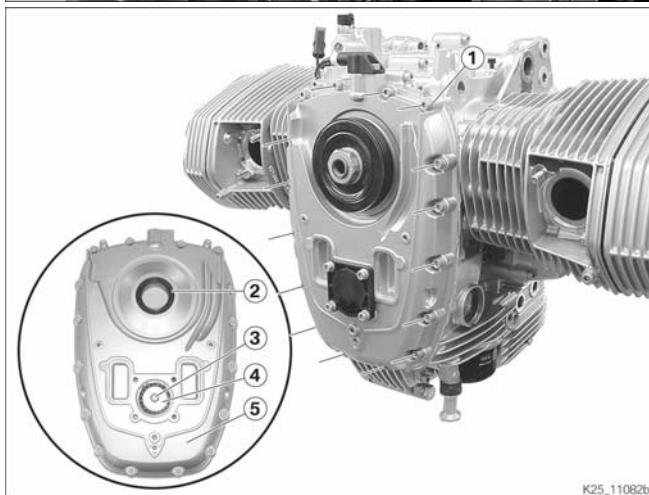
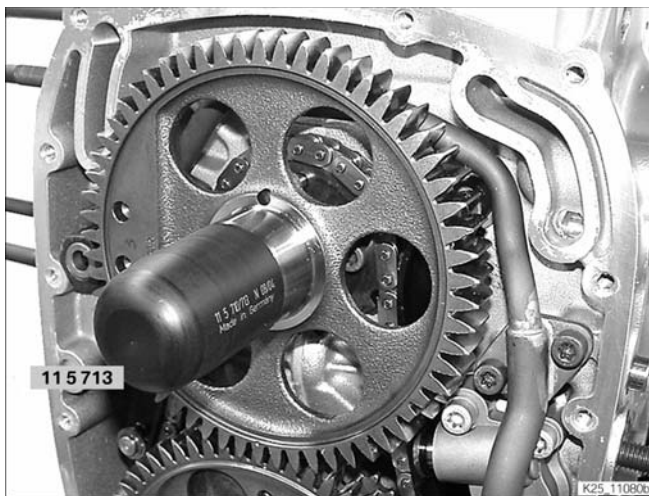
Avoidance: If the timing case cover is removed secure the balancing shaft in position, so that it cannot be pushed forward.

- Push balance weight (1) onto the counterbalance shaft.
- Install screw (2) and tighten.


 Tightening torques		
Neck-down screw, M8 x 70, Replace screws	Initial torque, 10 Nm	
	Final torque, 90 °	

(-) Installing timing case cover

- Install sliding sleeve (No. 11 5 713) .




- Make sure the sealing surface of the timing case cover is clean and free of grease and run a uniform bead of sealant round the face.

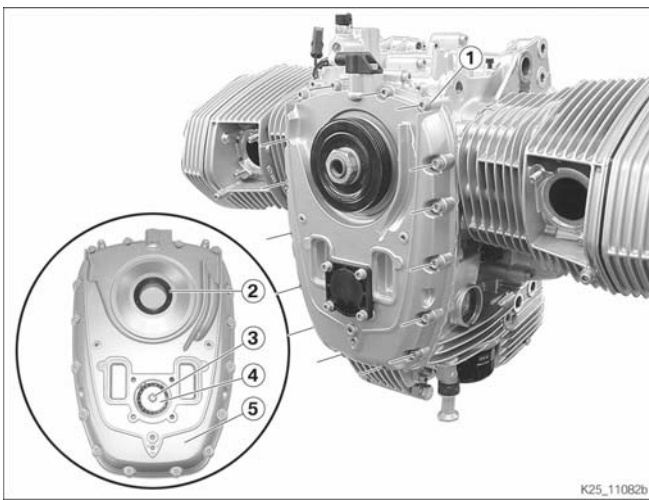
 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

► Securing crankshaft inductive sensor in timing case cover


- Position inductive sensor for crankshaft (2) on the timing case cover and install the screw.




 Tightening torques		
Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	



- Place timing case cover (5) in position.
- Install screws (1).

 Tightening torques		
Timing case cover to crankcase, M6	8 Nm	


- Remove sliding sleeve (No. 11 5 713) .
- Install screw (3) and washer (4).

 Tightening torques		
Gear wheel to balancing shaft, M8 x 50	19 Nm	

(-) Installing counter balance shaft cover

- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).

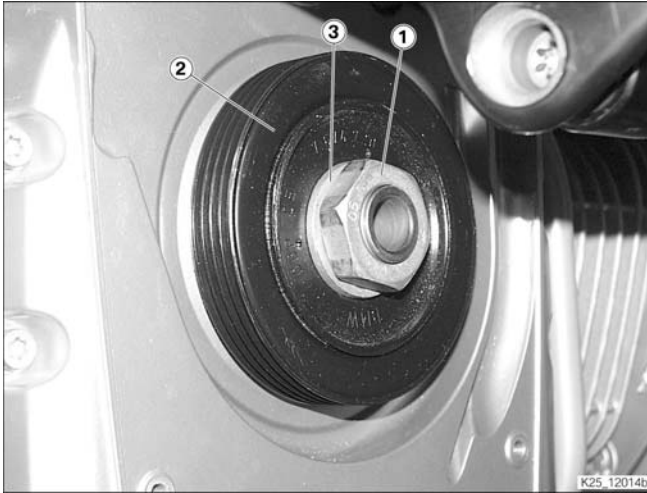


 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing crankshaft belt pulley

Precondition


-



Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	



- Remove TDC locating pin (No. 11 2 650) .

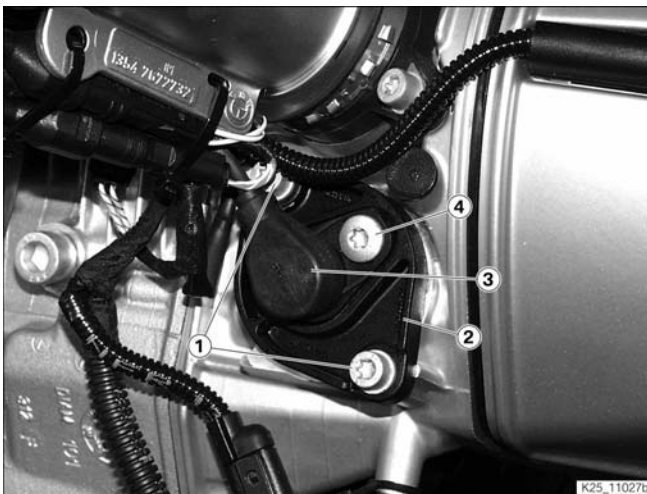
(-) Installing right camshaft cover



Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.



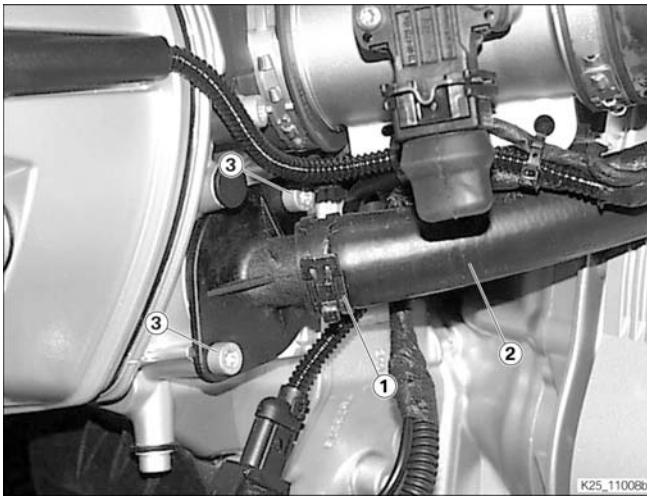
- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

(-) Installing left camshaft cover



Attention

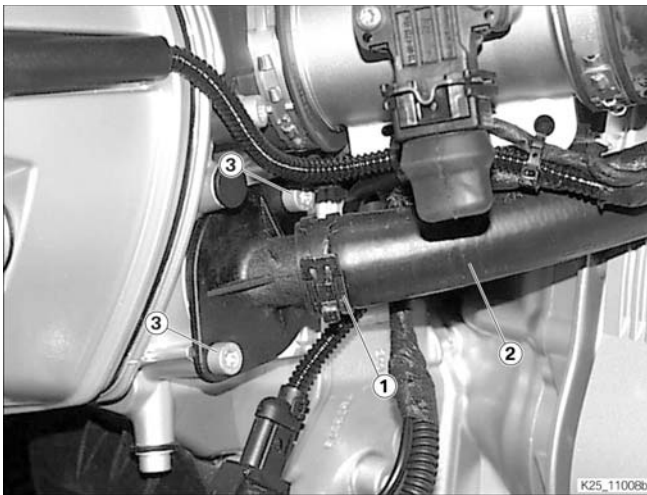
Nature: Sharp edges of the housing can damage the O-ring in the course of assembly



work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).



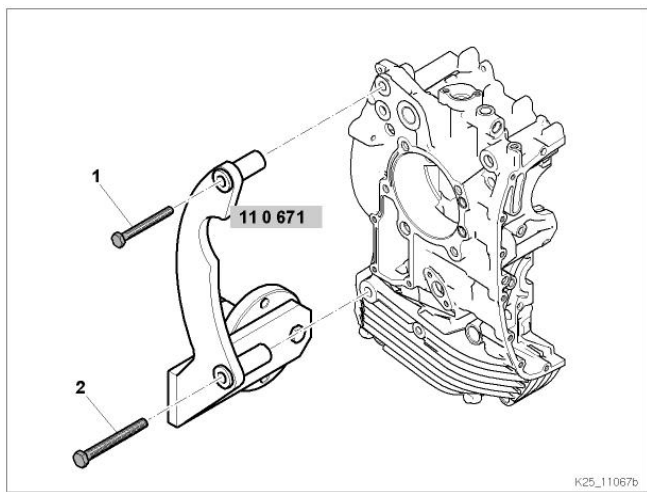
► **Connecting hose for crankcase breather**

- Connect hose (2) to the camshaft cover.
 - Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



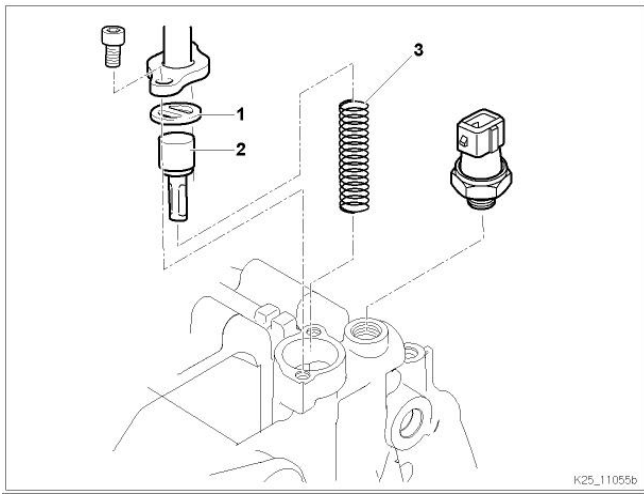
(-) Removing engine holder from right half of engine block

- Remove screws (1) and (2).
- Remove engine holder (No. 11 0 671) .



(-) Installing oil thermostat

- Install spring (3), control element (2), and supporting plate (1).



K25_11055b

 **11 27 000 Replacing balancing shaft**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

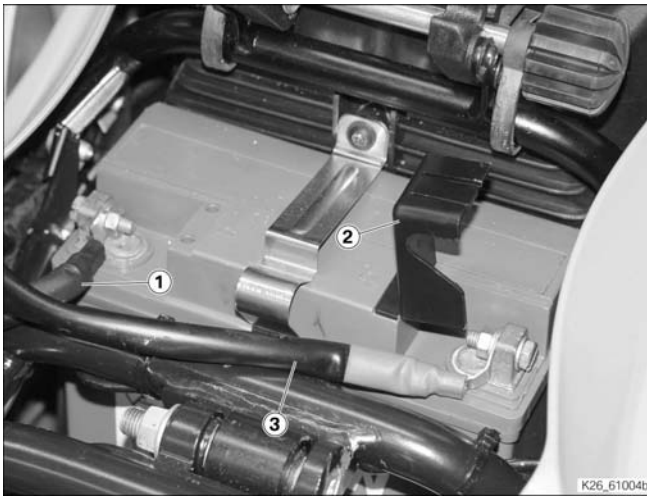
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

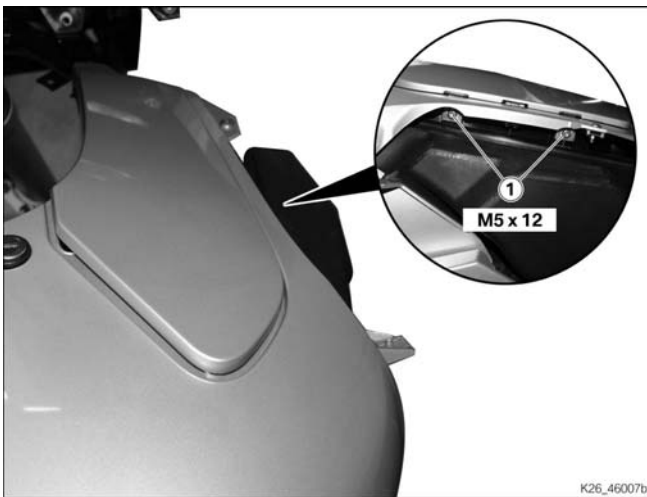
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



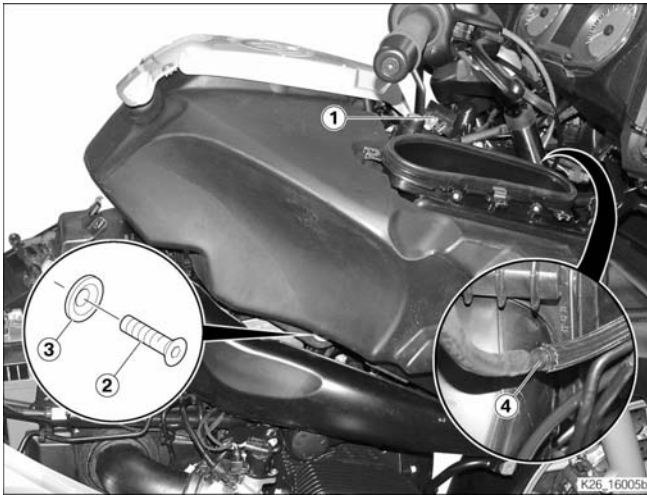
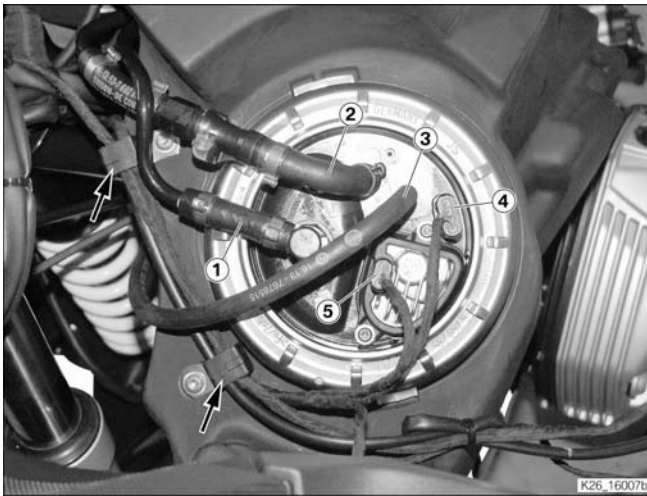
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

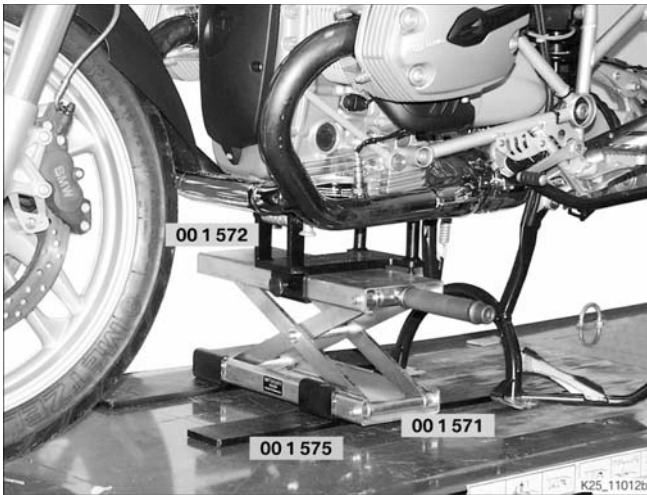


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

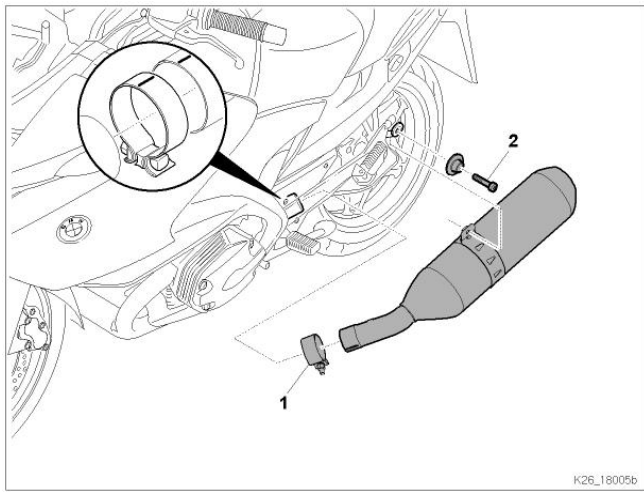


(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

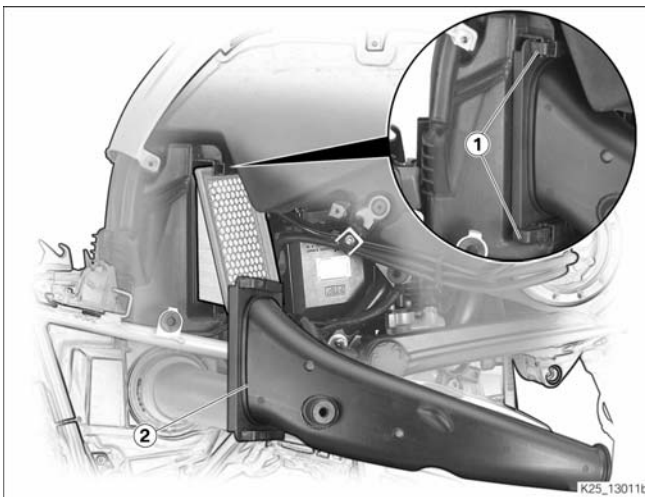
(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



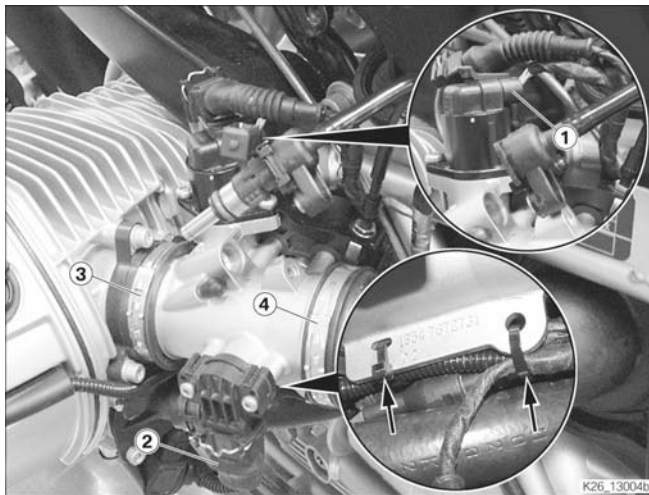
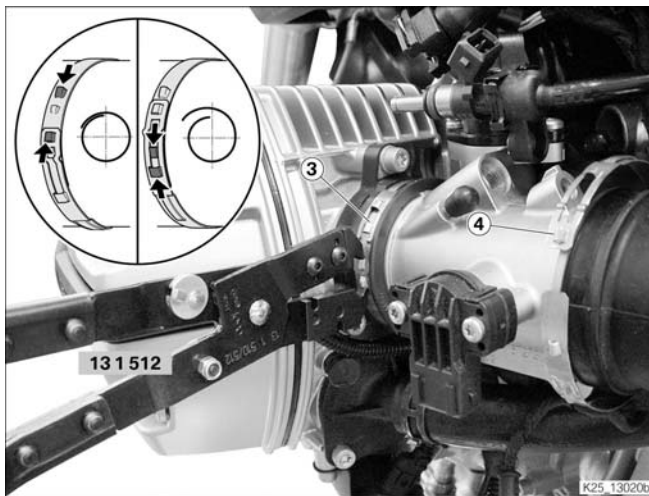
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.



(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

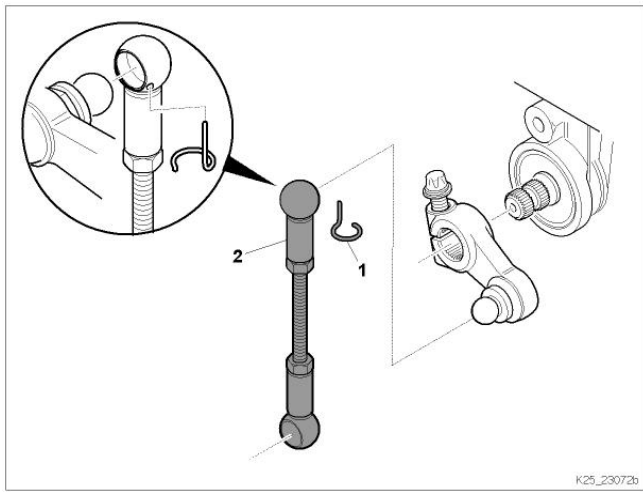
(-) Securing throttle valve stub with cable divider

- Tie up throttle valve stub and cable divider with cable tie (arrow).



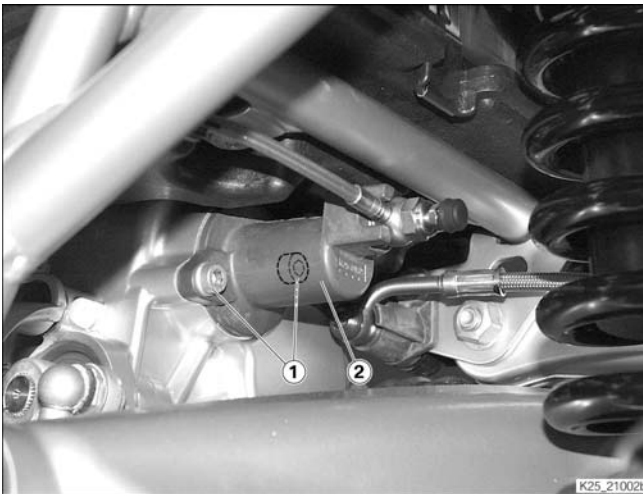
(-) Disengaging selector rod from shift lever

- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.



(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.

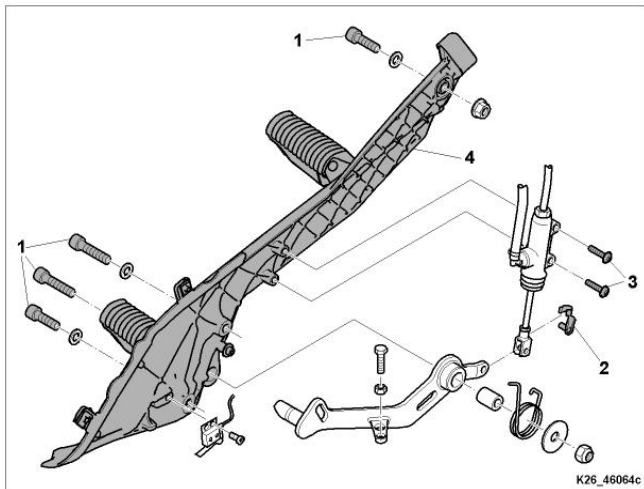


(-) Removing right footrest plate

- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.



Technical data

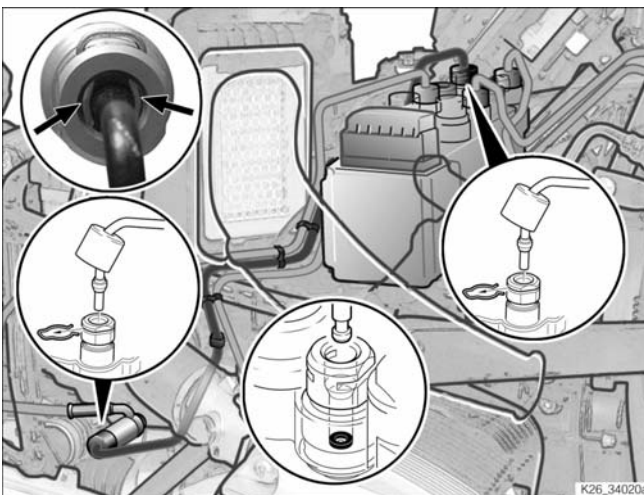
Release temperature, screws for rear brake master cylinder		100 °C	
--	--	--------	--

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.



- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.

(-) Disconnecting brake pipe for rear wheel circuit from pressure modulator



- Push the protective cap up.
- Remove the spring clip.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap the area around the connector in a cloth.
- Open the retaining clips, lift the brake pipe out of the pressure modulator and catch escaping brake fluid with a cloth.
- Seal the open end of the brake pipe to prevent brake fluid from dripping.

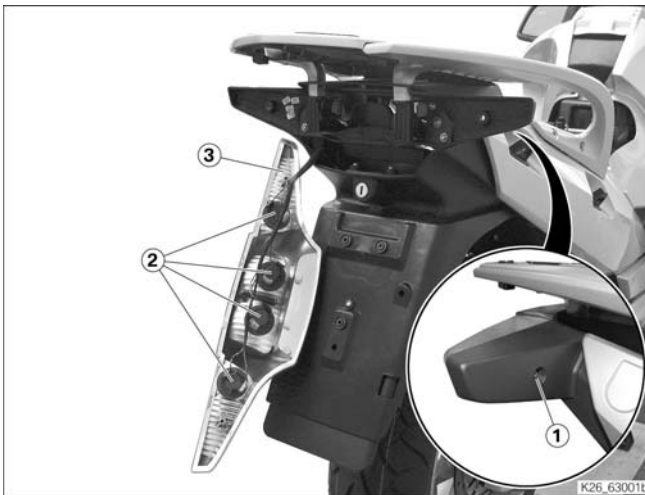


Note

Use the protective cap from a bleed screw to seal the brake pipes.

(-) Removing rear-light unit

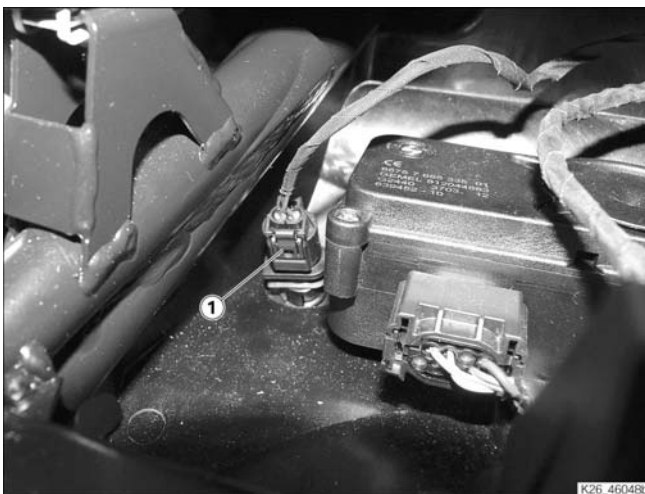
- Remove screws (1).
- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).



(-) Disengaging wiring harness at rear

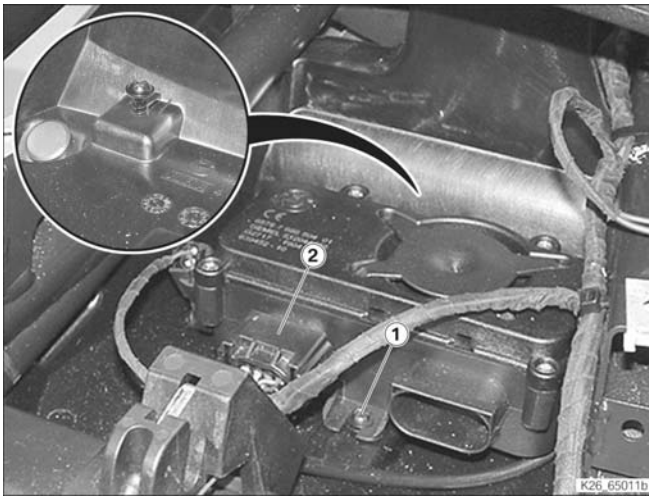
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



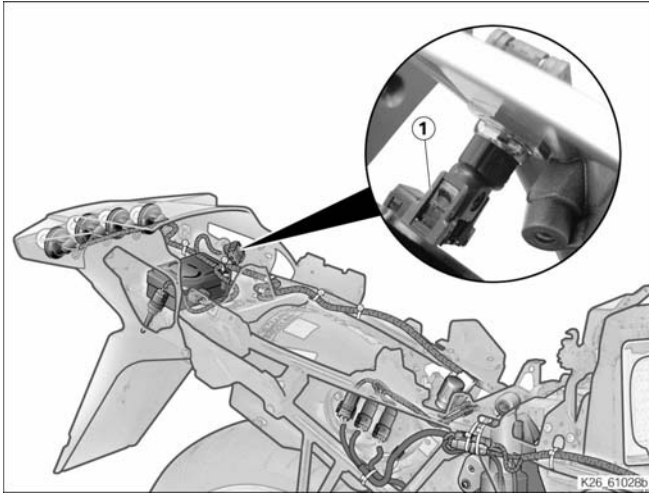
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

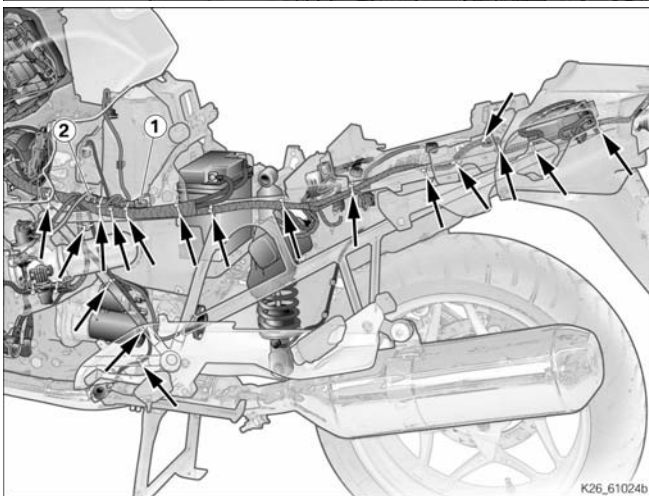


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.

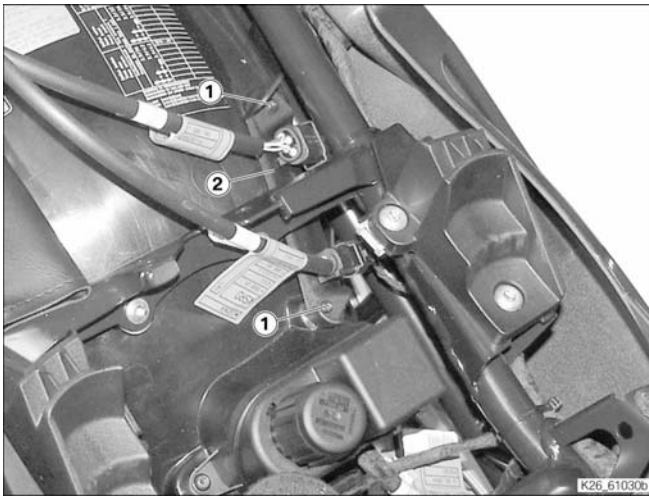


- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.

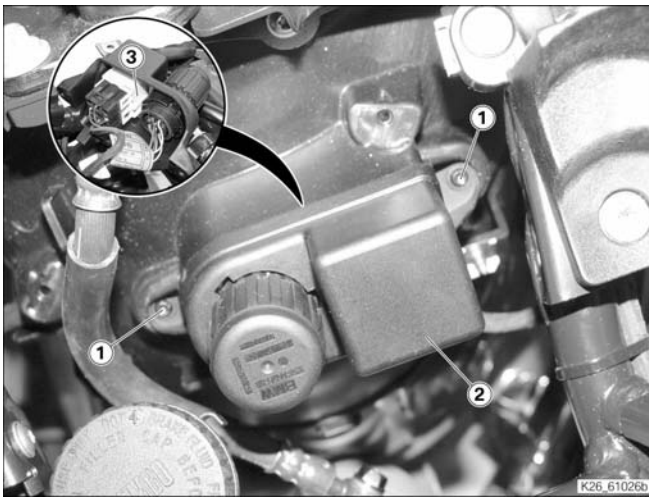


Variant, Seat heating

- Remove screws (1).
- Pass holder (2) forward with the cables.

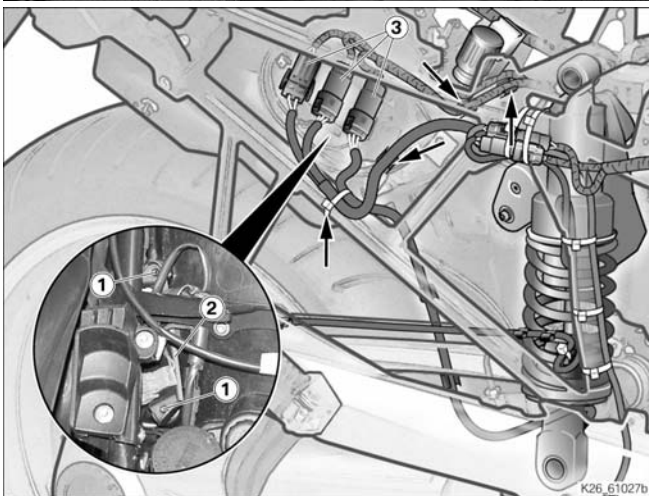


- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.

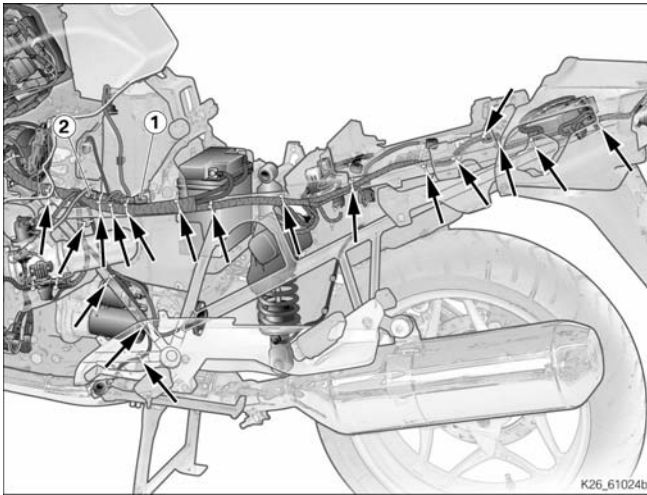
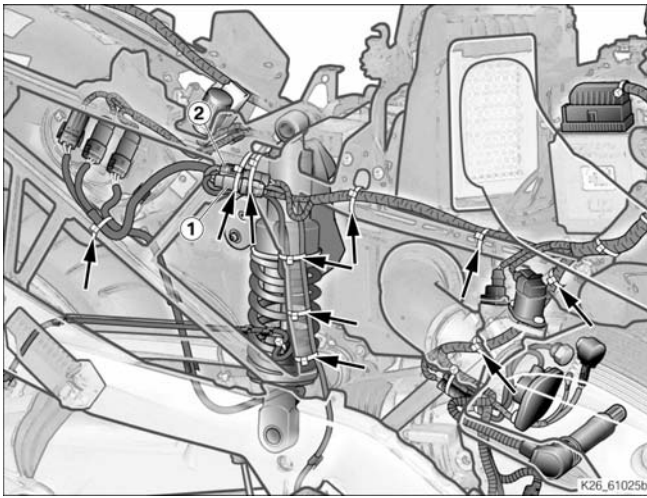


Variant, ESA

- Remove screws (1).
- Pass holder (2) forward with the cables.
- Disconnect plug (3) of the spring strut.



- Disconnect plug (1) of the speed sensor.



- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.

(-) Removing rear section of motorcycle



- Open hose clip (1).
- Disconnect the hose from the intake air silencer.

- Secure the front wheel on the lifting platform.
- Using straps, secure the rear section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.



► **Releasing threaded fastener on rear frame**

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.

! **Attention**

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

Apply masking tape to the part of the swinging arm that could be damaged.

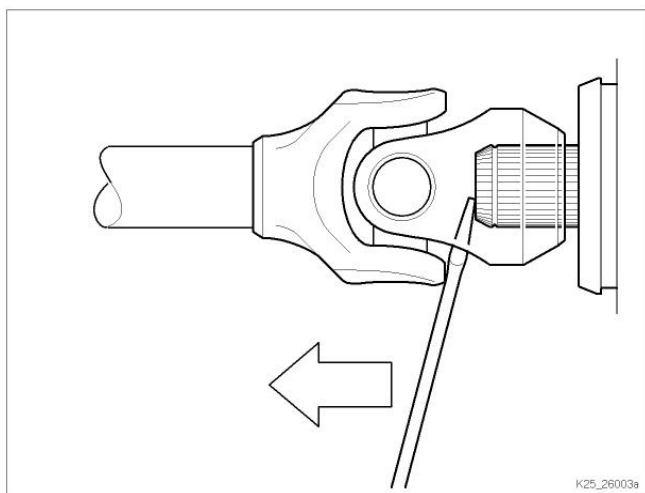
- Slacken screw (4), but do not remove it at this point.

▷ **Pressing universal shaft off gearbox output shaft**

- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.



- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the



shaft in this position.

- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Remove screw (4).



- Thread the fuel-tank breather hose out of the rear frame.
- Disconnect the fuel pressure regulator from the intake air silencer.
- Using crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) , carefully lift the rear section clear of the motorcycle, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.



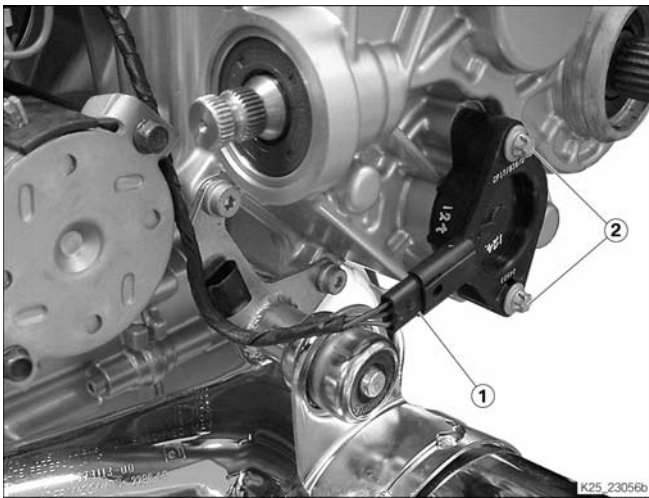
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Pass the control-circuit line with the brake master cylinder forward out of the way.
- Carefully set down the rear section where it will not be damaged.

(-) Removing gearbox potentiometer



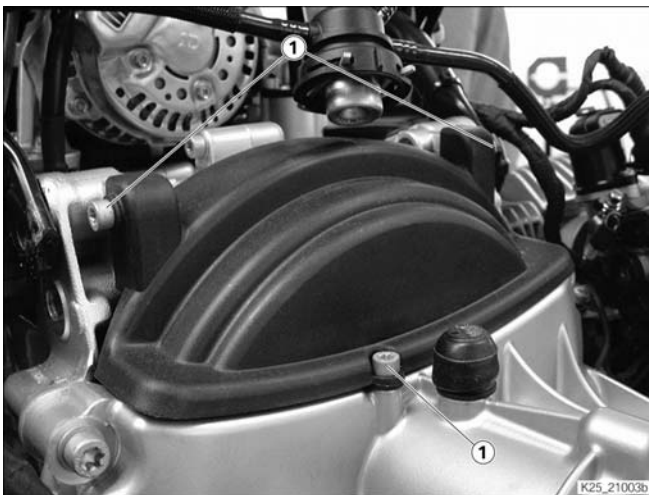
- Disconnect plug (1) of the gearbox potentiometer.
- Release the cable from the cable clips.
- Remove screws (2) from the gearbox potentiometer.
- Remove the gearbox potentiometer, noting the O-ring.

(-) Removing starter



- Disconnect "starter positive" cable (1) (terminal 30).
- Disconnect "starter start signal" plug (2) (terminal 50).
- Remove screws (3).
- Remove the starter.

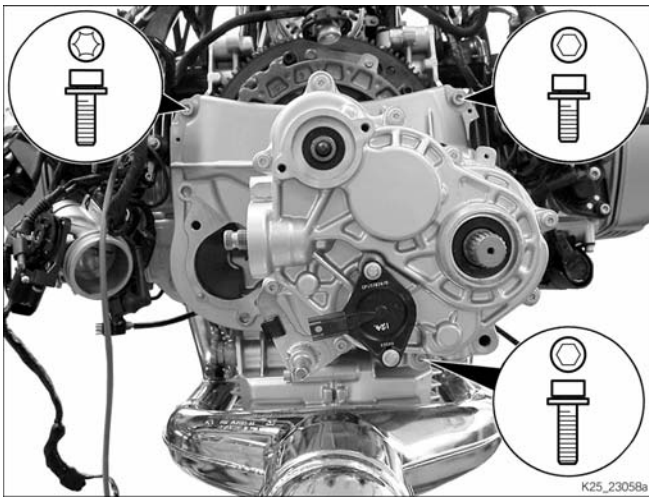
(-) Removing cover for clutch



- Remove screws (1).
- Carefully slip the clutch cover to the rear underneath the pressure modulator and remove.
- Install screws to hold the pressure modulator in position.

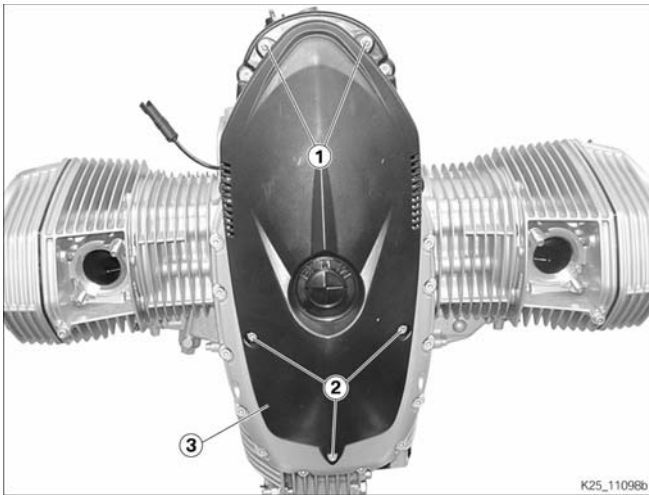
(-) Removing gearbox

- Remove screws (1) of the clamps on the exhaust manifold.
- Pull clamp (arrow) off the bracket.



- Remove 3 screws.
- Pull the gearbox straight to the rear to remove.
- Keeping it straight to ensure that oil does not escape through the breather, place the gearbox on a smooth, level surface.

(-) Removing belt guard



- Remove screws (1) and (2).
- Remove belt guard (3).

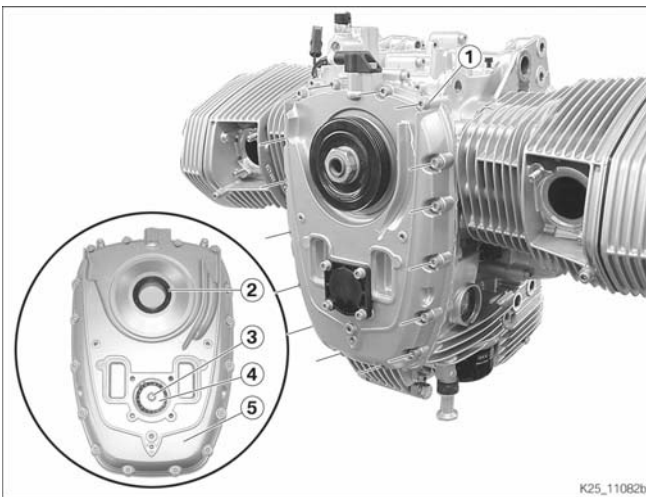
(-) Removing cover for counterbalance shaft

- Remove screws (1) and remove cover.



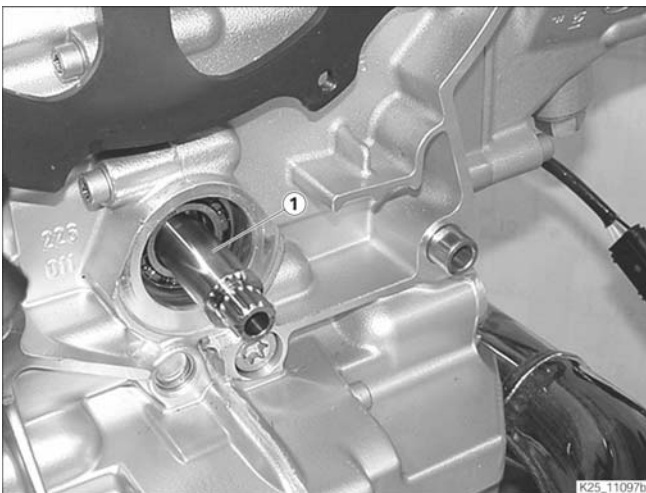
(-) Releasing balancing shaft at front bearing

- Remove screw (3) and washer (4).



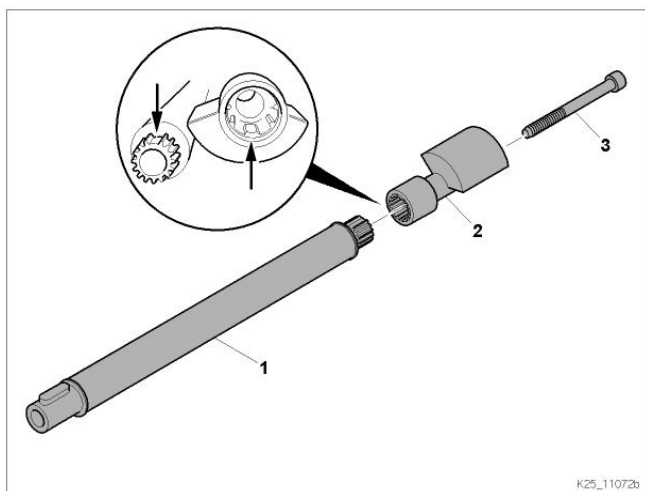
(-) Removing counterbalance shaft

- Pull balancing shaft (1) to the rear to remove.




(-) Replacing balancing shaft

- Clamp compensating weight (2) in a vice fitted with protective jaws.
- Remove screw (3) dispose of it in an environmentally approved manner.
- Remove balancing shaft (1).



- Remove the Woodruff key, if necessary.
- Install the Woodruff key in the new balancing shaft, if necessary.
- Position the balancing shaft on the compensating weight, making sure that the splines (arrows) engage correctly.
- Install new screws.

 Tightening torques		
Neck-down screw, M8 x 70, Replace screws	Initial torque, 10 Nm	
	Final torque, 90 °	


(-) Installing counterbalance shaft

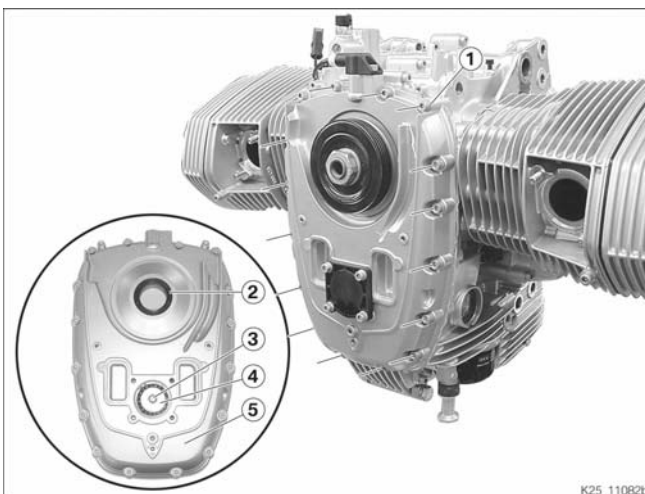
- Install balancing shaft (1) from behind.



(-) Securing balancing shaft in front bearing

- Install screw (3) and washer (4).


 Tightening torques		
Gear wheel to balancing shaft, M8 x 50	19 Nm	



(-) Installing counter balance shaft cover

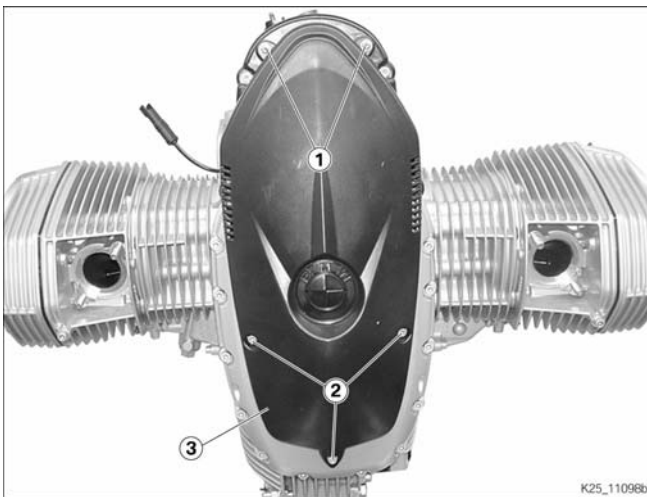
- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).




 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing belt guard


- Install belt guard (3) and secure with screws (1) and (2).



 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing gearbox

- Remove dirt and old lubricant from the splines of the clutch hub and the gearbox input shaft.
- Lubricate the splines of the clutch hub and the gearbox input shaft.

 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

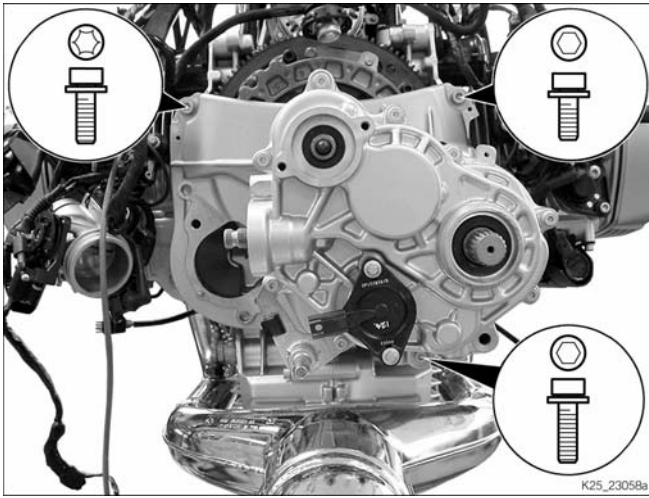
- Position the gearbox with the gearbox input shaft just introduced into the hub of the clutch plate.



Note


You will find it easier to introduce the splined end of the gearbox input shaft into the clutch hub if you engage a gear and turn the gearbox output shaft.

- Slide the gearbox over the reamed sleeve until it




mates with the crankcase.

- Install 3 screws.

 Tightening torques		
Gearbox to engine block, M8 x 35	19 Nm	
Gearbox to engine block, M8 x 70	19 Nm	
Gearbox to engine block, M8 x 50	19 Nm	

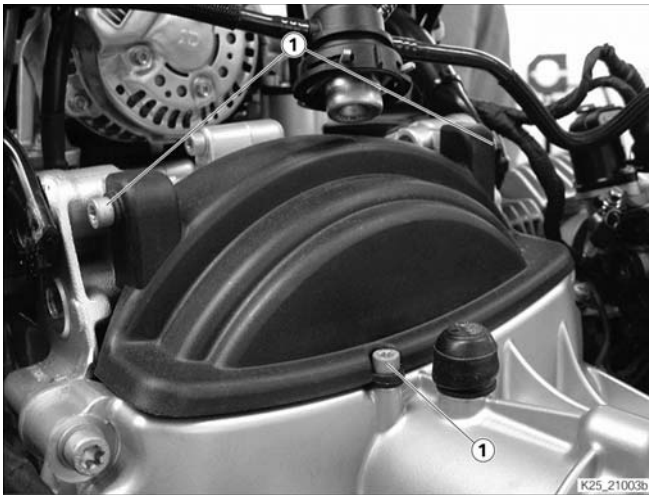



- Slip the exhaust clamp onto the holder on the gearbox and align it with the exhaust.
- Tighten screws (1).

 Tightening torques		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	

(-) Installing cover for clutch


- Remove screws (1).
- Carefully fit clutch cover under the pressure modulator and align.
- Install screws (1).



 Tightening torques		
Clutch cover to engine, M6 x 16	8 Nm	

(-) Installing starter


- Install the starter.
- Install screws (3).

 Tightening torques		
Starter with gearing to	19 Nm	



engine, M8 x 60		
-----------------	--	--

- Connect "starter positive" cable (1) (terminal 30).


 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).

(-) Installing gearbox potentiometer




- Install the gearbox potentiometer, noting the O-ring.
- Install screws (2).

 Tightening torques		
Gear potentiometer to gearbox	9 Nm	

- Connect plug (1) to the gearbox potentiometer.
- Clip the cable into the cable clips.

(-) Installing rear section of motorcycle

- Remove dirt and old lubricant from the splines of the gearbox output shaft.
- Lubricate the splines of the gearbox output shaft.

 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

- Carefully manoeuvre the rear section of the motorcycle into position at the front section, making sure that the wiring harness is correctly positioned.
- Mate the universal shaft with the gearbox output shaft and align the rear frame with the anchorages.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have




to be disassembled in order to permit reinstallation of the universal shaft.

- Carefully turn the rear wheel to check that the universal shaft is still correctly positioned.
- Position the fuel pressure regulator on the intake air silencer.



► **Securing rear frame to motorcycle**

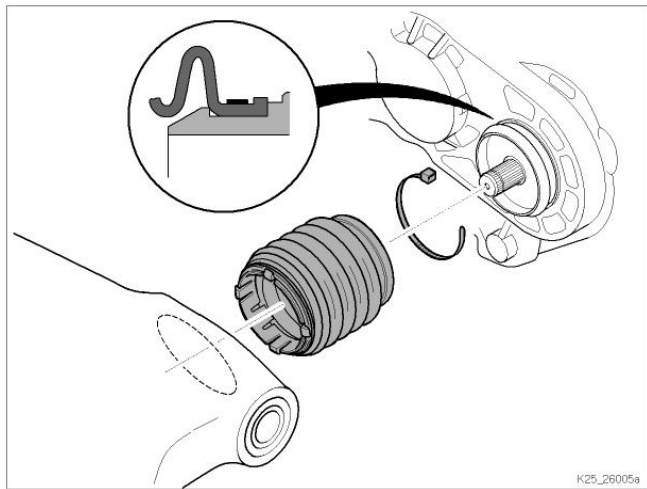
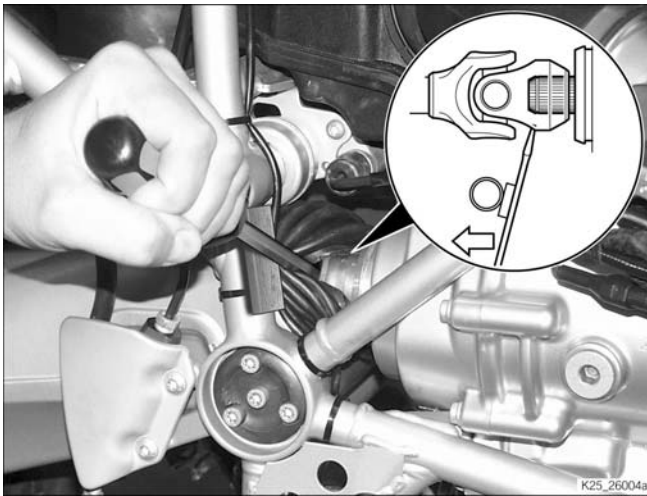
- Install screw (4), but do not tighten it at this point.
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert screws (1) on left and right.
- Tighten screw (4).
- Tighten screws (1), (2) and (3).

 Tightening torques		
Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	




► **Pressing universal shaft onto gearbox output shaft**

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.

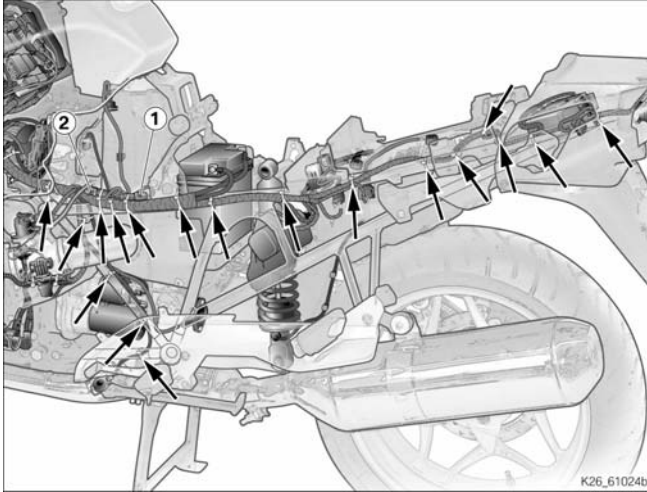
 Consumables/lubricants		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.

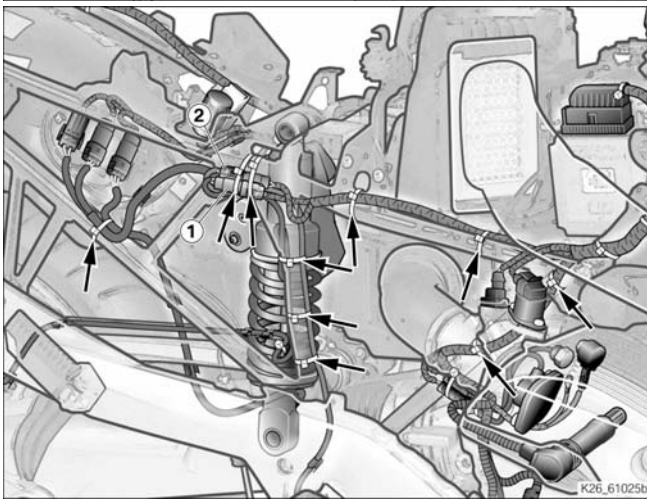
- ◀
- Release the straps securing the front wheel and disengage crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) with the straps from the rear section of the motorcycle.
- Release the control-circuit line complete with the brake master cylinder and pass it through to the rear.
- Route the fuel-tank breather hose into position along the rear frame.
- Connect the hose of the crankcase breather to the intake air silencer.
- Slide hose clamp (1) into position.



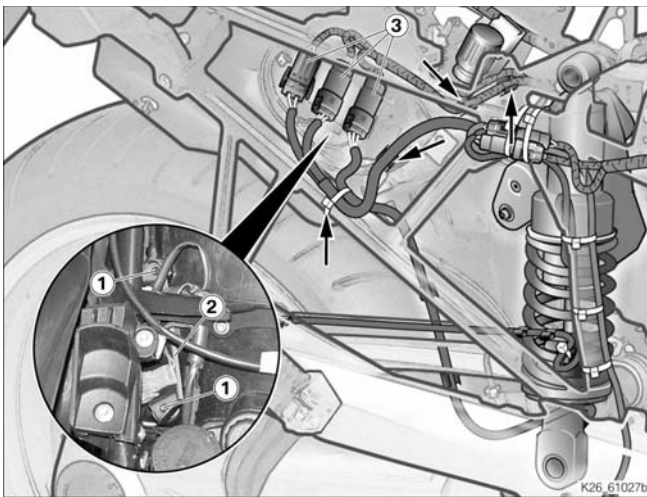
(-) Securing wiring harness at rear



- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.



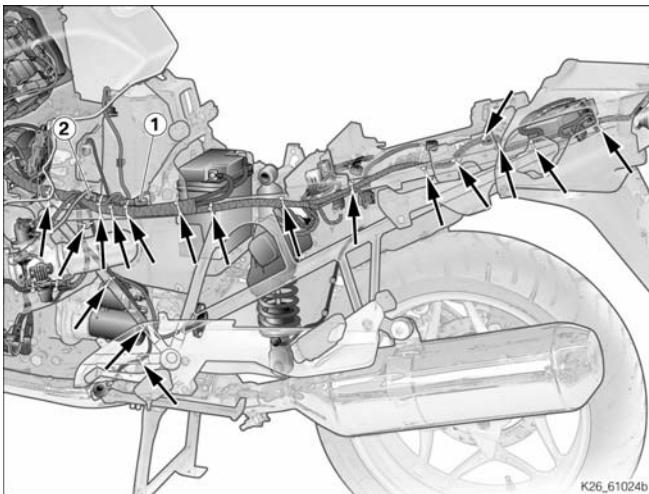
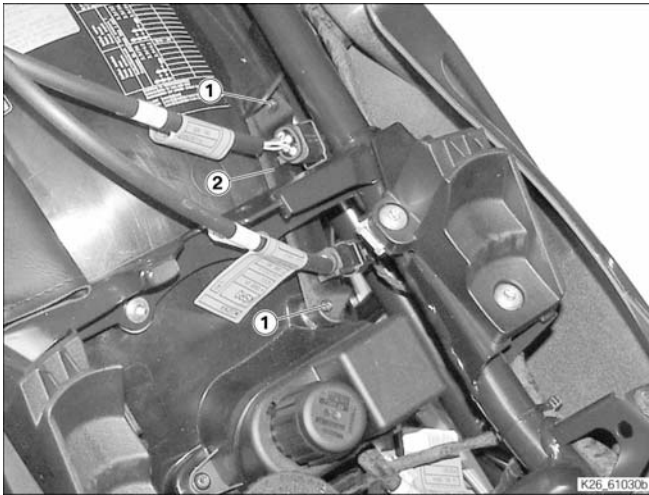
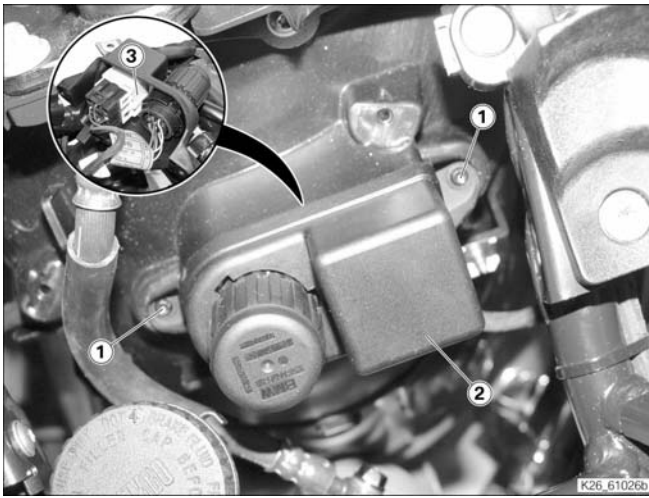
- Connect plug (1) of the speed sensor.



Variant, ESA

- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Secure holder (2) with screws (1).

- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).



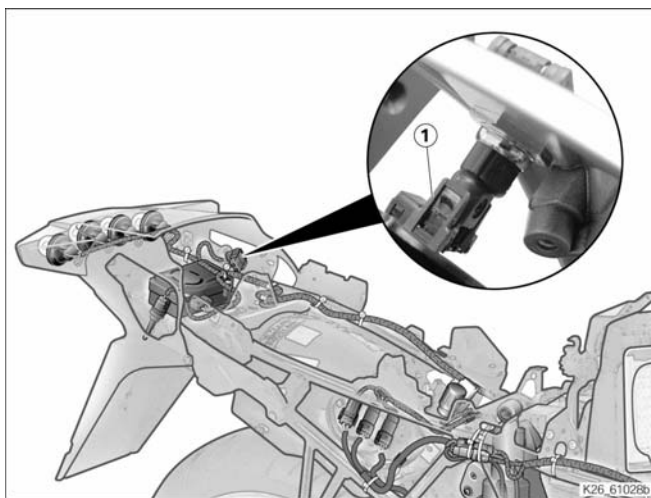
Variant, Seat heating

- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

- Secure the wiring harness to the rear frame with cable ties (arrows).

Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



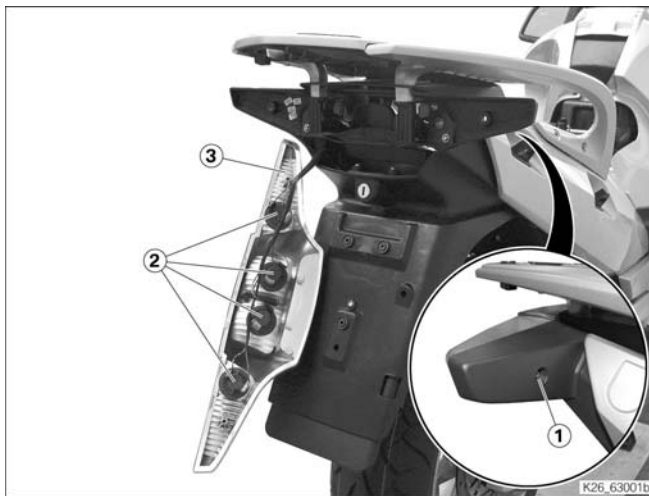
Variant, On-board computer

- Connect plug (1) of the temperature sensor.

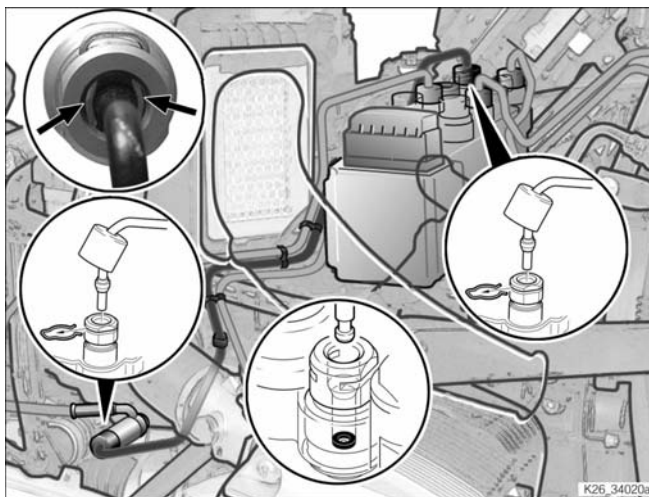


(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



(-) Connecting brake pipe for rear wheel circuit to pressure modulator



Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.



Warning

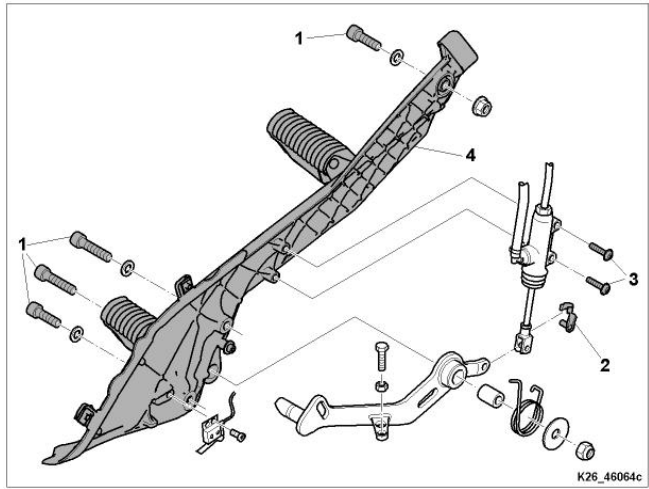
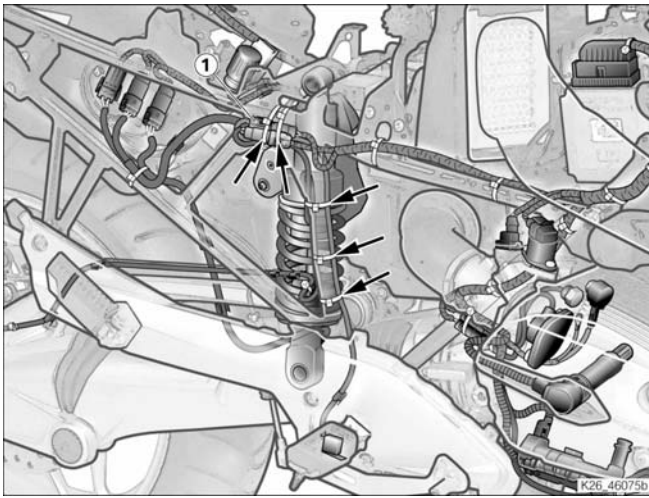
Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.


- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Installing right footrest plate


- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

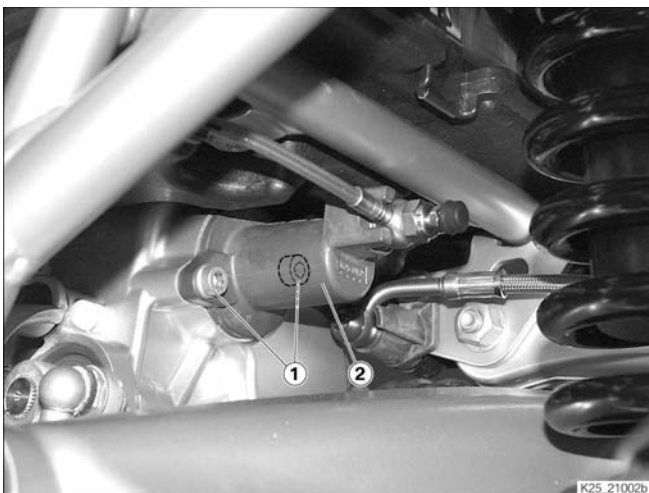
- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.

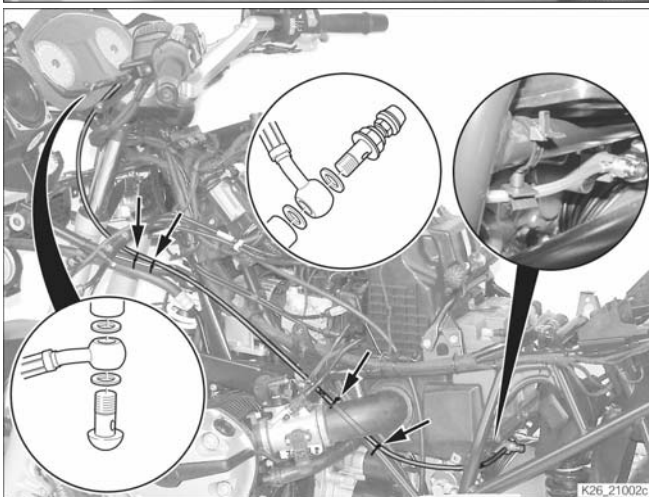


(-) Installing clutch slave cylinder



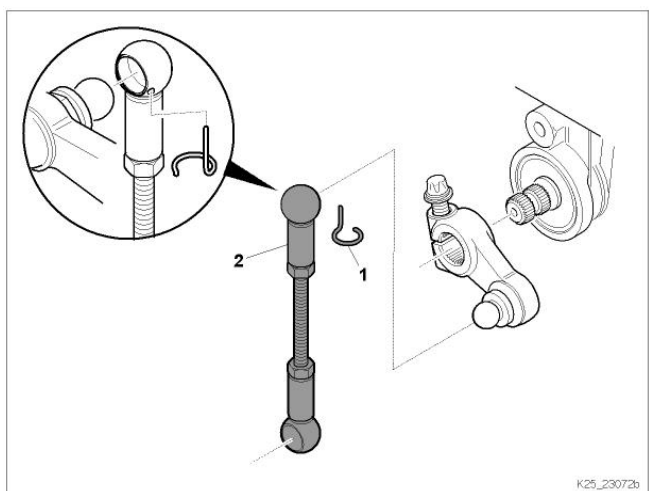
- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.

 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	




- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.

(-) Securing selector rod to shift lever



- Grease the ball head of the shift lever and the ball socket of selector rod (2).

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

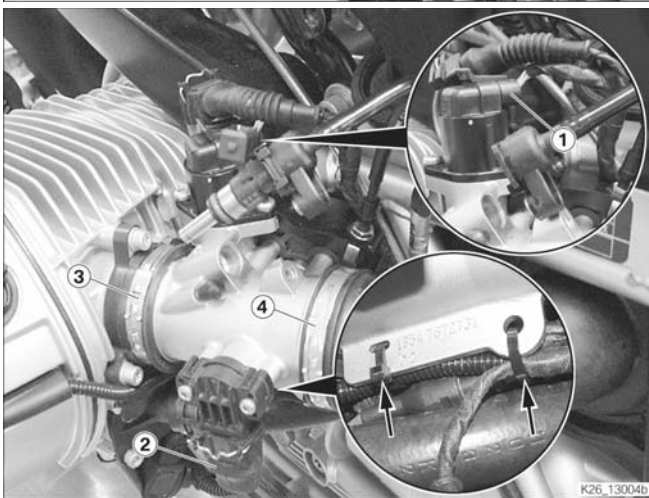
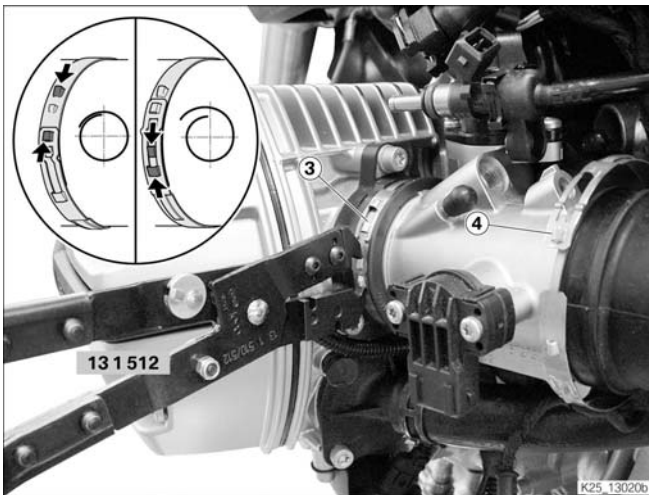
(-) Releasing throttle valve stub with cable divider

- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.



(-) Installing throttle-valve stub

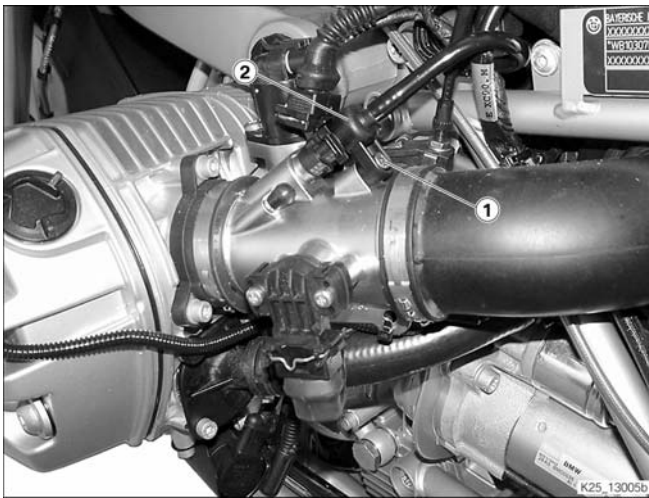
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .




- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing right and left injection valves

- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure

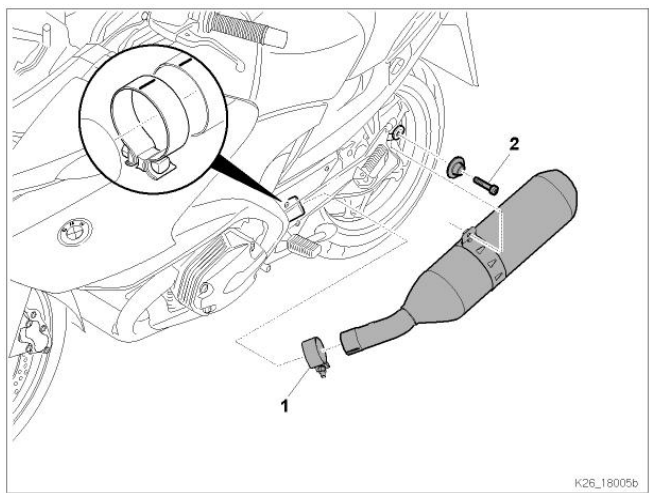


with screws (2).


 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.


(-) Installing silencer



- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

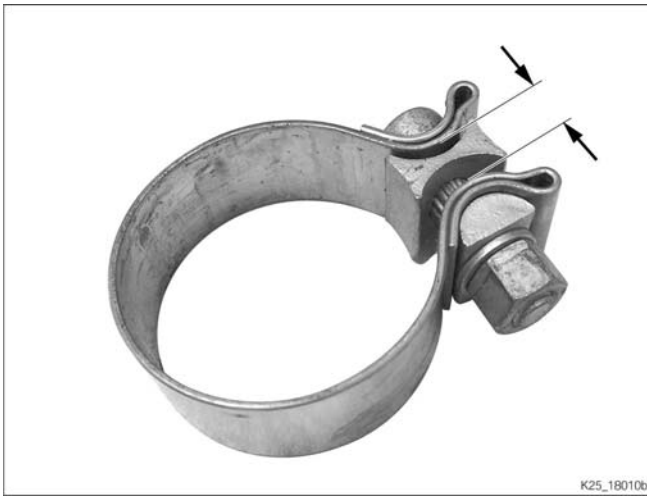
- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


► Checking Torca clamp on silencer

- Tighten the Torca clamp.



Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

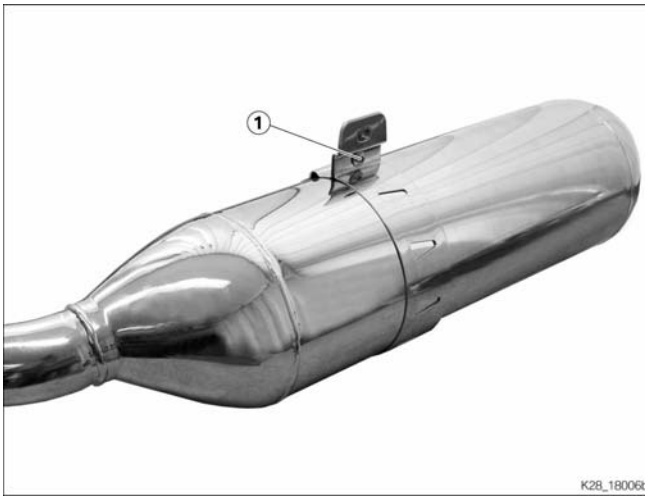


Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.



- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
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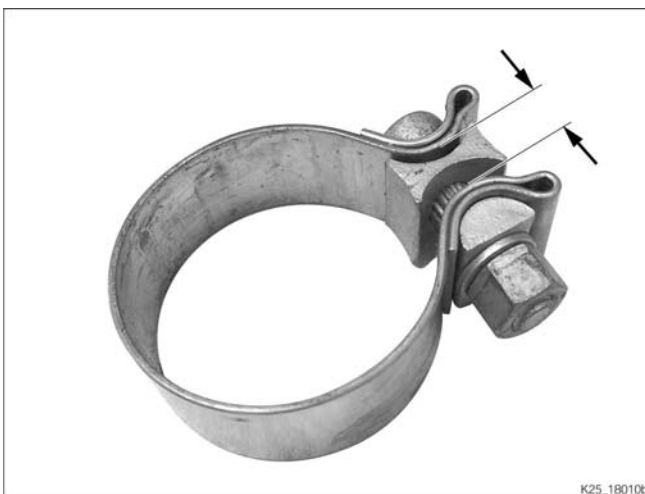


Checking Torca clamp on silencer

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
---	-------	--

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.

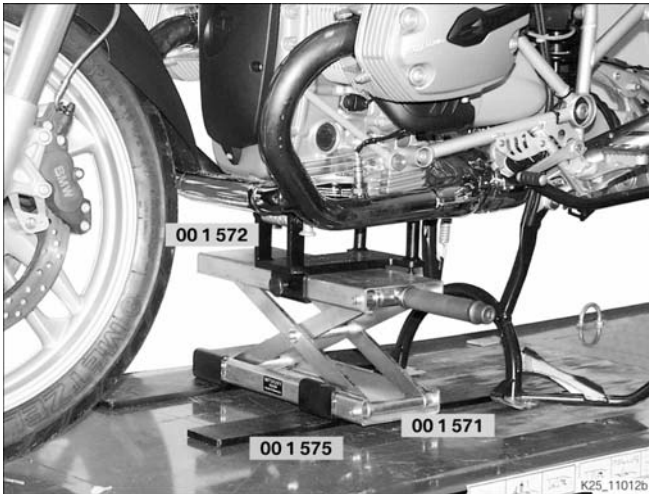


Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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(-) Removing engine stand



- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .

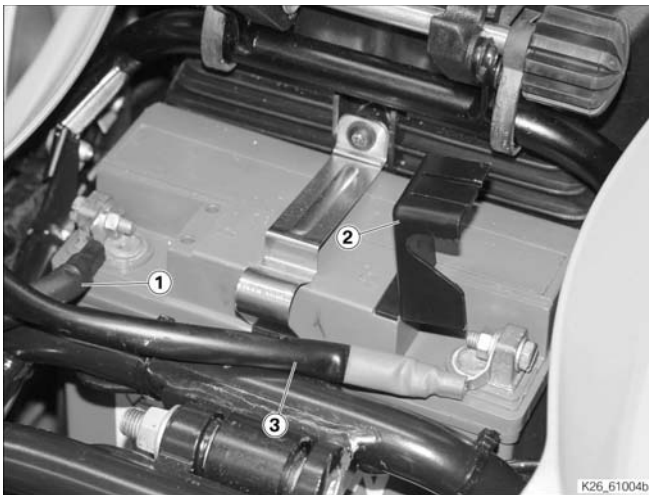
(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.



- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

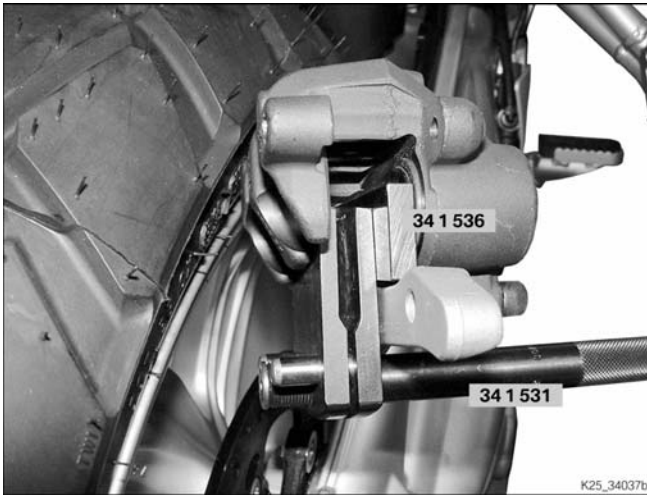


Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the

pressure modulator.



- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.



Consumables/lubricants

DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

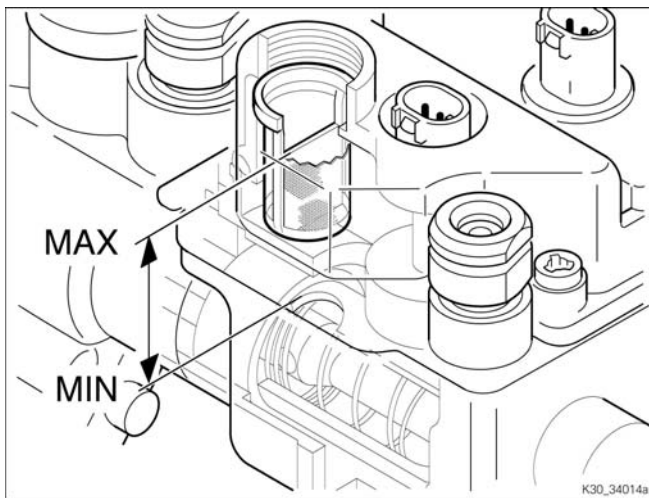
- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

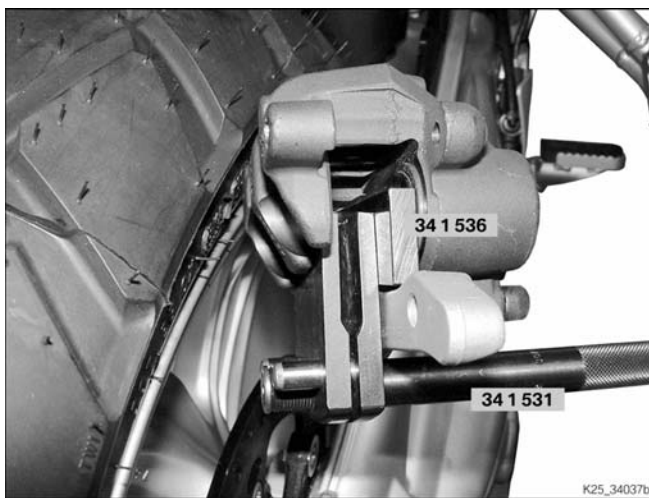
Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in



accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.



► **Instructions for filling rear wheel circuit reservoir**

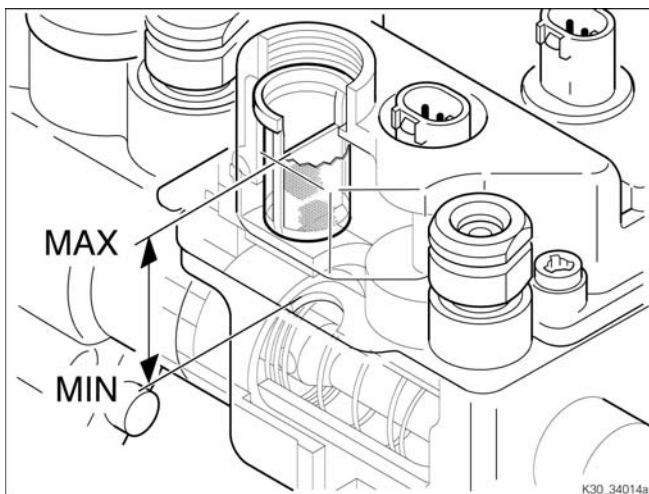
- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536) , in the rear brake caliper.



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.



- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.



Consumables/lubricants

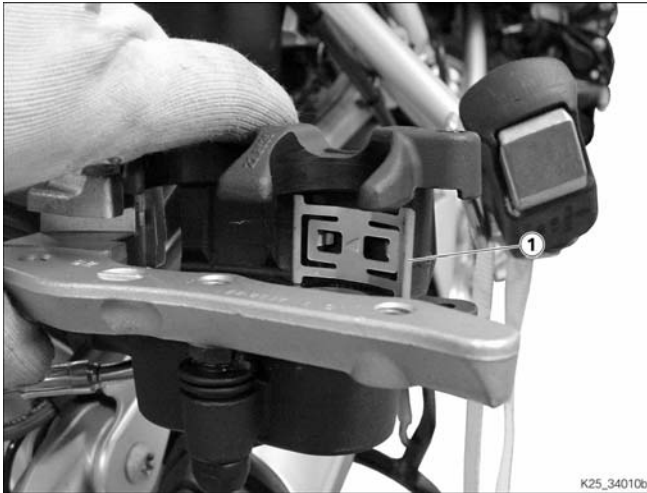
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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- Hand-tighten the cap of the rear wheel-circuit reservoir.

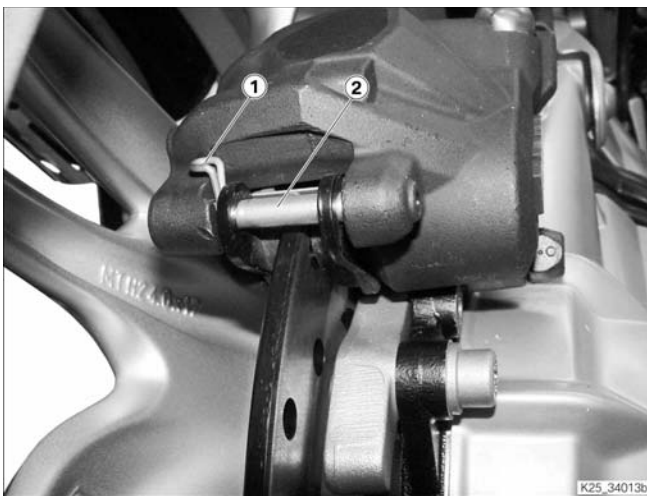
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary

▷ **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.
- » Arrow points in direction of travel.



K25_34010b



K25_34013b


- Install the brake pads.
- Manually install retaining pin (2).

▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).



K25_34034b

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

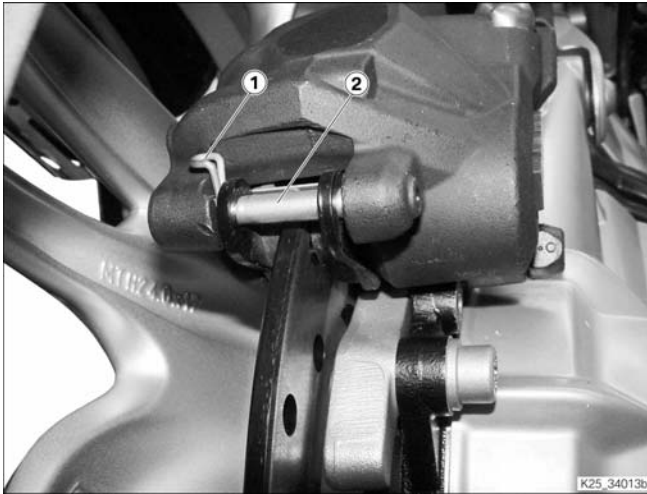
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



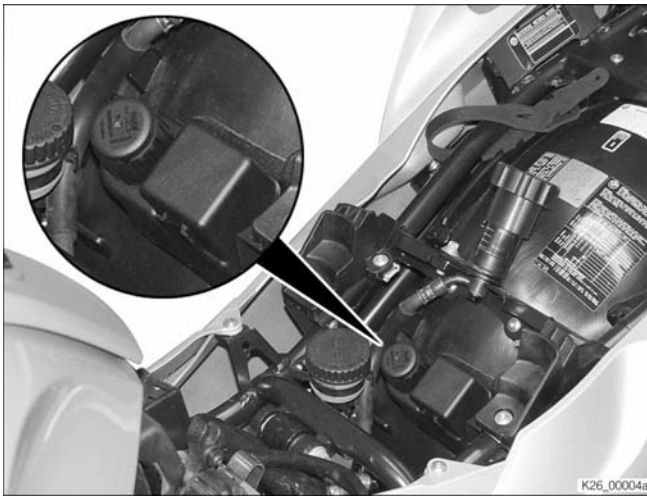
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.



- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



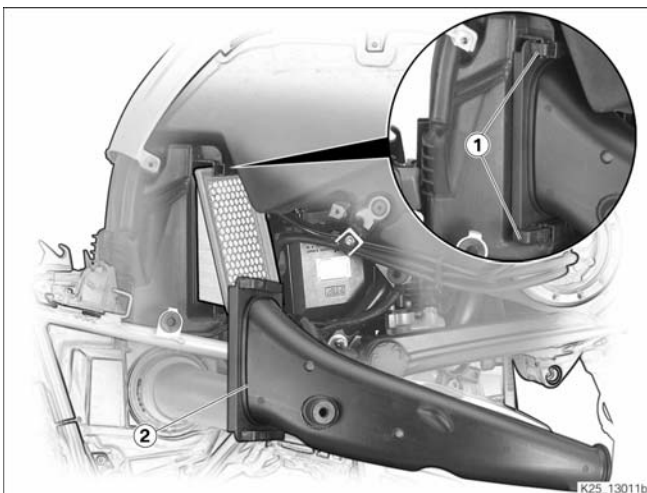
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

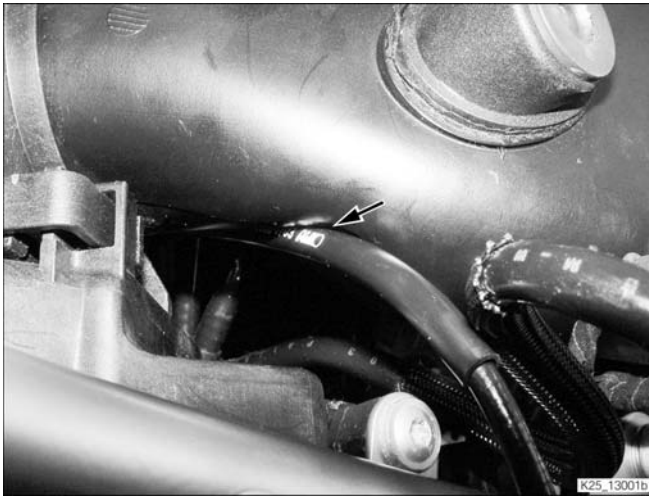
- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing intake air pipe



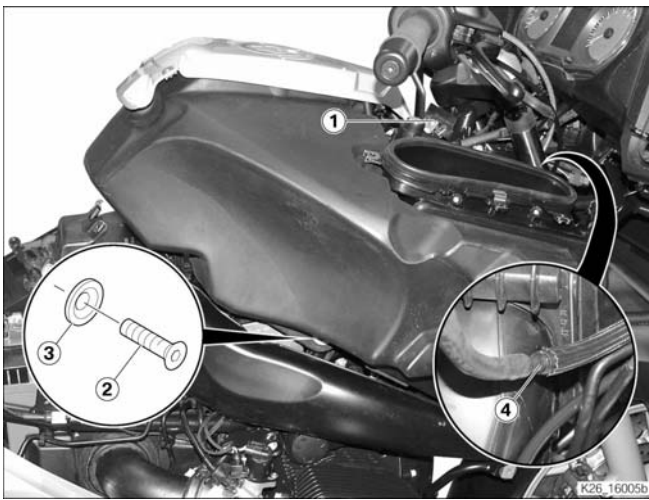
- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the



guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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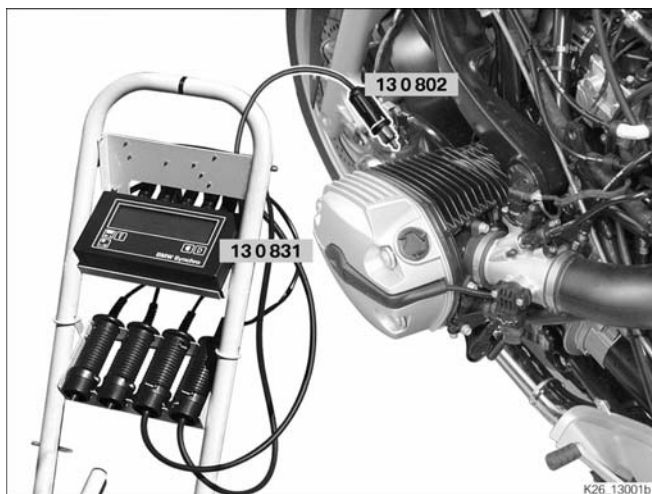
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

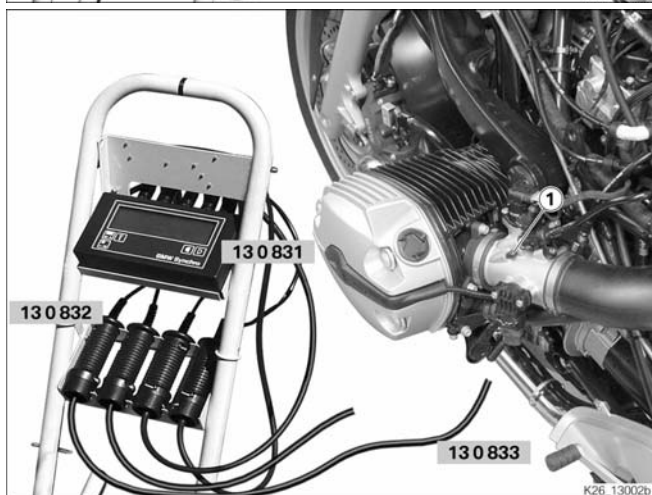
- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



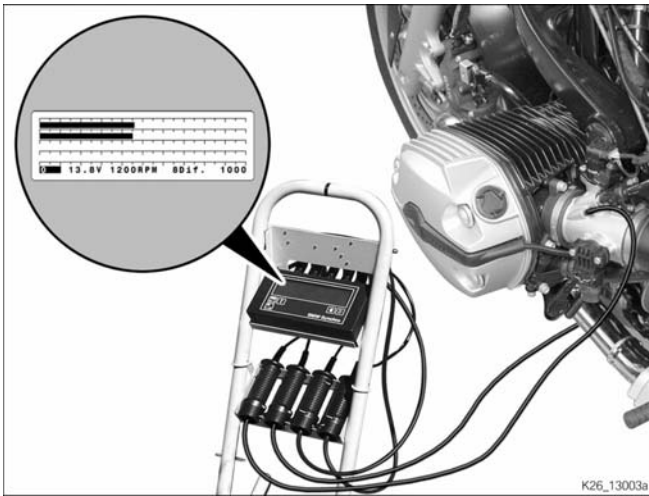
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions

issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

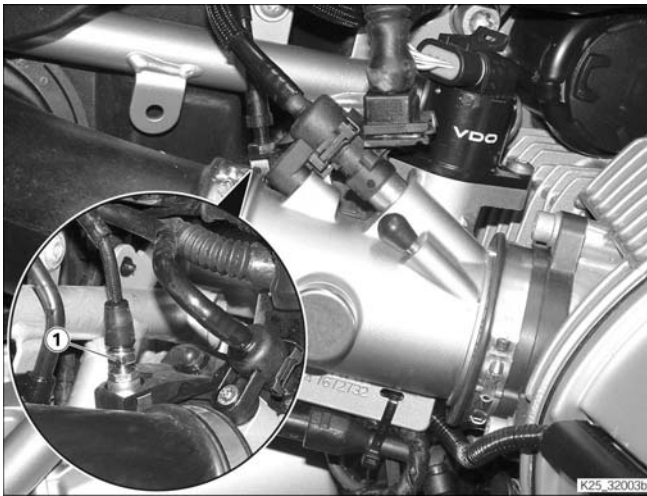
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.



» Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

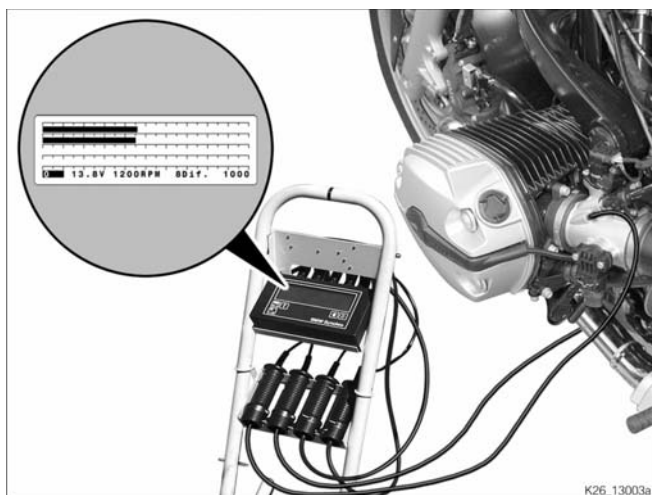
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.

- Disconnect the BMW Motorrad battery charger from the vehicle.

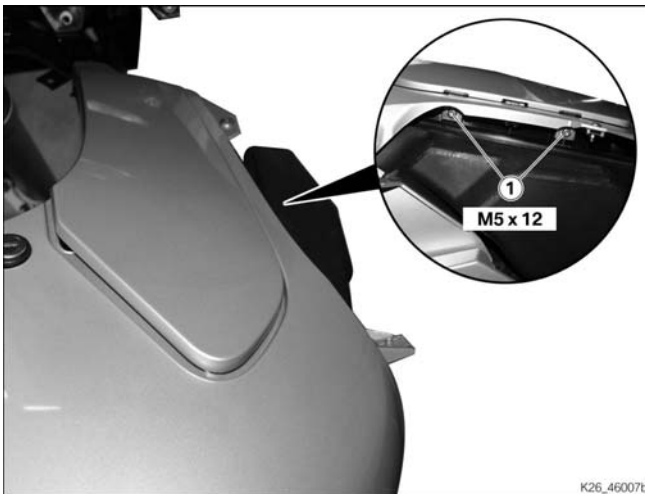
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



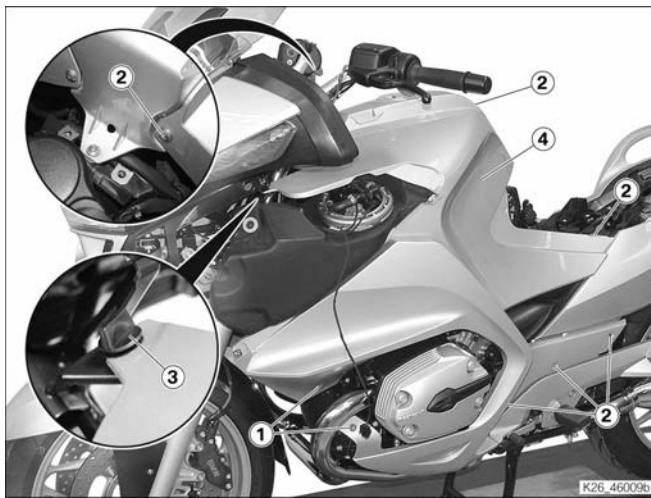
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).



- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



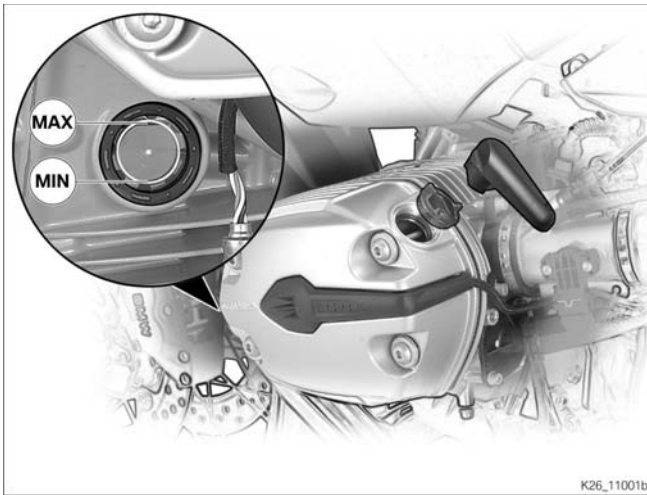
Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 27 020 Replacing gear set for balancing shaft**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

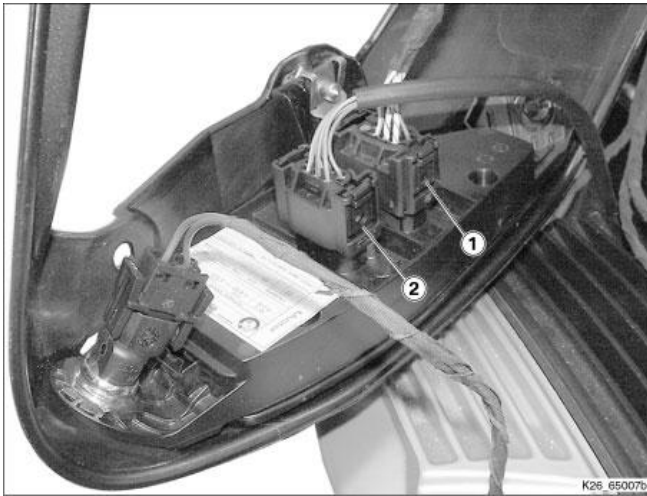


- Disconnect plug (1) from socket.

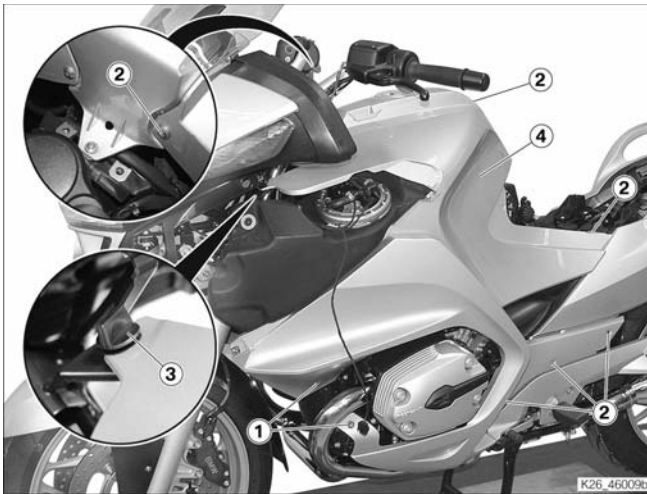


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

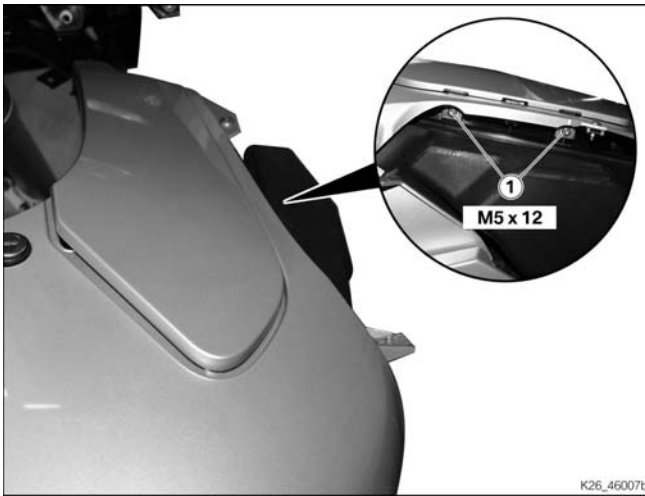
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



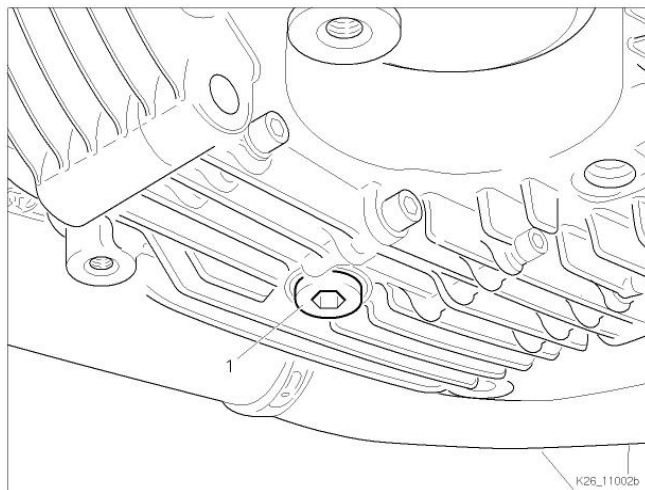
(-) Draining engine oil



Warning

Nature: Parts of the exhaust system can be hot.

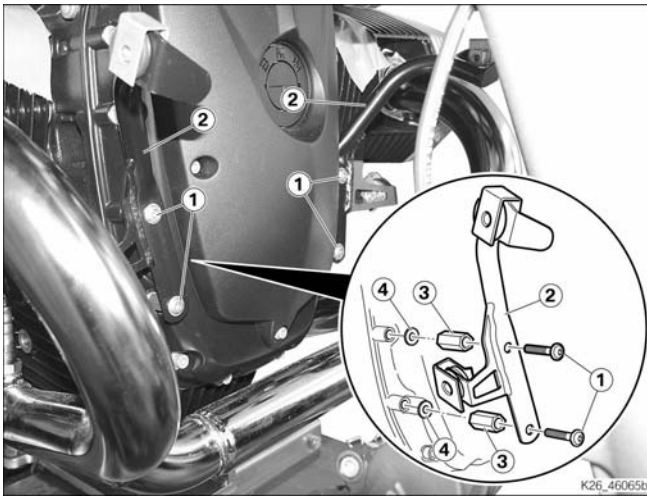
Avoidance: Do not touch hot parts of the exhaust system.



- Place a suitable tray underneath the engine.
- Remove oil drain plug (1) and drain the oil.
- Dispose of used oil in an environmentally friendly manner.
- Remove the old sealing ring from the drain plug.

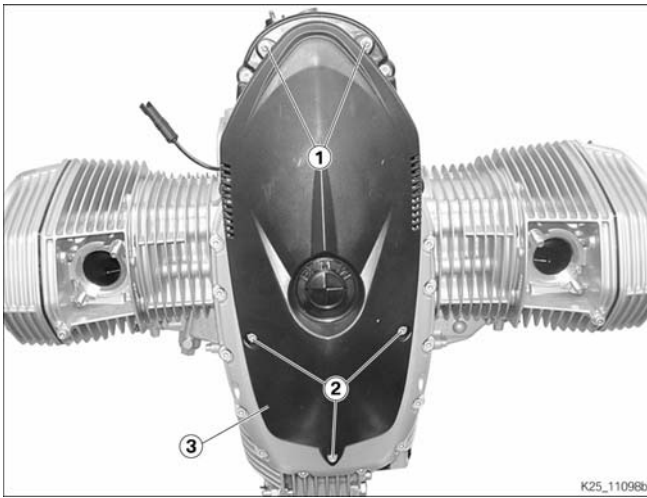
(-) Removing left and right fairing bracket

- Remove screws (1).
- Remove fairing bracket (2) with sleeves (3) and washers (4).



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

- Gearbox in neutral.



Warning

Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



(-) Removing cover for counterbalance shaft

- Remove screws (1) and remove cover.



(-) Locking engine at TDC



- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until it is at TDC (TDC = top dead centre).
- » The inlet and exhaust valves of one cylinder are closed; those of the other cylinder are at overlap.
- » The TDC locating pin can be inserted.
- Insert locating pin (No. 11 2 650) to lock the engine in position.

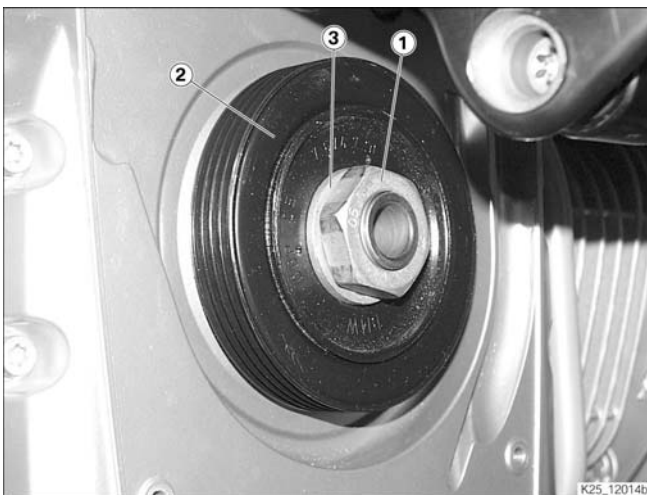
(-) Removing crankshaft belt pulley

Precondition

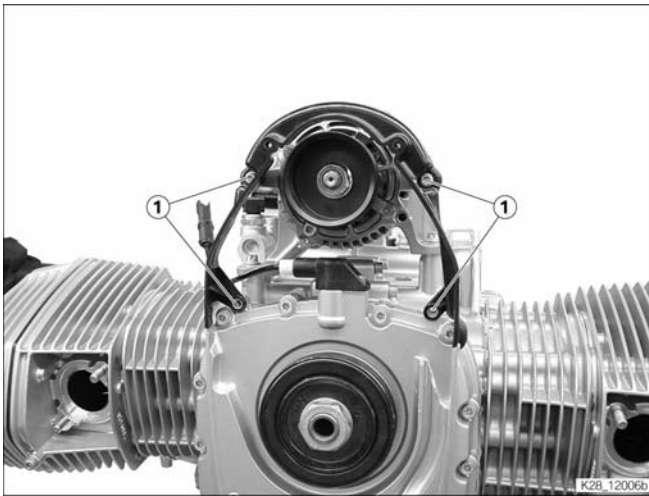
- Engine locked.



- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

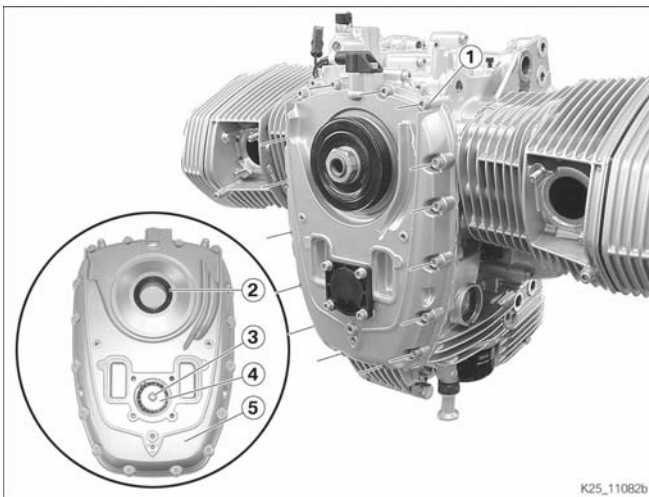


(-) Removing belt cover, rear, from engine and alternator



- Remove screws (1).

(-) Removing time case cover



- Remove screw (3) and washer (4).
- Remove screws (1).



- Install the puller and thrust piece (No. 31 3 671) .
- Remove the timing case cover, noting the inductive sensor of the crankshaft, which is still fixed in position.

► Releasing crankshaft inductive sensor from timing case cover

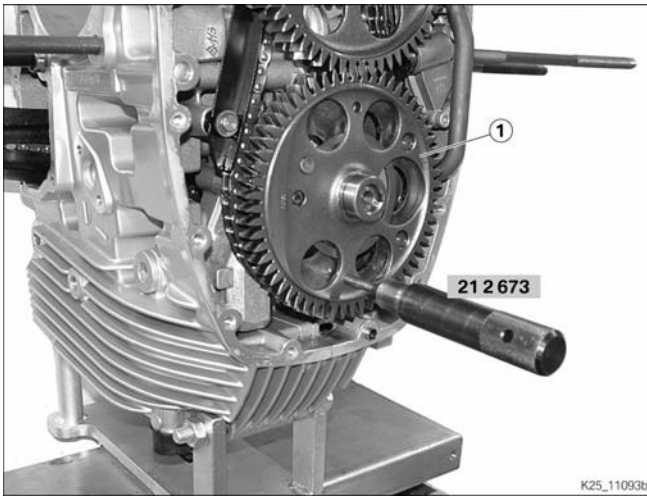
- Remove screw and remove crankshaft inductive sensor (2) from the timing case cover.



- Remove puller and thrust piece (No. 31 3 671) .

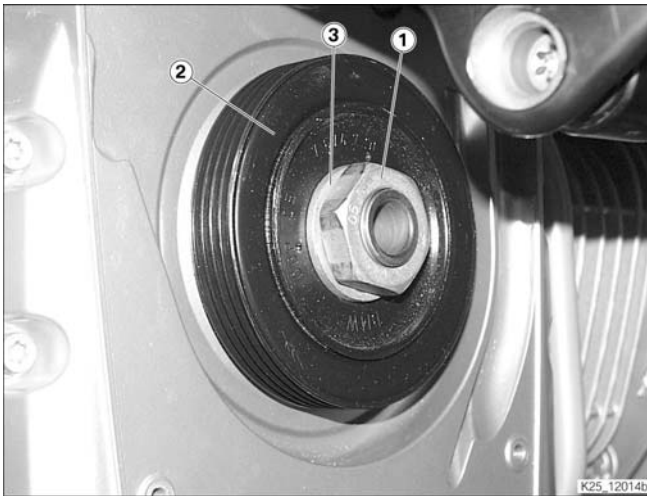
(-) Removing tensioning wheel

- Use clutch centring pin (No. 21 2 673) to fix the tensioning wheel in position.
- Remove tensioning wheel (1).



(-) Removing drive gear on counterbalance shaft

- Tighten nut (1) until hand-tight.



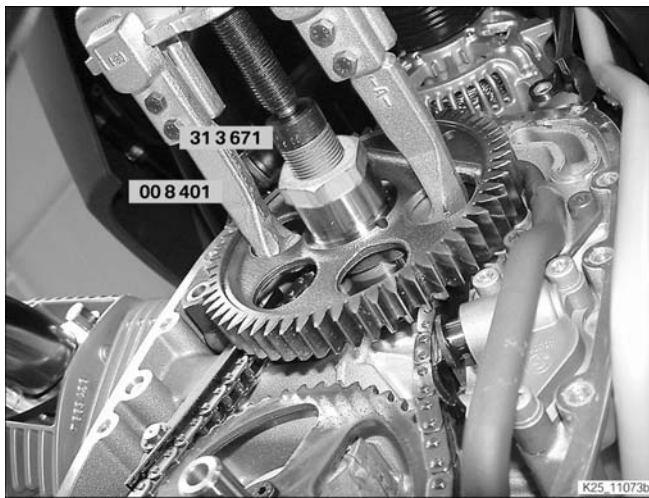
- Remove TDC locating pin (No. 11 2 650) .



- Engage the highest gear and turn the rear wheel until puller (No. 00 8 401) and thrust piece (No. 31 3 671) can be installed.
- Install puller and thrust piece and pretension.

⚠ Attention

Nature: Once the gear has been heated it can



work loose suddenly and damage components in the vicinity.

Avoidance: Cover components in the vicinity and protect them against damage.

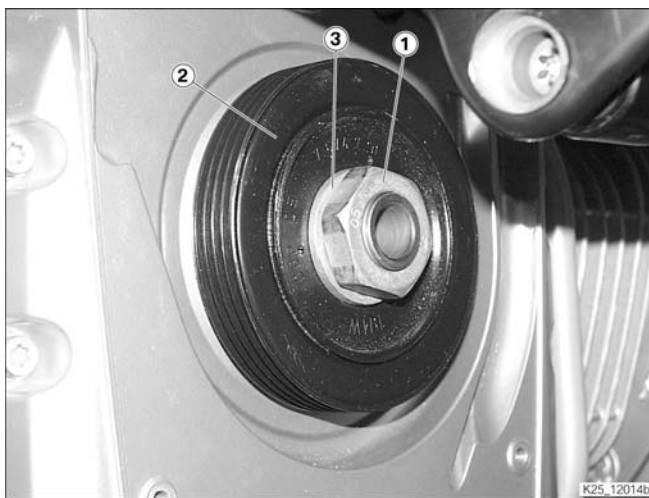
- Heat the drive gear for the balancing shaft at the crankshaft and tap it to release.



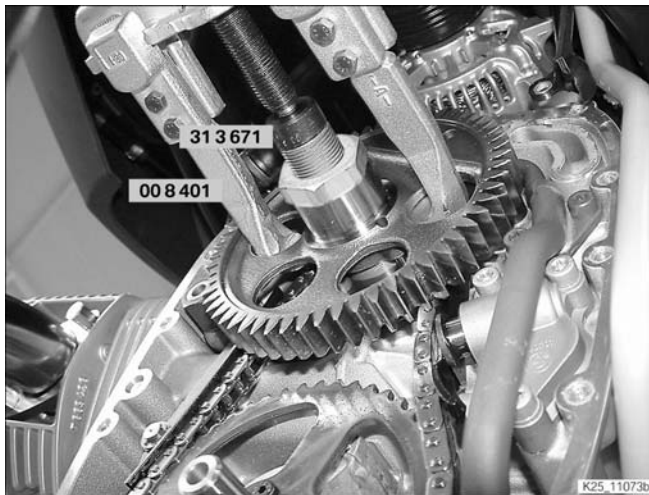
Technical data

Release temperature, drive gear for balancing shaft on crankshaft

80 °C



- Remove nut (1).



Warning

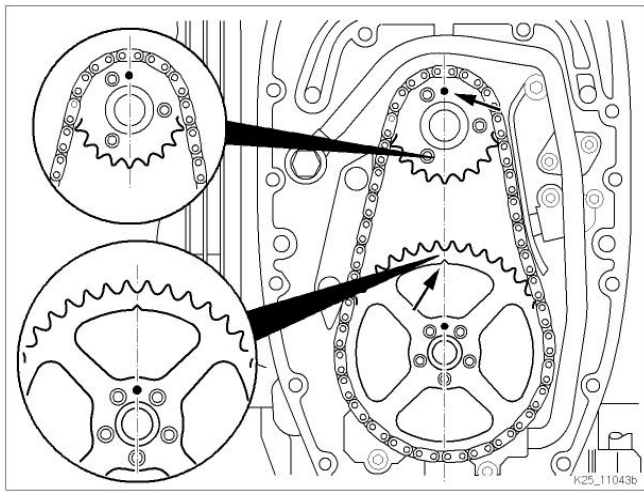
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Remove the drive gear for the balancing shaft and remove puller (No. 00 8 401) and thrust piece (No. 31 3 671).

► Adjusting crankshaft and auxiliary shaft to ignition TDC

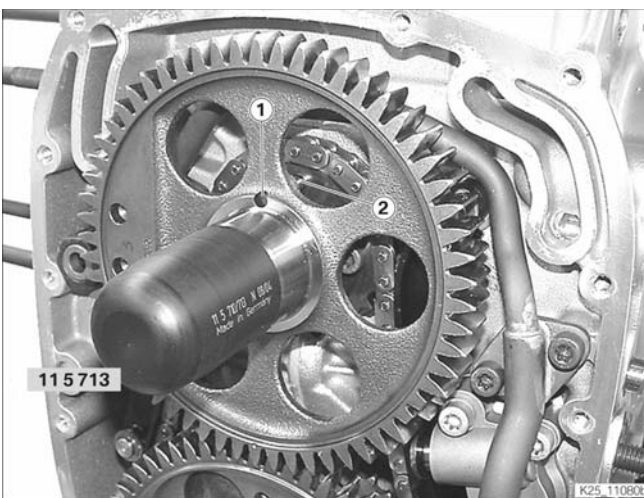
- Make sure that the crankshaft and countershaft are in the "firing TDC, right cylinder" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.



» The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



◀ Install TDC locating pin (No. 11 2 650) .



(-) Installing counterbalance shaft drive gear

- Clean inner taper of counterbalance drive gear and outer taper of crankshaft, **both must be free of oil and grease.**
- Install the drive gear for the balancing shaft, making sure that straight pin (2) of the crankshaft engages hole (1) in the drive gear.
- Install a suitable tool for holding the drive gear and preventing it from turning.

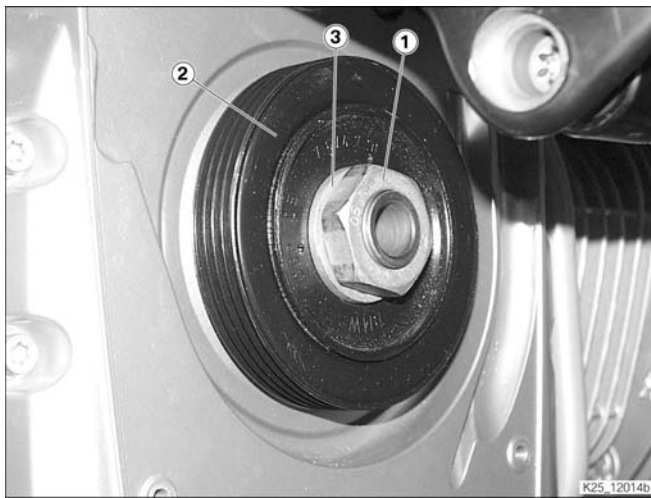
► **Installing crankshaft belt pulley**

Precondition


- Engine locked.



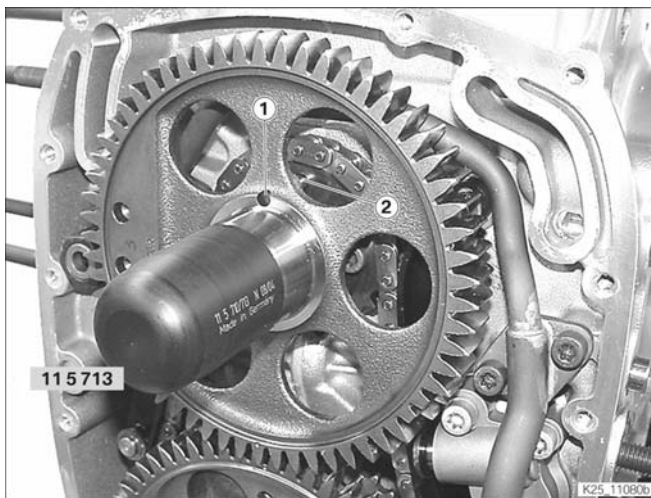
- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.



- Install washer (3) and nut (1) and tighten the nut.

 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	

- Remove TDC locating pin (No. 11 2 650) .

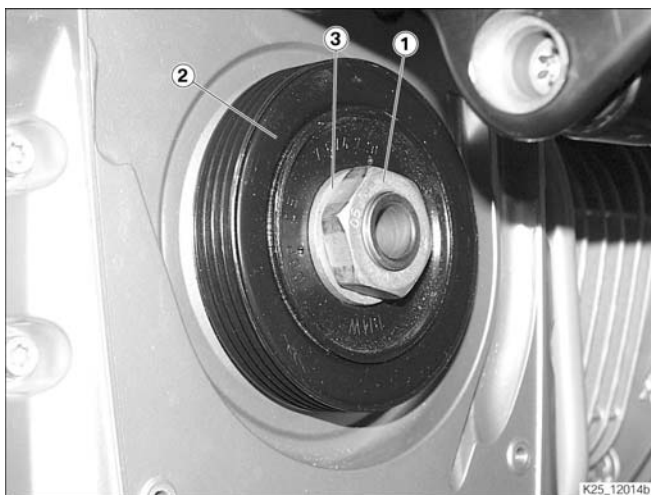


- Remove the tool for holding the drive gear and preventing it from turning.

► **Removing crankshaft belt pulley**

Precondition

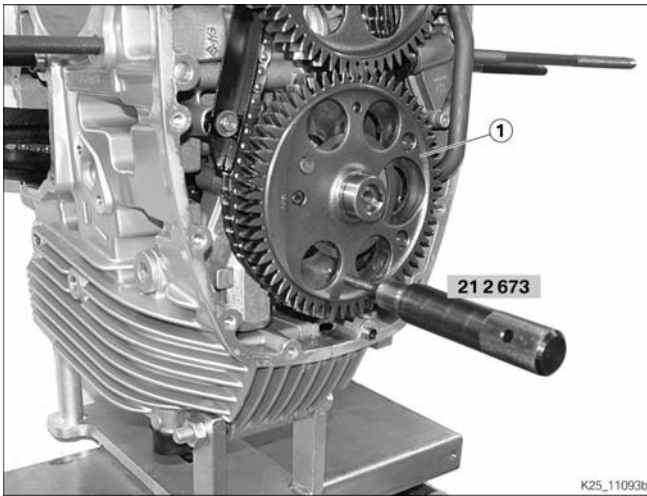
- Engine locked.



- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

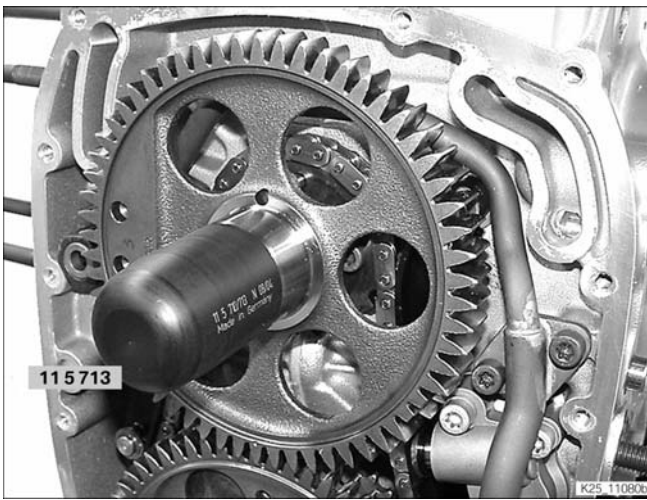
◄ **(-) Installing tensioning wheel**

- Install tensioning gear (1), if necessary noting the

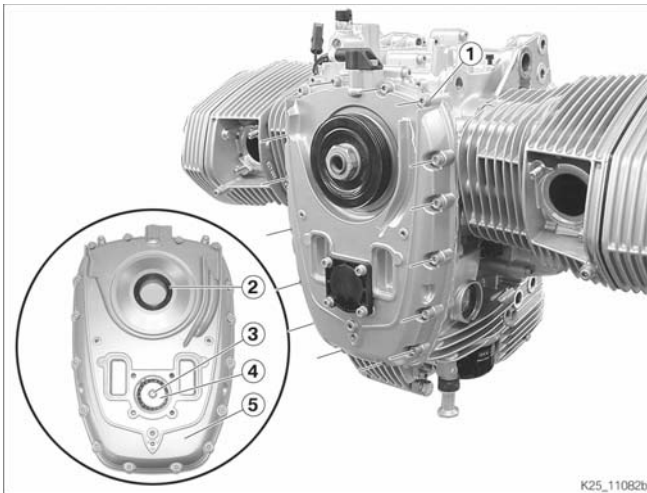


- feather key in the balancing shaft.
- Remove clutch centring pin (No. 21 2 673) .

(-) Installing timing case cover



- Install sliding sleeve (No. 11 5 713) .



- Make sure the sealing surface of the timing case cover is clean and free of grease and run a uniform bead of sealant round the face.



Consumables/lubricants

3 - Bond 1209	Surface sealant	07 58 9 062 376
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► Securing crankshaft inductive sensor in timing case cover

- Position inductive sensor for crankshaft (2) on the timing case cover and install the screw.

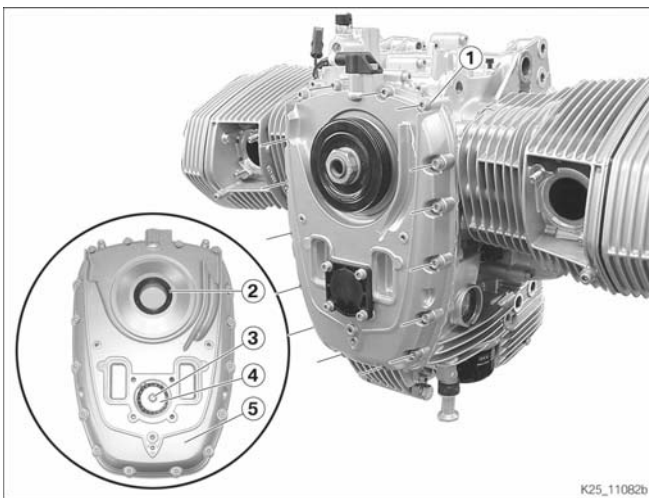


Tightening torques


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Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	
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- Place timing case cover (5) in position.
- Install screws (1).

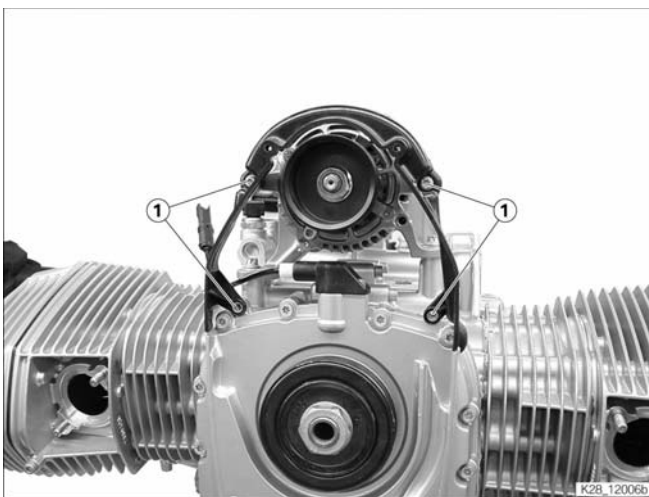
 Tightening torques		
Timing case cover to crankcase, M6	8 Nm	


- Remove sliding sleeve (No. 11 5 713) .
- Install screw (3) and washer (4).

 Tightening torques		
Gear wheel to balancing shaft, M8 x 50	19 Nm	

(-) Securing belt cover, rear, to engine and alternator

- Install screws (1).

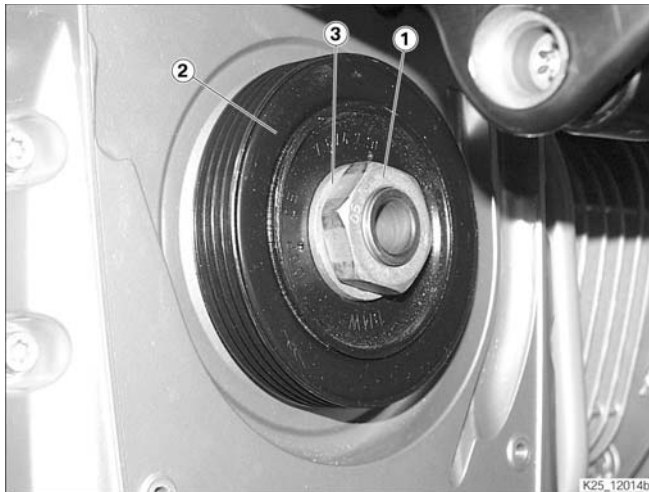


 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
Belt cover to alternator, M5 x 16	5 Nm	

(-) Installing crankshaft belt pulley

Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Installing counter balance shaft cover

- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).



Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.

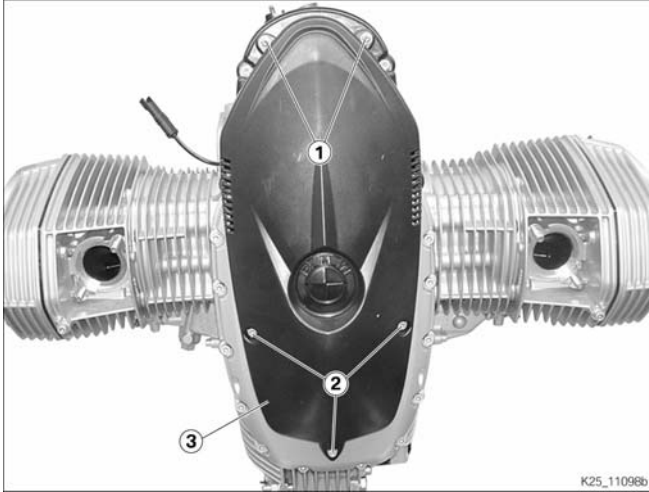


⚠ Attention

Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

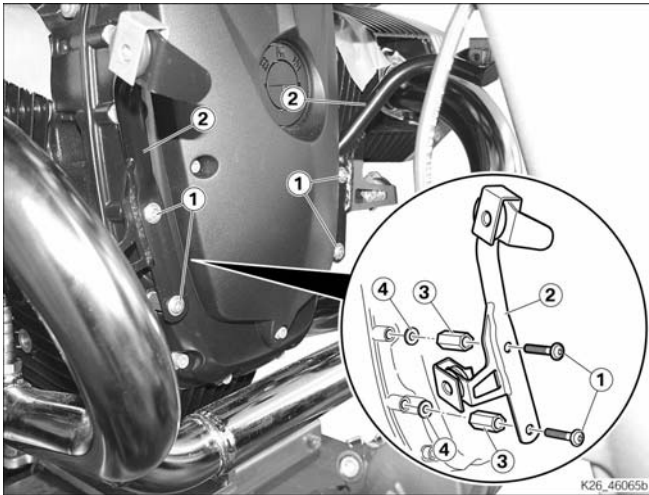
- Check that the drive belt is correctly seated on both pulleys.



(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

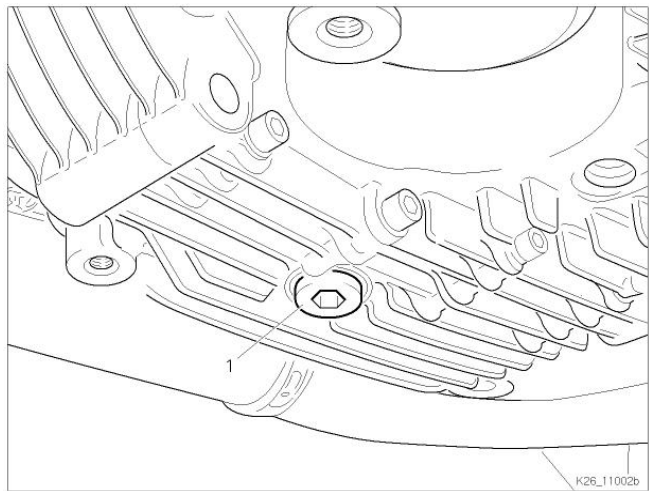



(-) Installing fairing bracket on left and right

- Hold fairing bracket (2) with sleeves (3) and washers (4) in position.
- Install screws (1).

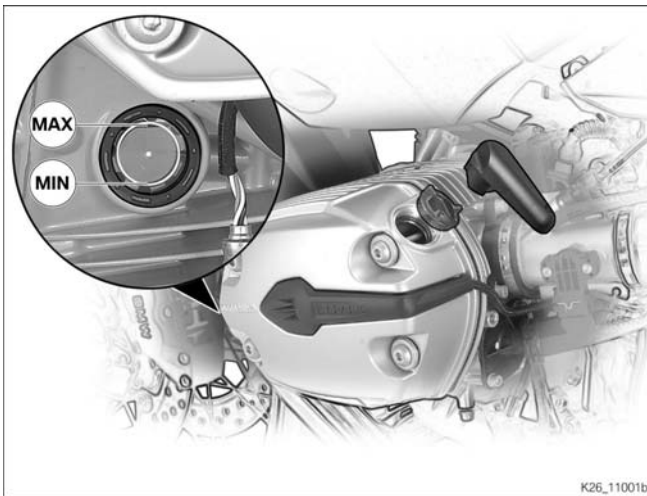
(-) Pouring engine oil into engine

- Replace the sealing ring of oil drain plug (1).
- Screw in oil drain plug.



 Tightening torques		
Oil drain plug, M16 x 1.5	Initial torque, 23 Nm	
	Final torque, 32 Nm	

- Open oil filler plug using spanner from toolkit.
- Pour engine oil into the engine until the level reaches the MAX mark.



K26_11001b



Technical data

Oil capacity, engine	with filter change	max. 4 l	
	Difference between Min. / Max. marks	0.5 l	
Consumables/lubricants			
Engine oil, 20W-50			



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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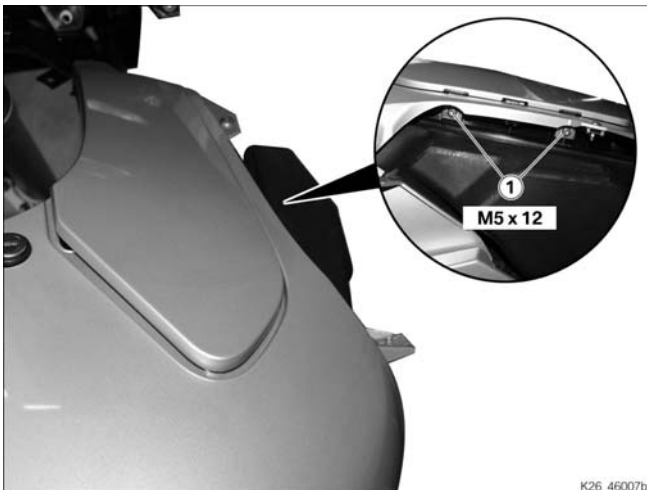
(-) Installing entire right side tank cover



K26_46008b

- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



K26_46007b

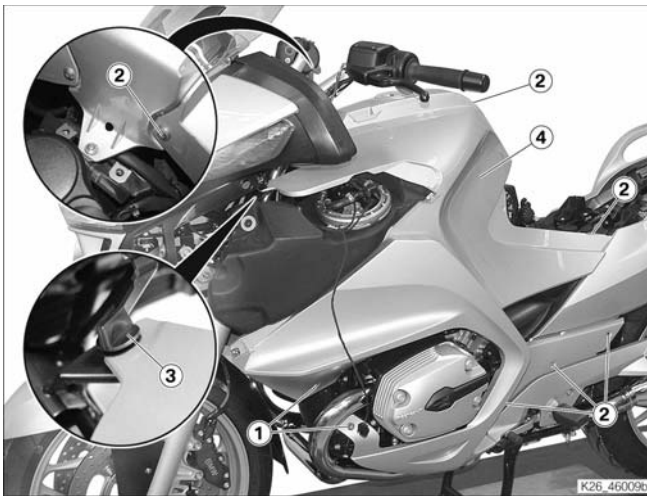
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

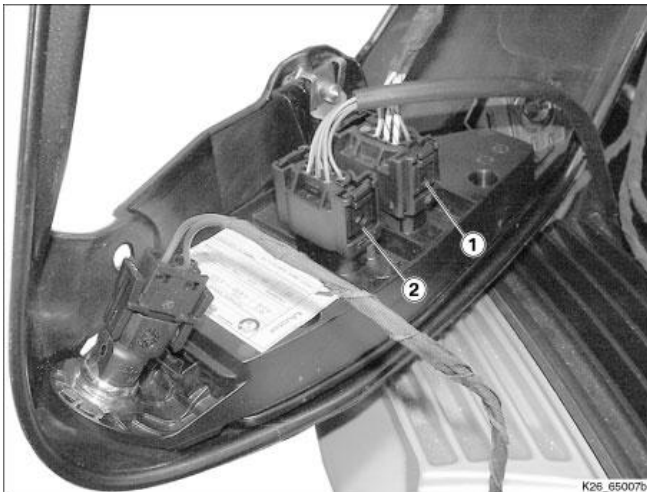
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



Technical data

Technical data			



K26_11001b

Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 27 031 Replacing bearing for balancing shaft in crankcase**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

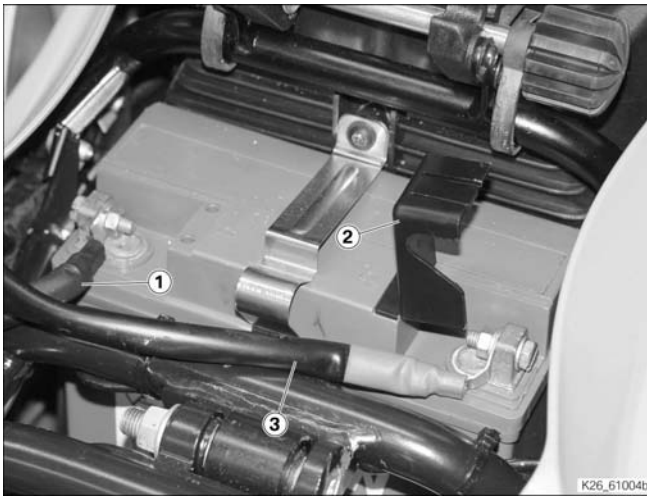
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

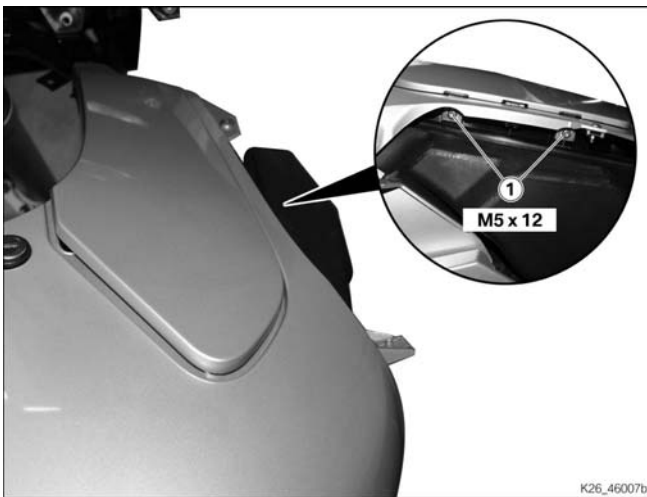
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



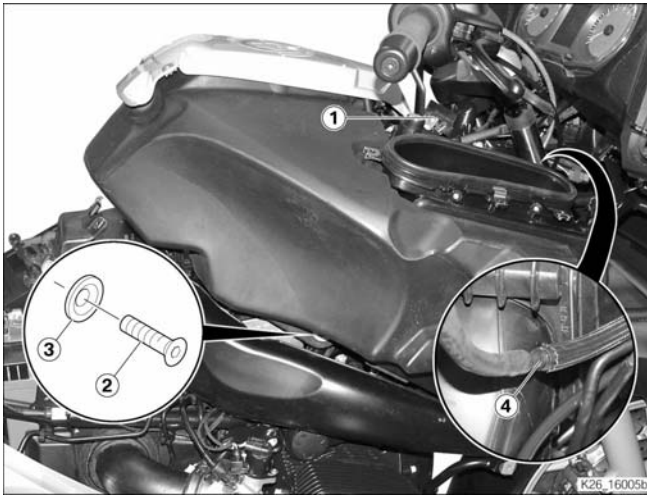
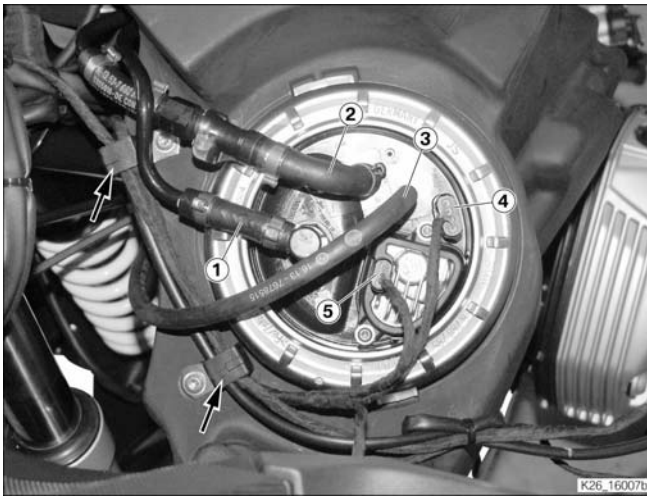
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

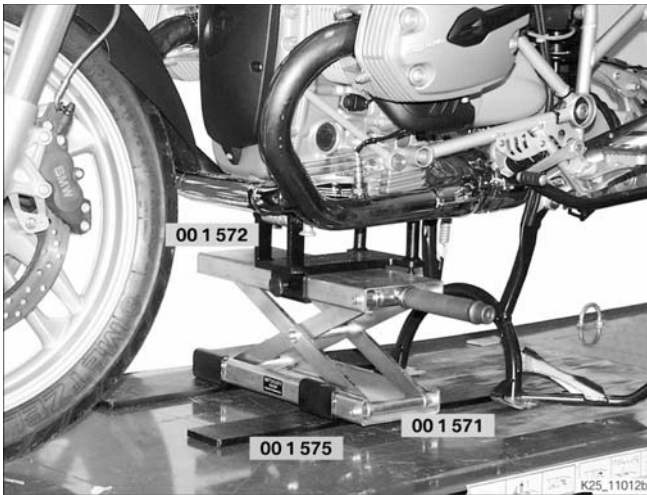


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

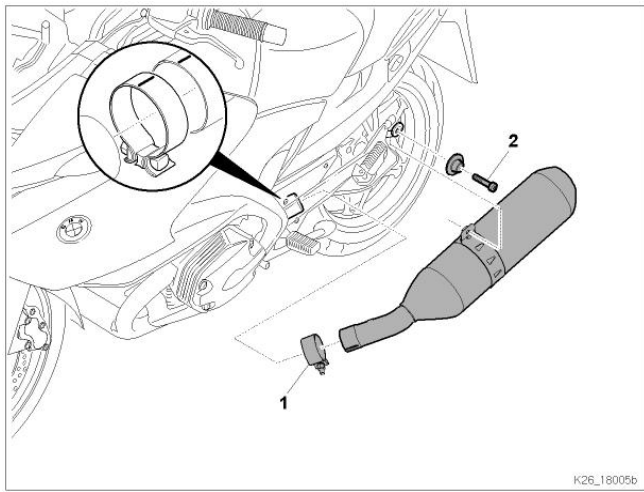


(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

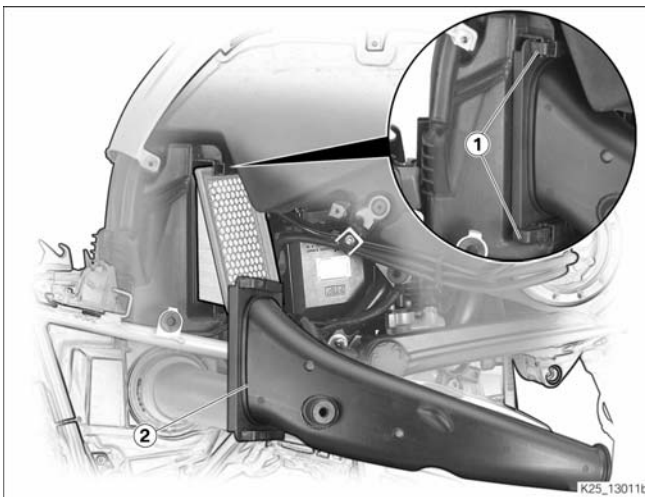
(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



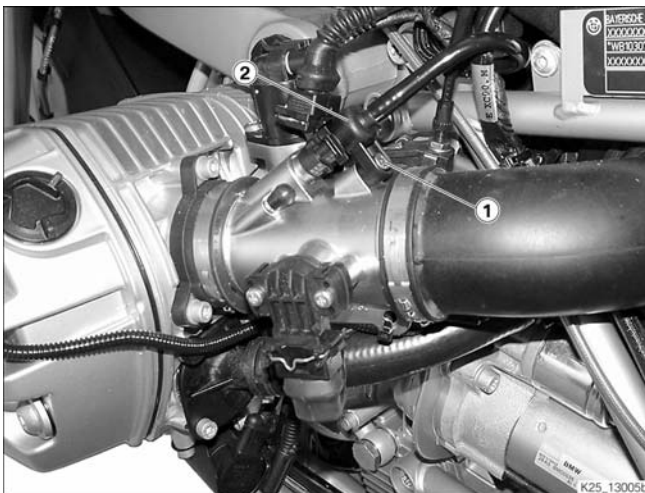
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



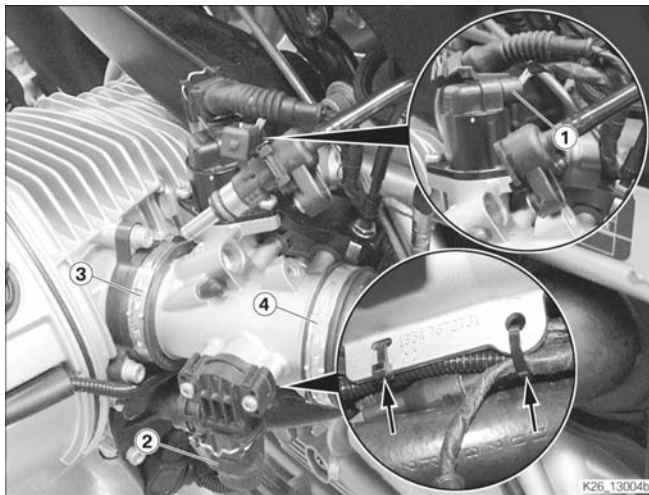
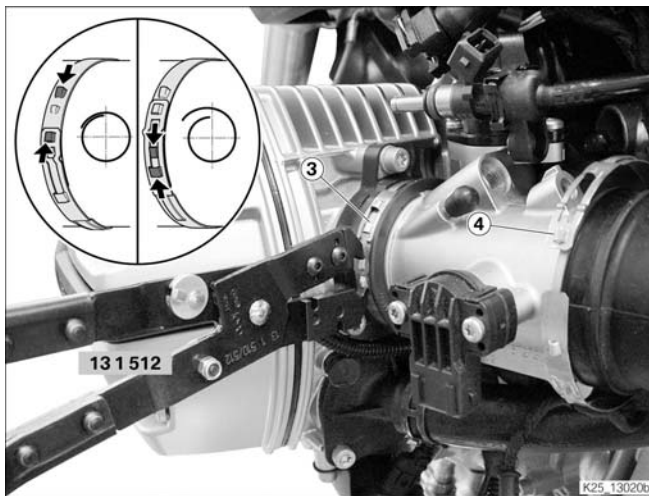
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.



(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

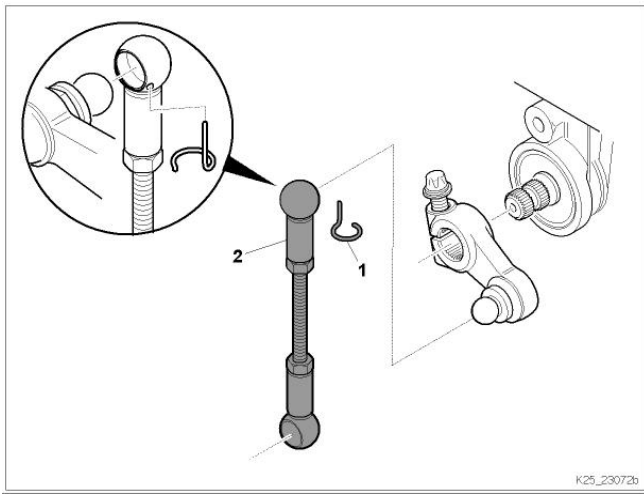
(-) Securing throttle valve stub with cable divider

- Tie up throttle valve stub and cable divider with cable tie (arrow).



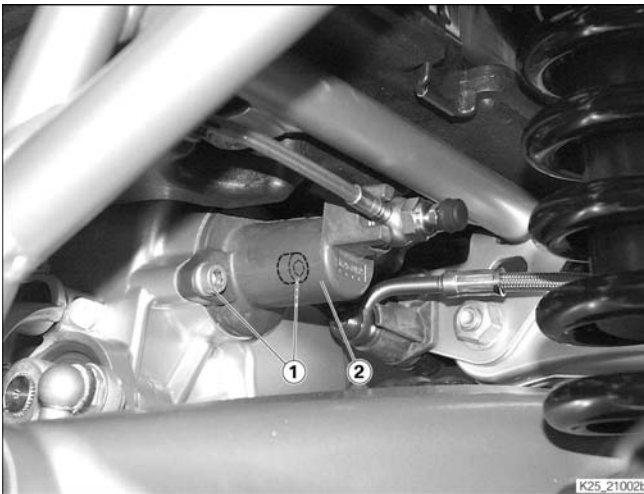
(-) Disengaging selector rod from shift lever

- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.



(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.

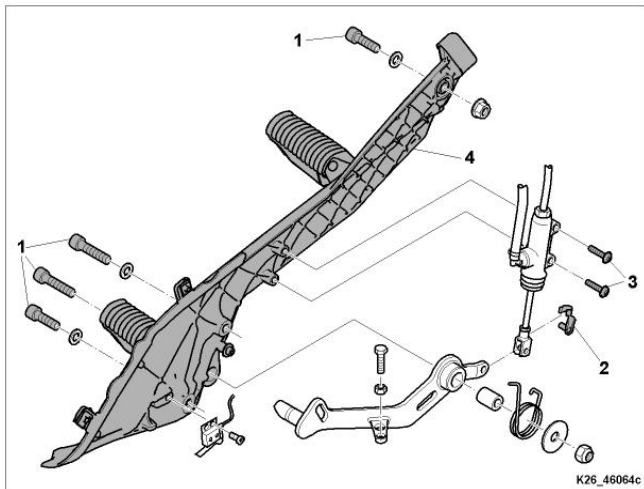


(-) Removing right footrest plate

- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.



Technical data

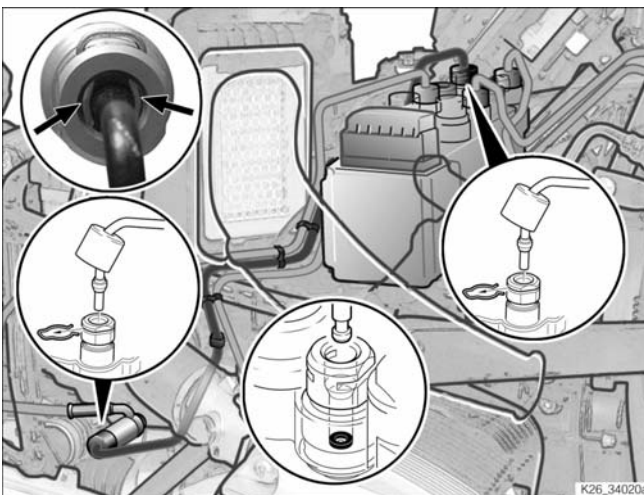
Release temperature, screws for rear brake master cylinder		100 °C	
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- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.



- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.

(-) Disconnecting brake pipe for rear wheel circuit from pressure modulator



- Push the protective cap up.
- Remove the spring clip.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap the area around the connector in a cloth.
- Open the retaining clips, lift the brake pipe out of the pressure modulator and catch escaping brake fluid with a cloth.
- Seal the open end of the brake pipe to prevent brake fluid from dripping.

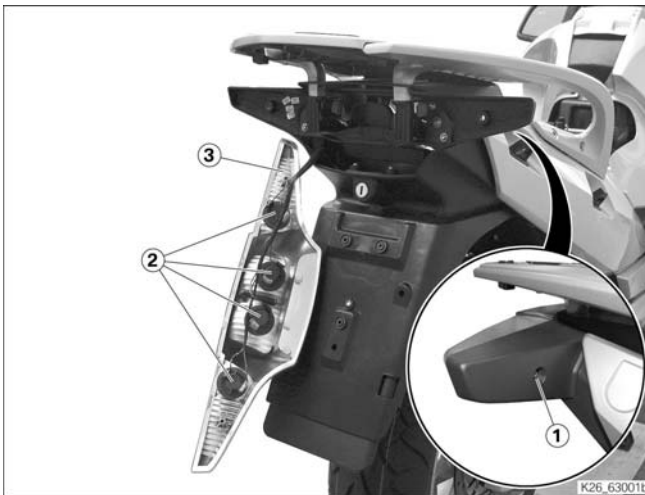


Note

Use the protective cap from a bleed screw to seal the brake pipes.

(-) Removing rear-light unit

- Remove screws (1).
- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).



(-) Disengaging wiring harness at rear

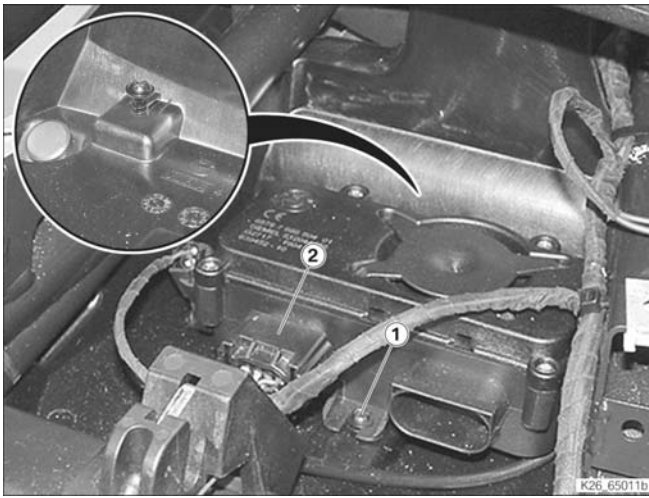
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



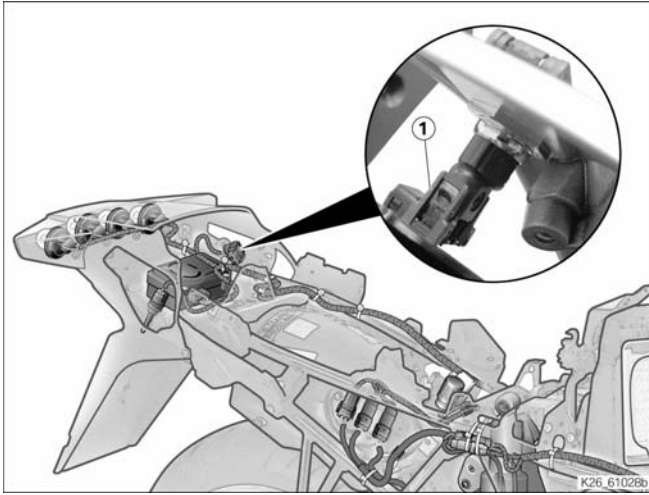
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

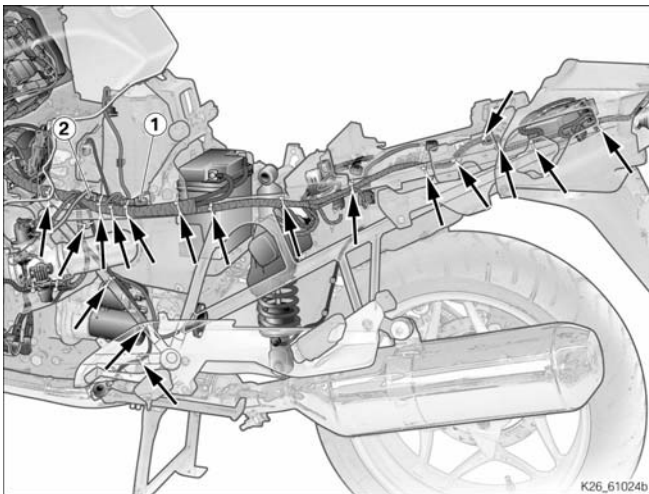


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.

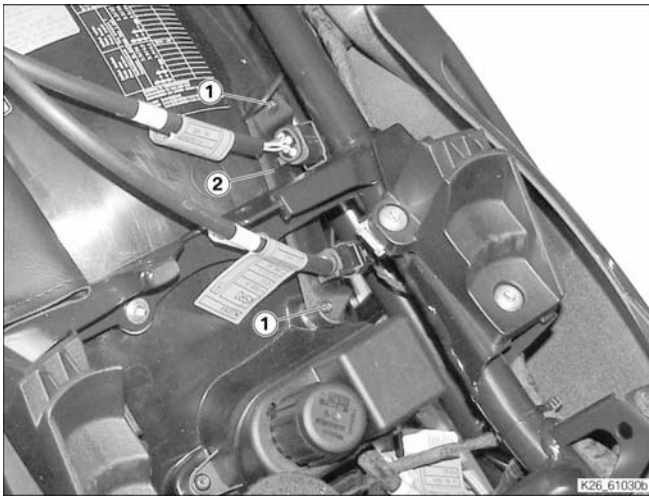


- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.

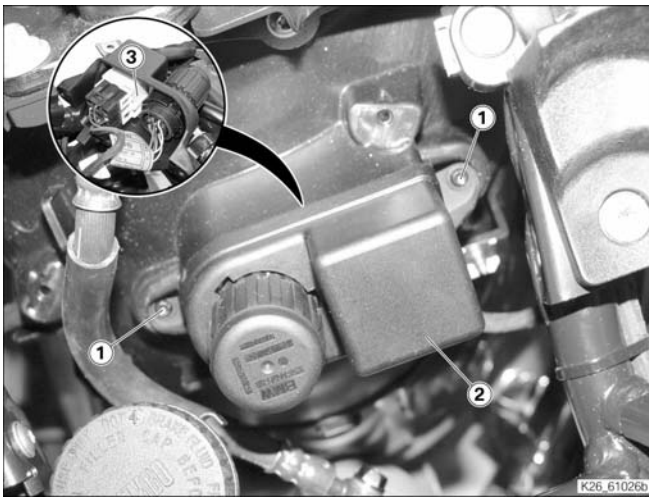


Variant, Seat heating

- Remove screws (1).
- Pass holder (2) forward with the cables.

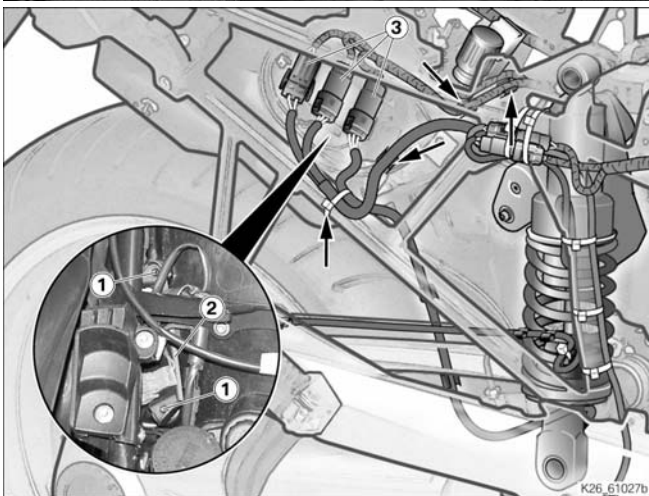


- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.

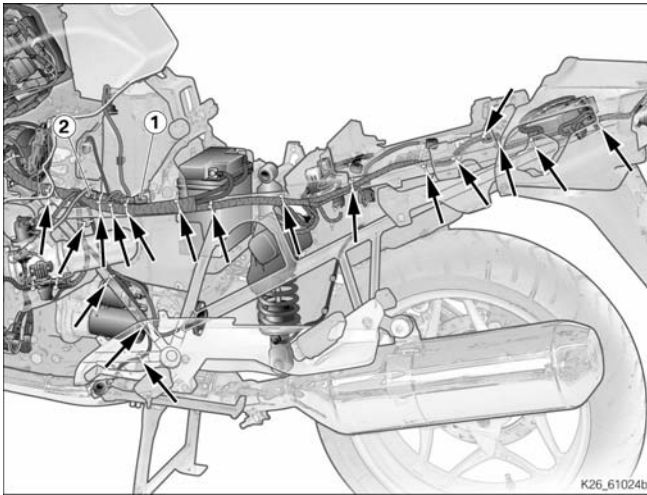
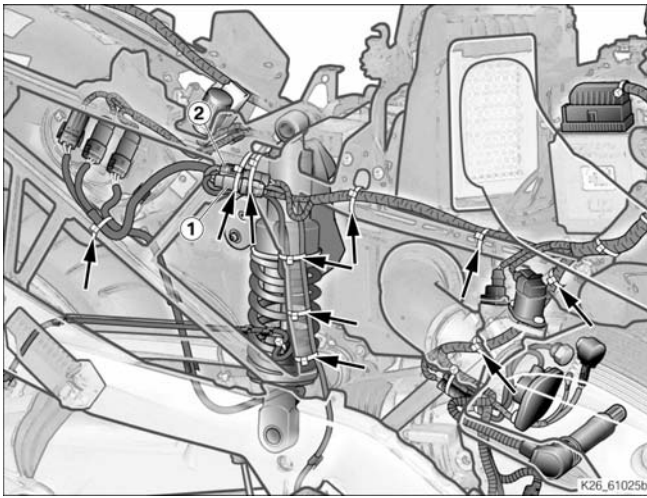


Variant, ESA

- Remove screws (1).
- Pass holder (2) forward with the cables.
- Disconnect plug (3) of the spring strut.



- Disconnect plug (1) of the speed sensor.



- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.

(-) Removing rear section of motorcycle



- Open hose clip (1).
- Disconnect the hose from the intake air silencer.

- Secure the front wheel on the lifting platform.
- Using straps, secure the rear section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.



► **Releasing threaded fastener on rear frame**

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.

! **Attention**

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

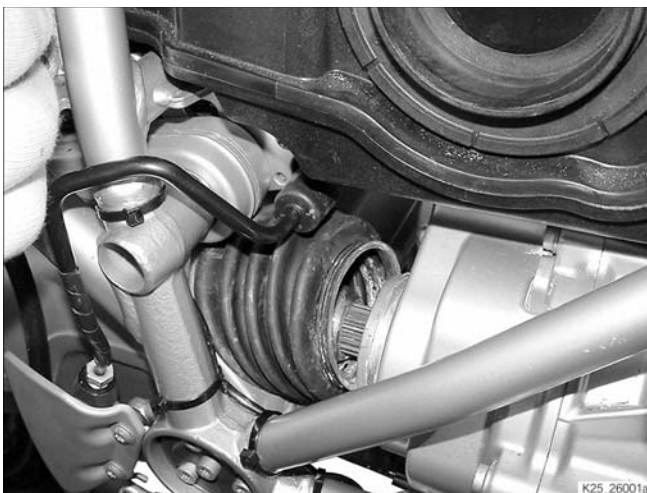
Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

Apply masking tape to the part of the swinging arm that could be damaged.

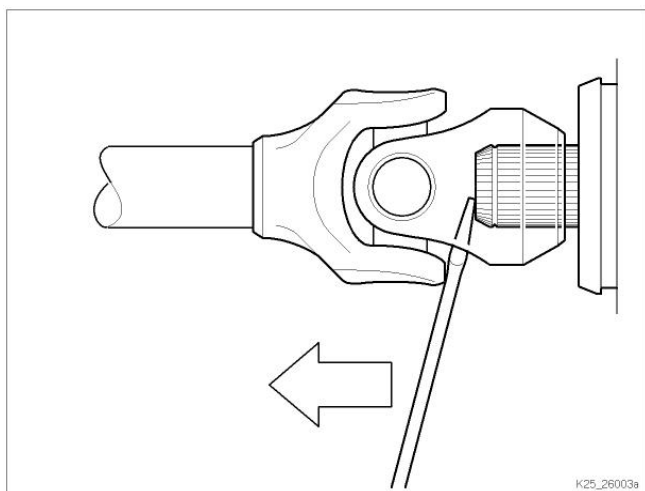
- Slacken screw (4), but do not remove it at this point.

▷ **Pressing universal shaft off gearbox output shaft**

- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.



- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the



shaft in this position.

- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Remove screw (4).



- Thread the fuel-tank breather hose out of the rear frame.
- Disconnect the fuel pressure regulator from the intake air silencer.
- Using crane (No. 46 5 671), (No. 46 5 672), (No. 46 5 673), (No. 46 5 674), carefully lift the rear section clear of the motorcycle, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.



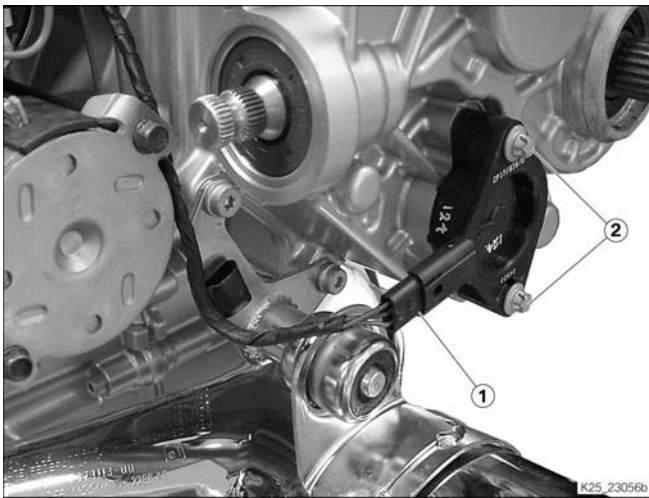
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Pass the control-circuit line with the brake master cylinder forward out of the way.
- Carefully set down the rear section where it will not be damaged.

(-) Removing gearbox potentiometer



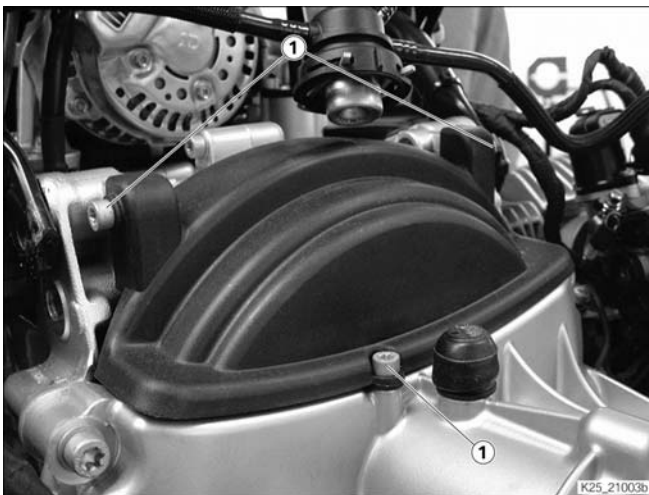
- Disconnect plug (1) of the gearbox potentiometer.
- Release the cable from the cable clips.
- Remove screws (2) from the gearbox potentiometer.
- Remove the gearbox potentiometer, noting the O-ring.

(-) Removing starter



- Disconnect "starter positive" cable (1) (terminal 30).
- Disconnect "starter start signal" plug (2) (terminal 50).
- Remove screws (3).
- Remove the starter.

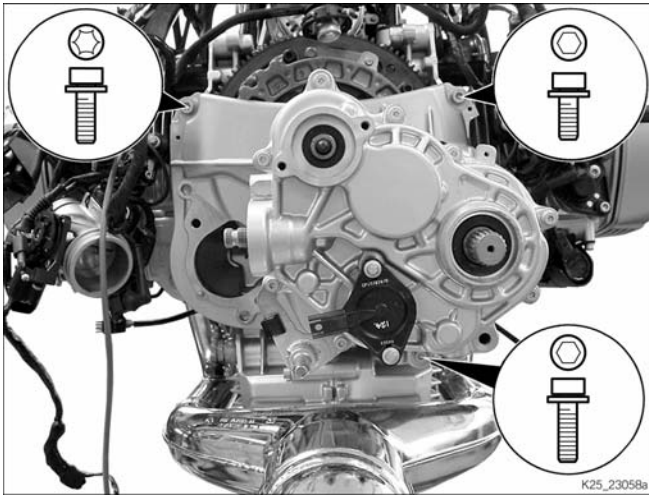
(-) Removing cover for clutch



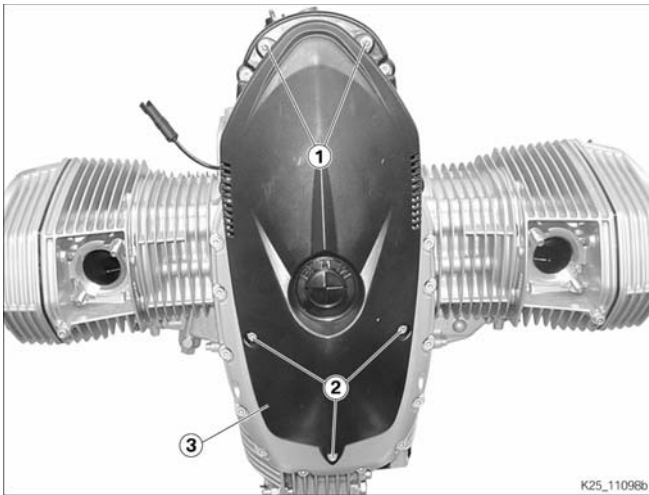
- Remove screws (1).
- Carefully slip the clutch cover to the rear underneath the pressure modulator and remove.
- Install screws to hold the pressure modulator in position.

(-) Removing gearbox

- Remove screws (1) of the clamps on the exhaust manifold.
- Pull clamp (arrow) off the bracket.



- Remove 3 screws.
- Pull the gearbox straight to the rear to remove.
- Keeping it straight to ensure that oil does not escape through the breather, place the gearbox on a smooth, level surface.

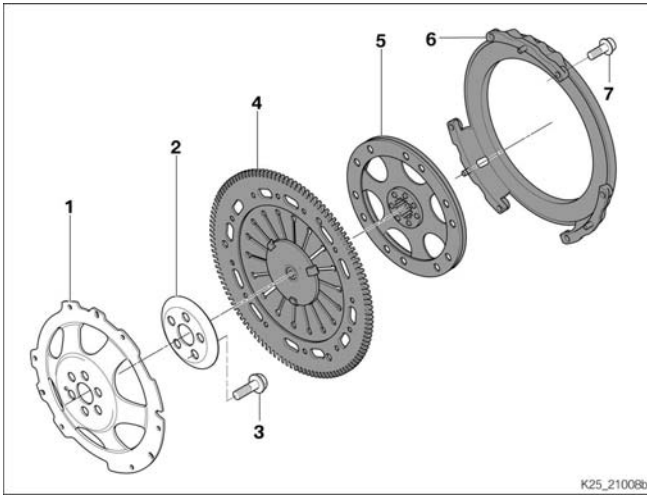
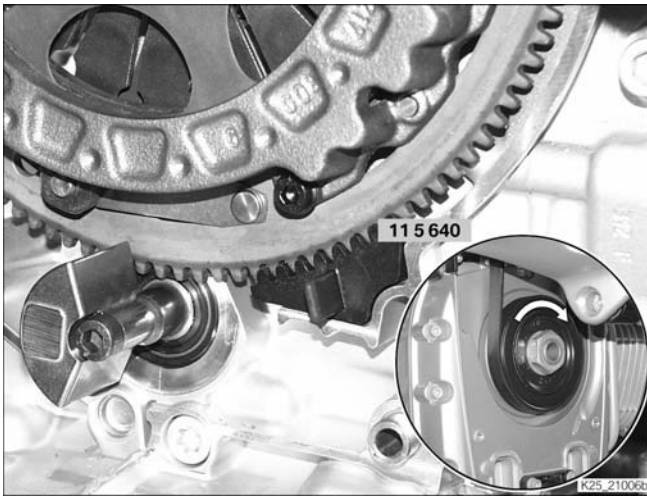


(-) Removing belt guard

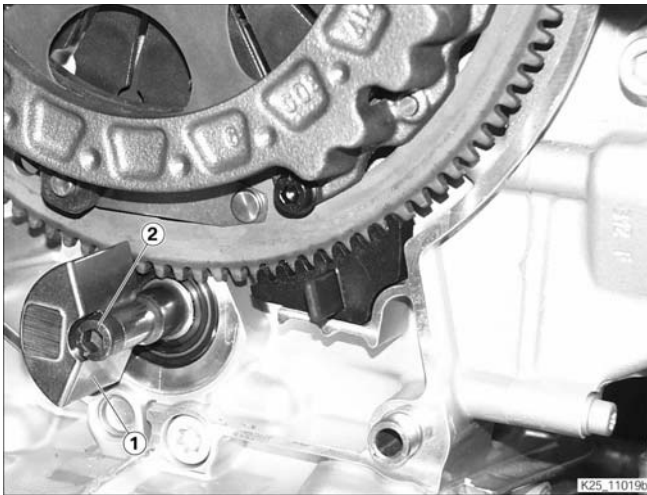
- Remove screws (1) and (2).
- Remove belt guard (3).

(-) Removing clutch

- By means of the belt pulley, turn the engine in the normal direction of rotation until the engine locking device can be inserted.
- Insert engine locking device (No. 11 5 640) .



- Working in diagonally opposite sequence, loosen screws (7) in stages.
- Remove engine locking device (No. 11 5 640) .
- Remove the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6).



(-) Removing balance weight

- Remove screw (2) from the balance weight.
- Pull balance weight (1) back and off the counterbalance shaft.

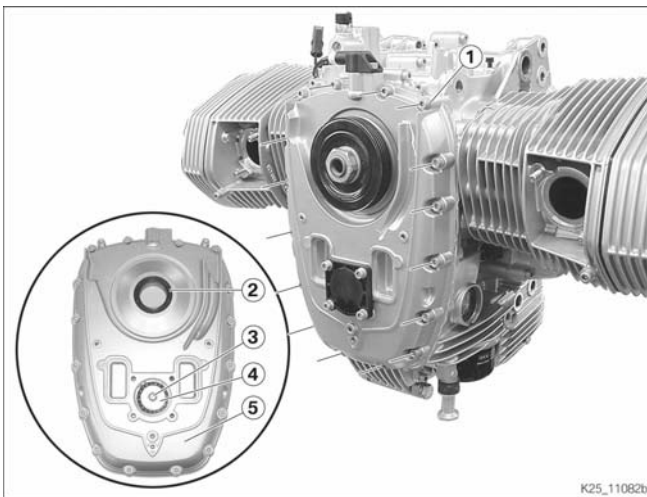
(-) Removing cover for counterbalance shaft

- Remove screws (1) and remove cover.



(-) Releasing balancing shaft at front bearing

- Remove screw (3) and washer (4).



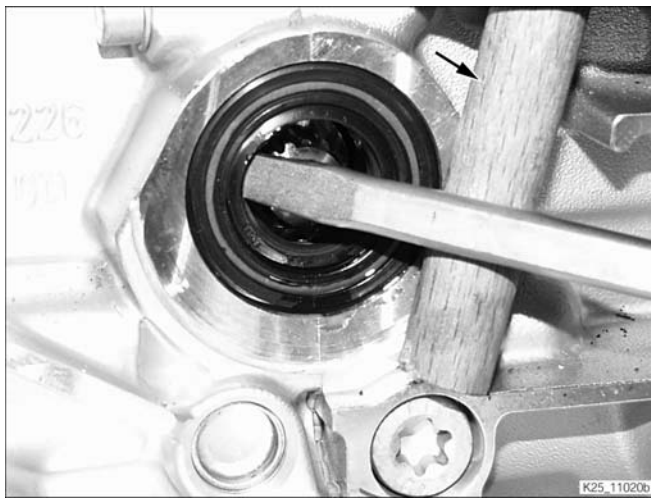
(-) Removing counterbalance shaft

- Pull balancing shaft (1) to the rear to remove.




(-) Removing rotary shaft seal, counterbalance shaft

- Use a piece of wood (arrow) or similar to protect the edge of the crankcase and use a suitable screwdriver to pry out the rotary shaft seal.
- Clean the bore in the crankcase where the rotary shaft

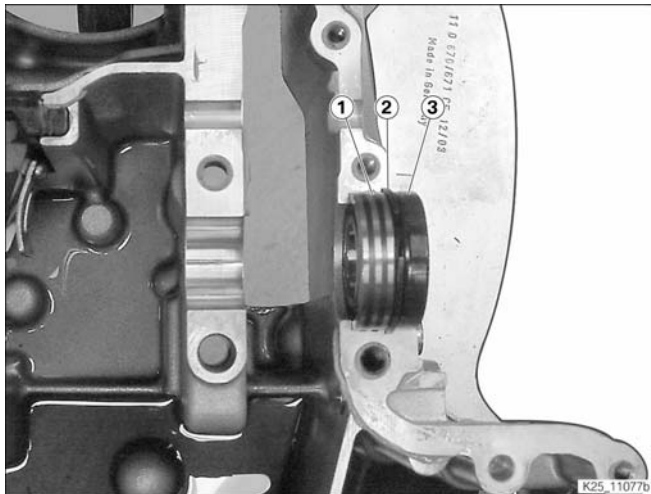


seal sits in the bore.


 Consumables/lubricants		
Brake cleaner	Cleaners	83 11 9 407 848

(-) Replacing bearing for balancing shaft in engine block

- Remove circlip (2).



- Heat the engine block around the bearing.


 Technical data			
Release/mating temperature		80 °C	



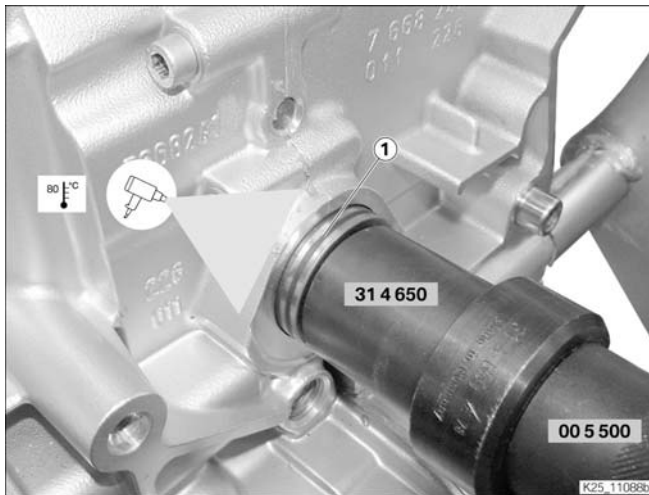
Warning

Nature: Heated/hot parts can cause burns.
Avoidance: Wear protective gloves when handling heated parts.

- Remove bearing (1) with internal puller (No. 00 8 573) and reaction support (No. 00 8 572).
- If necessary, reheat the engine block around the bearing.

 Technical data			

Release/mating temperature	80 °C	
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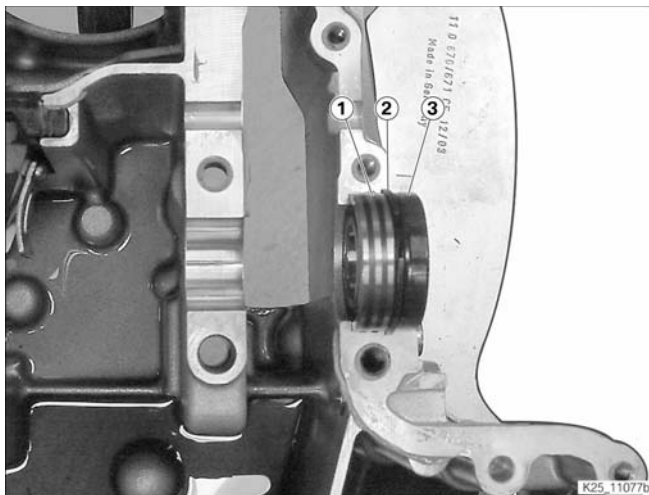


Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Drive in new bearing (1) with handle (No. 00 5 500) and drift (No. 31 4 650) .



- Install circlip (2).

(-) Installing counterbalance shaft

- Install balancing shaft (1) from behind.



(-) Installing rotary shaft seal, counterbalance shaft



Attention



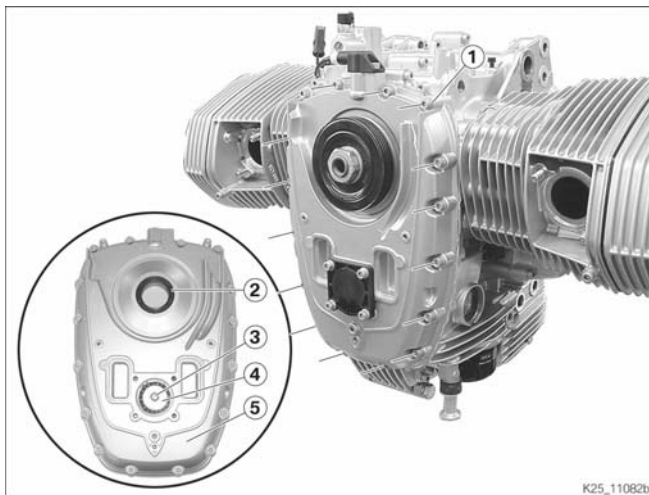
Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.


Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.

- Using handle (No. 00 5 500) and drift (No. 23 1 770) , drive the rotary shaft seal into the crankcase.

(-) Securing balancing shaft in front bearing

- Install screw (3) and washer (4).




 Tightening torques		
Gear wheel to balancing shaft, M8 x 50	19 Nm	

(-) Installing counter balance shaft cover

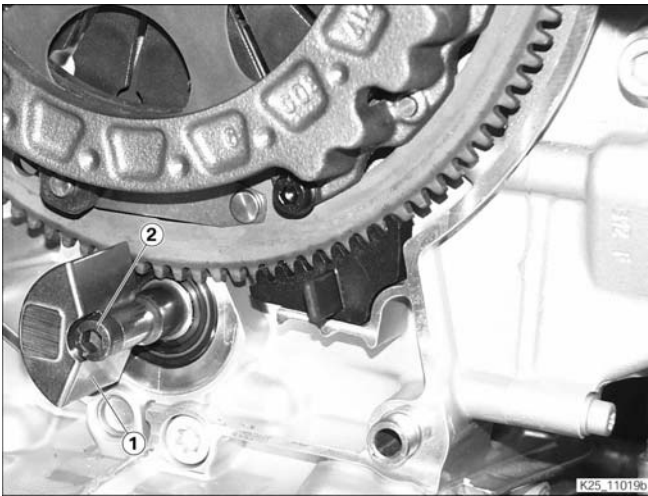
- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).



 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing balancing weight

- Lightly coat the friction face of the rotary shaft seal on balance weight (1) with engine oil.



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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Attention

Nature: When the timing case cover is removed, the balancing shaft can be pushed forward in the engine and damage the sealing lip of the shaft sealing ring.

Avoidance: If the timing case cover is removed secure the balancing shaft in position, so that it cannot be pushed forward.

- Push balance weight (1) onto the counterbalance shaft.
- Install screw (2) and tighten.



Tightening torques

Neck-down screw, M8 x 70, Replace screws	Initial torque, 10 Nm	
	Final torque, 90 °	

(-) Installing clutch

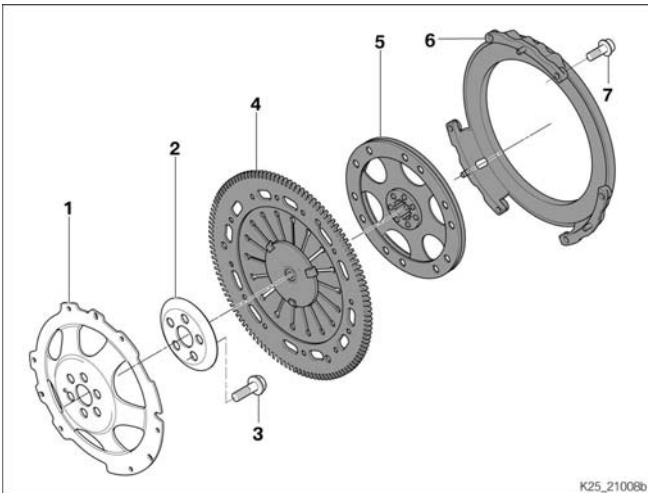
- Install the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6) in clutch housing (1).



Note

The clutch components are all precision-balanced. It is not necessary to check for identification marks when assembling.

- Insert screws (7).
- Use centering pin for clutch (No. 21 2 673) to centre the clutch plate.
- Insert engine locking device (No. 11 5 640) .
- Install screws (7) and tighten in correct tightening sequence.



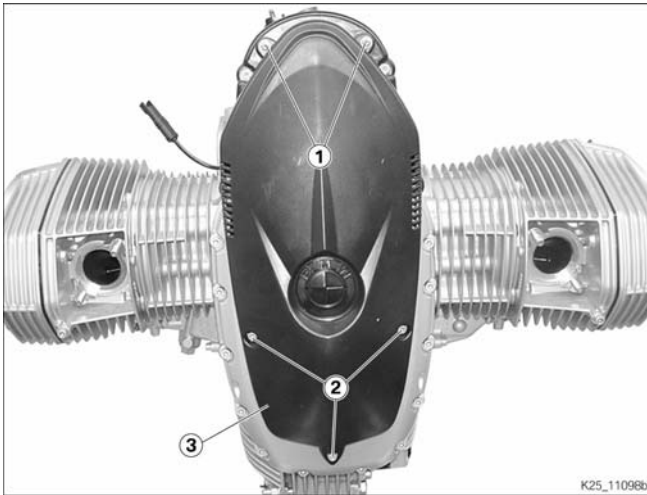
Tightening torques


Never re-use the original screws, M6 x 20, in diagonally opposite sequence and stage by stage	12 Nm	
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Remove engine locking device (No. 11 5 640) and centering pin for clutch (No. 21 2 673) .

(-) Installing belt guard


- Install belt guard (3) and secure with screws (1) and (2).



 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing gearbox

- Remove dirt and old lubricant from the splines of the clutch hub and the gearbox input shaft.
- Lubricate the splines of the clutch hub and the gearbox input shaft.

 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

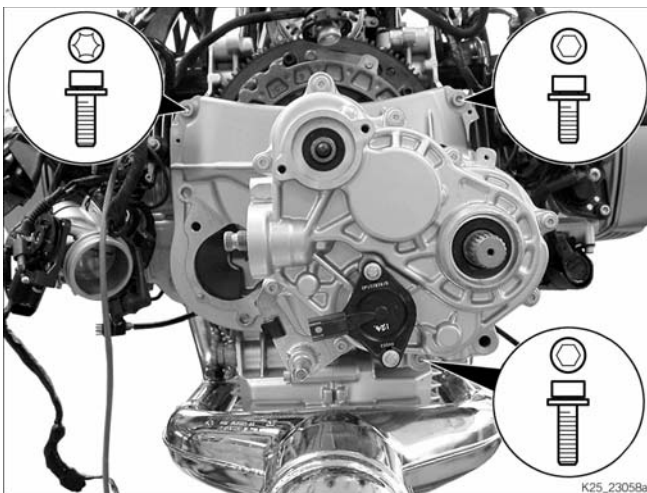
- Position the gearbox with the gearbox input shaft just introduced into the hub of the clutch plate.




Note

You will find it easier to introduce the splined end of the gearbox input shaft into the clutch hub if you engage a gear and turn the gearbox output shaft.


- Slide the gearbox over the reamed sleeve until it mates with the crankcase.
- Install 3 screws.



 Tightening torques		
Gearbox to engine block, M8 x 35	19 Nm	
Gearbox to engine block, M8 x 70	19 Nm	
Gearbox to engine block, M8 x 50	19 Nm	




- Slip the exhaust clamp onto the holder on the gearbox and align it with the exhaust.
- Tighten screws (1).

 Tightening torques		
Clamp, elbow, rear, M6 x 20	8 Nm	
Optimoly TA		

(-) Installing cover for clutch




- Remove screws (1).
- Carefully fit clutch cover under the pressure modulator and align.
- Install screws (1).

 Tightening torques		
Clutch cover to engine, M6 x 16	8 Nm	


(-) Installing starter



- Install the starter.
- Install screws (3).

 Tightening torques		
Starter with gearing to engine, M8 x 60	19 Nm	

- Connect "starter positive" cable (1) (terminal 30).

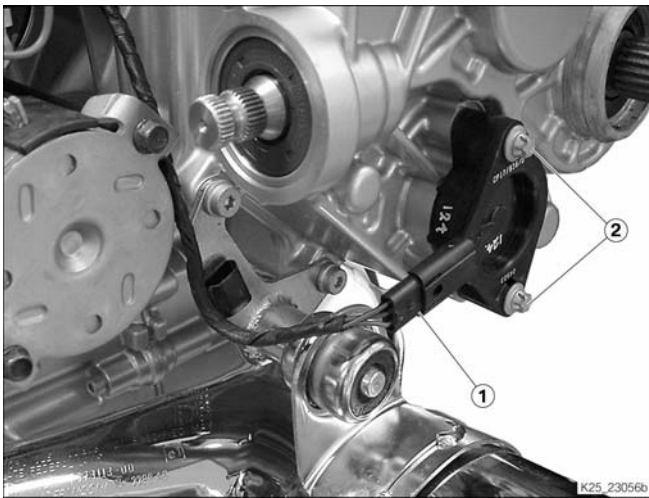
 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).

(-) Installing gearbox potentiometer

- Install the gearbox potentiometer, noting the O-ring.
- Install screws (2).

 Tightening torques		



Tightening torques

Gear potentiometer to gearbox	9 Nm	
-------------------------------	------	--

- Connect plug (1) to the gearbox potentiometer.
- Clip the cable into the cable clips.

(-) Installing rear section of motorcycle

- Remove dirt and old lubricant from the splines of the gearbox output shaft.
- Lubricate the splines of the gearbox output shaft.



Consumables/lubricants

Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476
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- Carefully manoeuvre the rear section of the motorcycle into position at the front section, making sure that the wiring harness is correctly positioned.
- Mate the universal shaft with the gearbox output shaft and align the rear frame with the anchorages.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Carefully turn the rear wheel to check that the universal shaft is still correctly positioned.
- Position the fuel pressure regulator on the intake air silencer.


► Securing rear frame to motorcycle

- Install screw (4), **but do not tighten it at this point.**
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert screws (1) on left and right.
- Tighten screw (4).





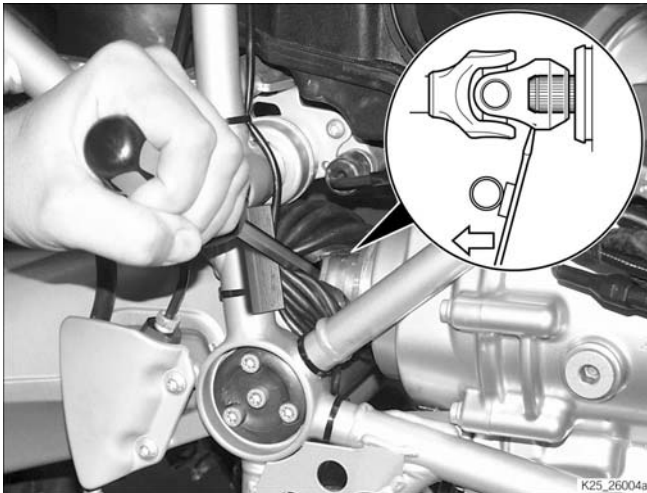
- Tighten screws (1), (2) and (3).

 Tightening torques		
Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	

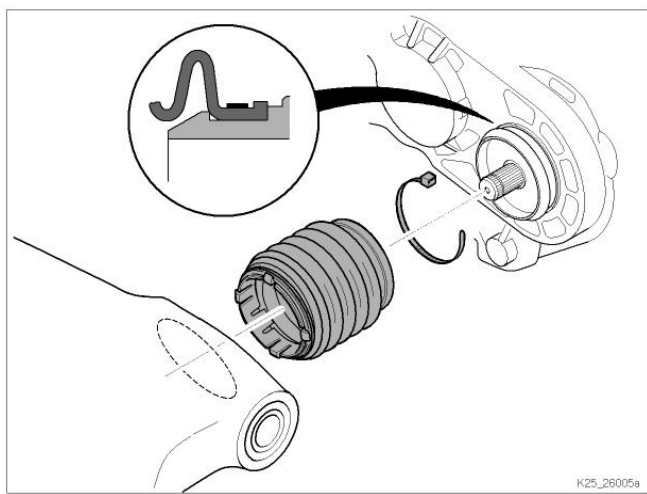



► **Pressing universal shaft onto gearbox output shaft**

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.



 Consumables/lubricants		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.



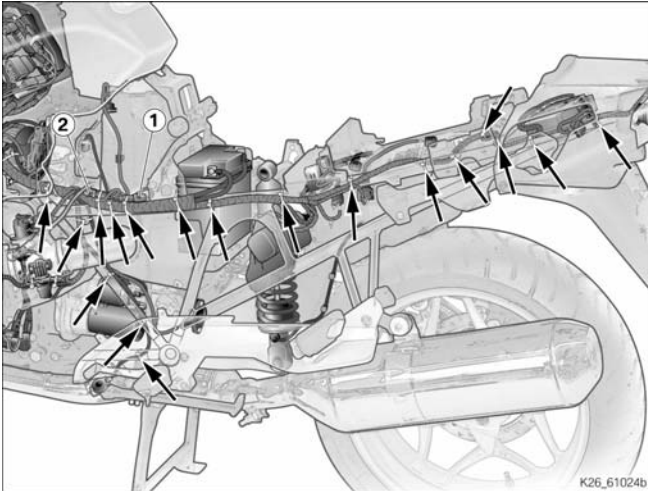
- Release the straps securing the front wheel and disengage crane (No. 46 5 671), (No. 46 5 672), (No. 46 5 673), (No. 46 5 674) with the straps from the rear section of the motorcycle.

- Release the control-circuit line complete with the brake master cylinder and pass it through to the rear.
- Route the fuel-tank breather hose into position along the rear frame.
- Connect the hose of the crankcase breather to the intake air silencer.
- Slide hose clamp (1) into position.

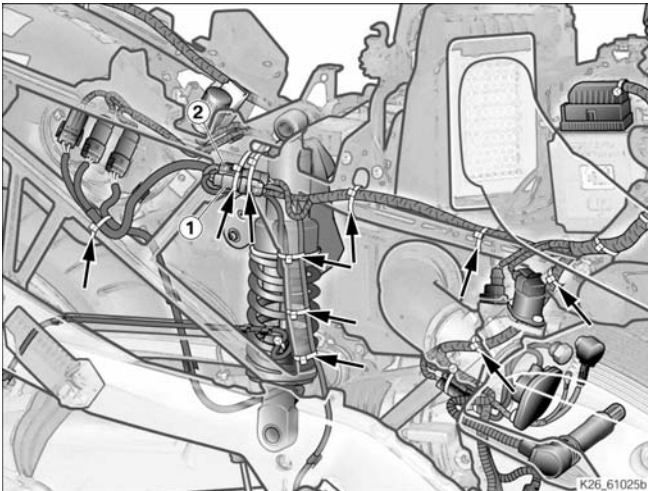


(-) Securing wiring harness at rear

- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.

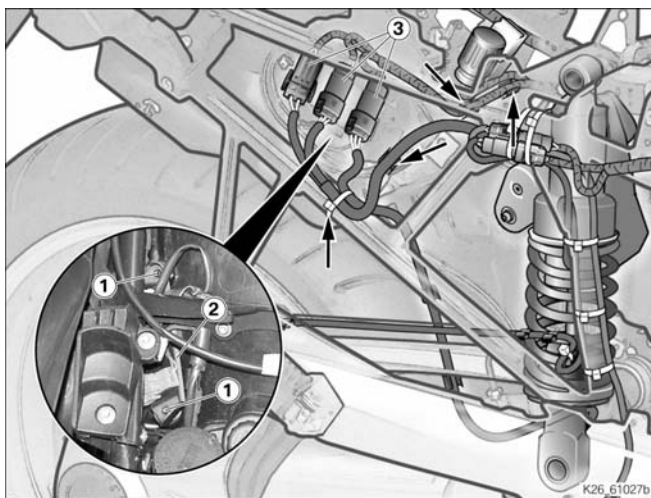


- Connect plug (1) of the speed sensor.

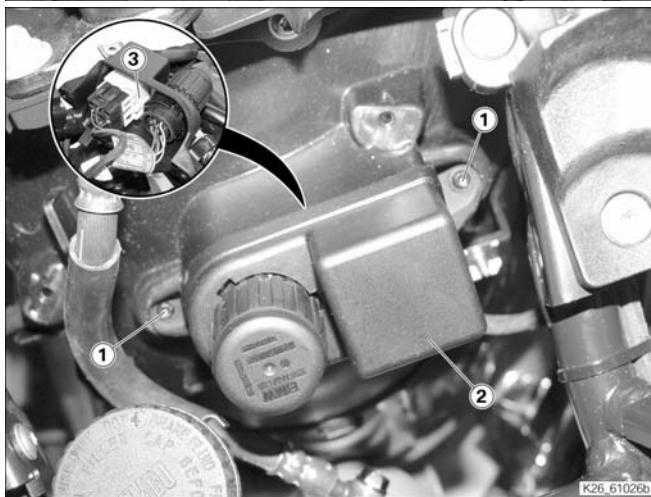


Variant, ESA

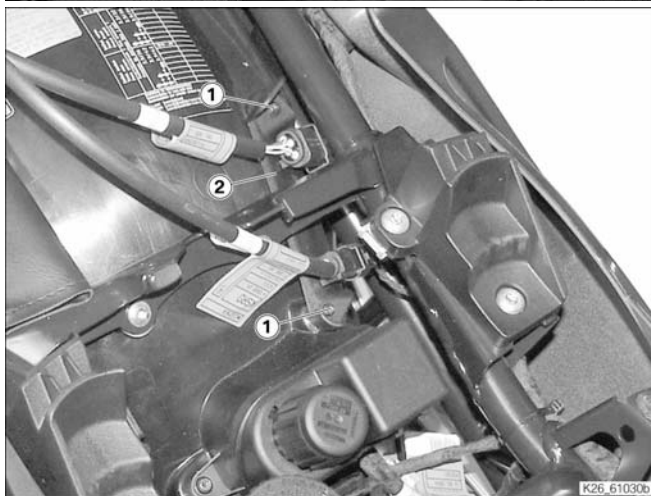
- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.



- Secure holder (2) with screws (1).



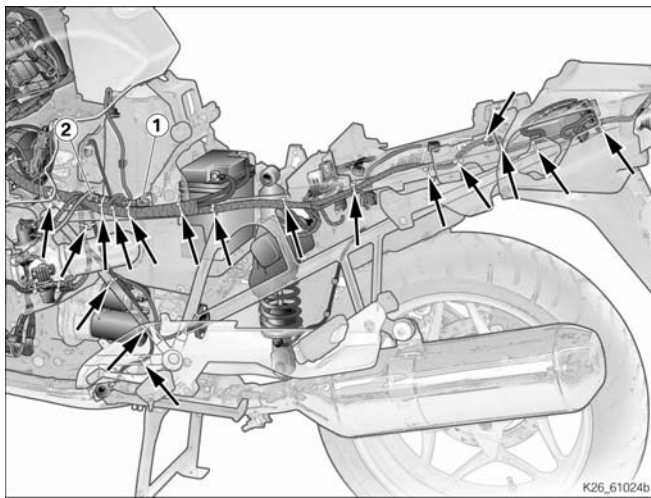
- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).



Variant, Seat heating

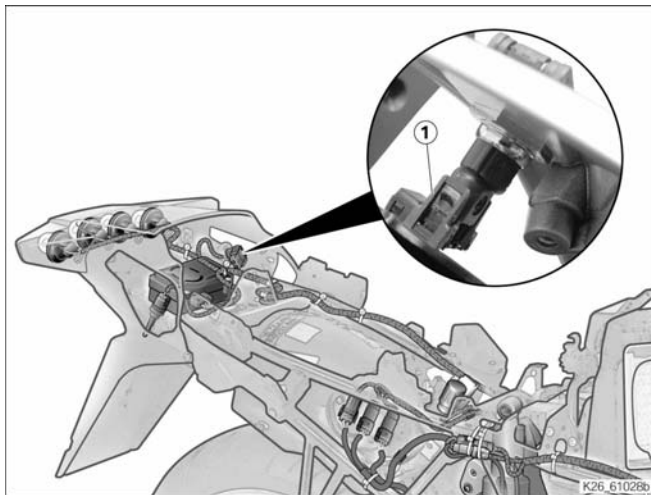
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

- Secure the wiring harness to the rear frame with cable ties (arrows).



Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



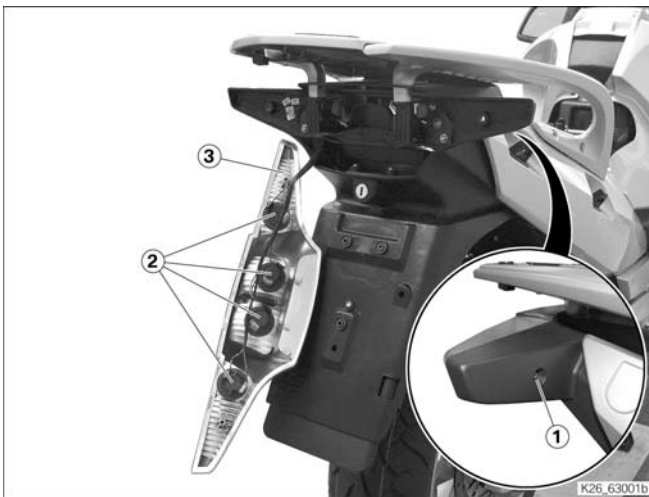
Variant, On-board computer

- Connect plug (1) of the temperature sensor.



(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



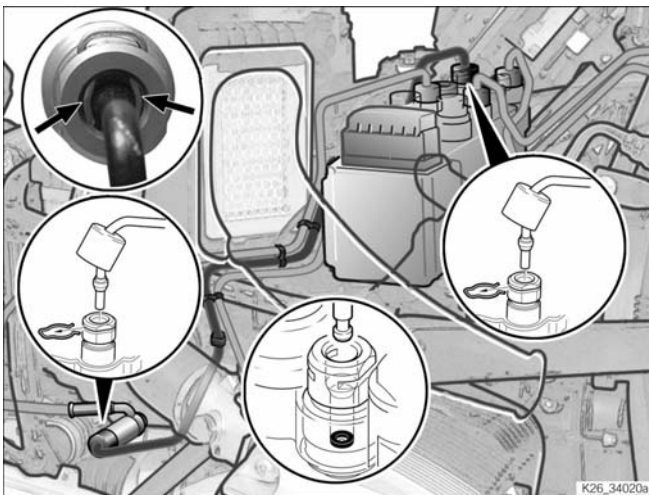
(-) Connecting brake pipe for rear wheel circuit to pressure modulator

⚠ Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.



- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.

⚠ Warning

Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure

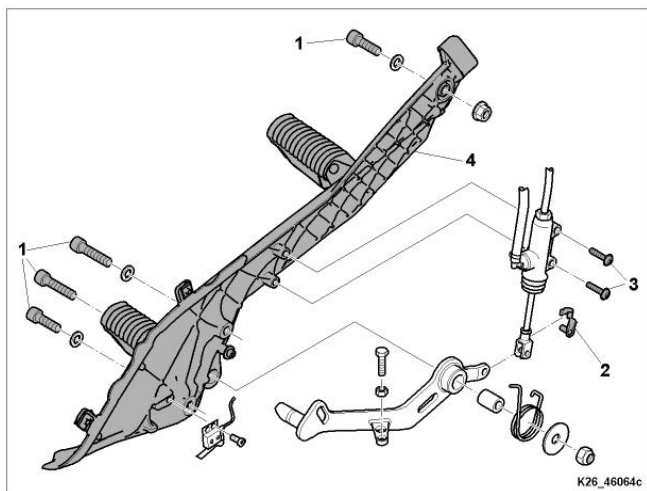
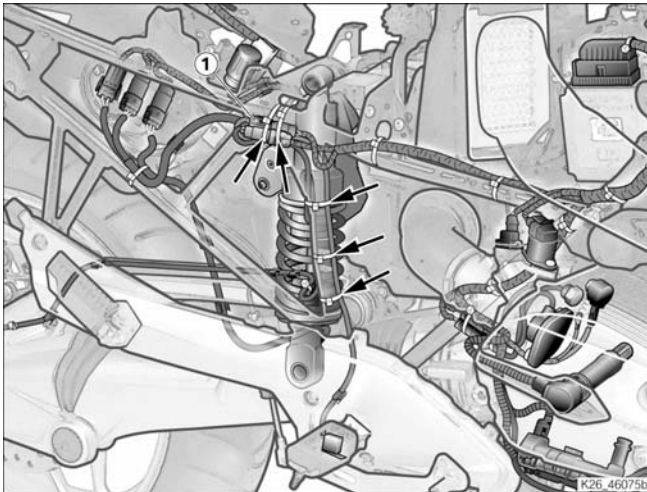
contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.


- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Installing right footrest plate


- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

- Install pin (2).
- Install screws (1).

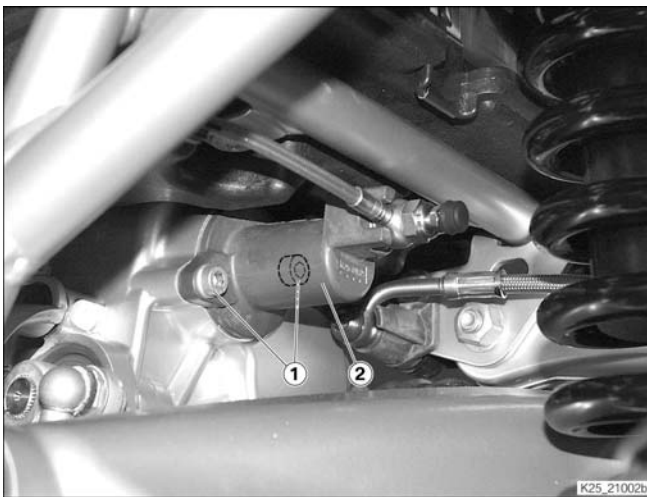
 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.

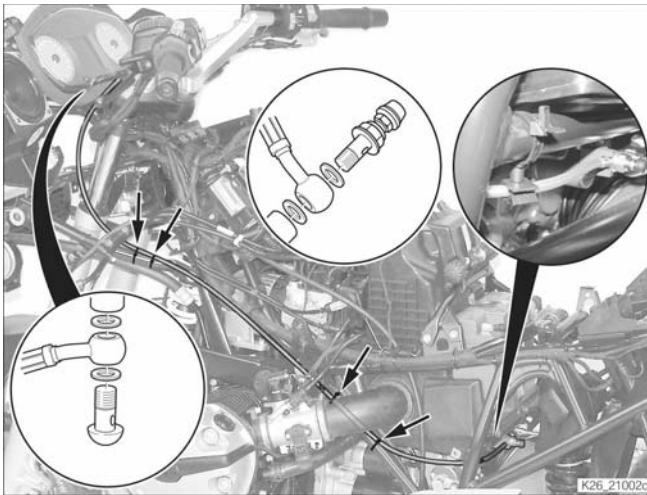


(-) Installing clutch slave cylinder

- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.




 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	

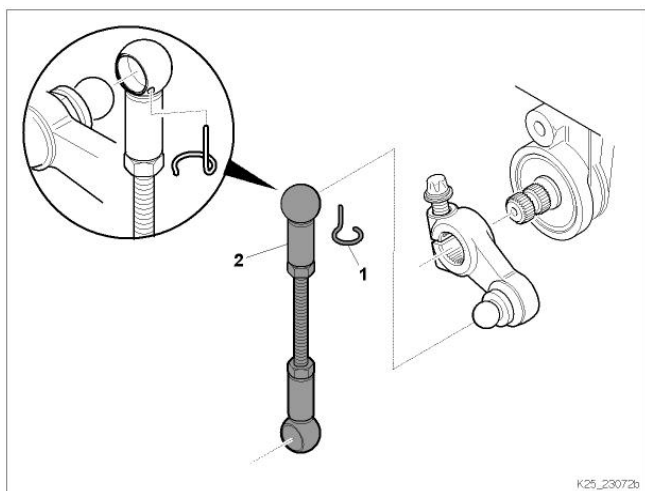


- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.

(-) Securing selector rod to shift lever

- Grease the ball head of the shift lever and the ball socket of selector rod (2).

 Consumables/lubricants		



Staburags NBU 30 PTM

High-performance lubricating grease

07 55 9 056 992

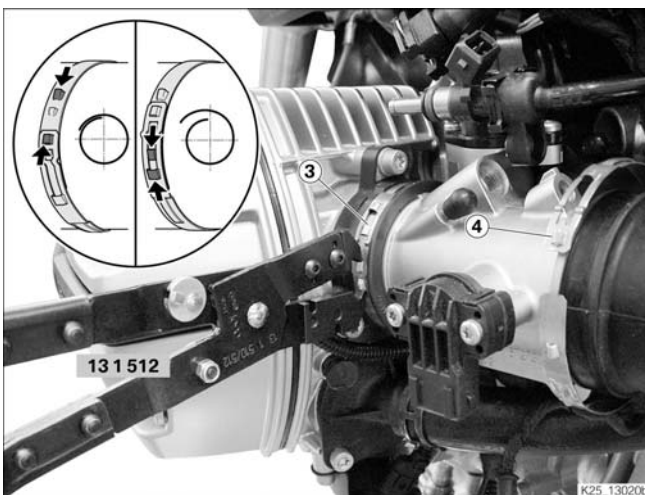
- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

(-) Releasing throttle valve stub with cable divider



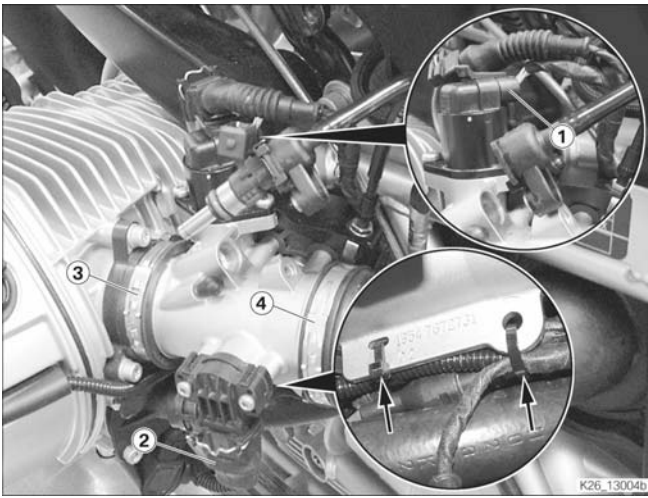
- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.

(-) Installing throttle-valve stub



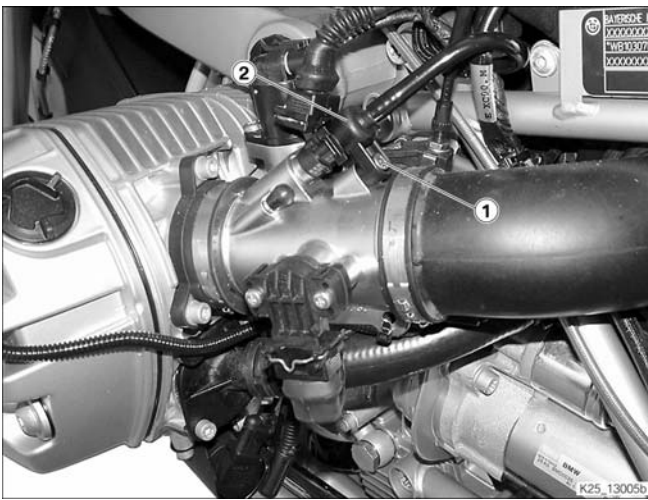
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .

- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to




- the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing right and left injection valves

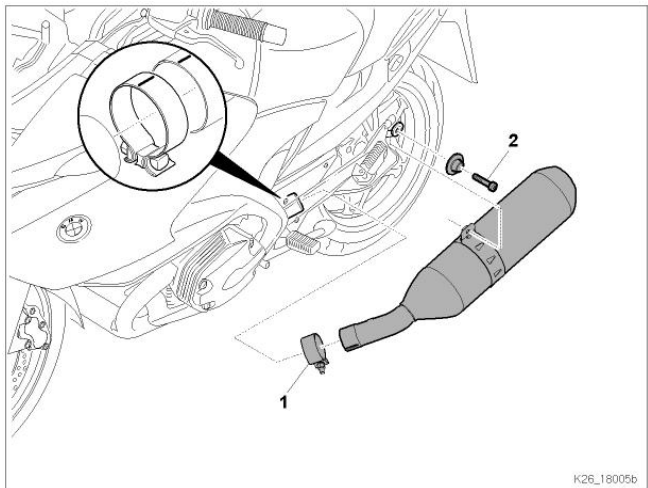


- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure with screws (2).


 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.


(-) Installing silencer



- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

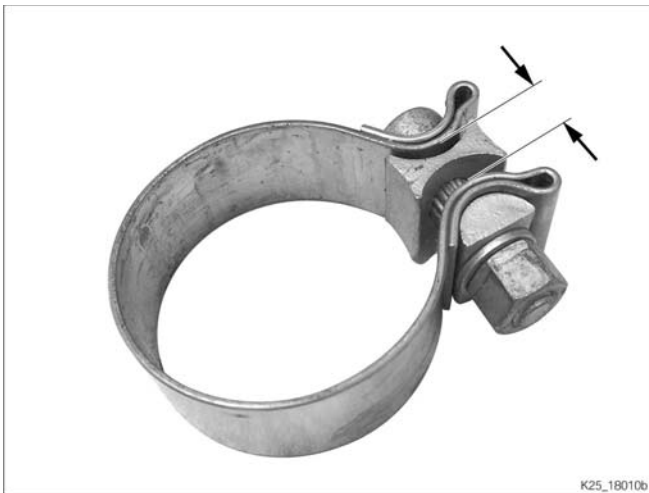
- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**

Test

- Check distance ([arrows](#)) between silencer and rear wheel.



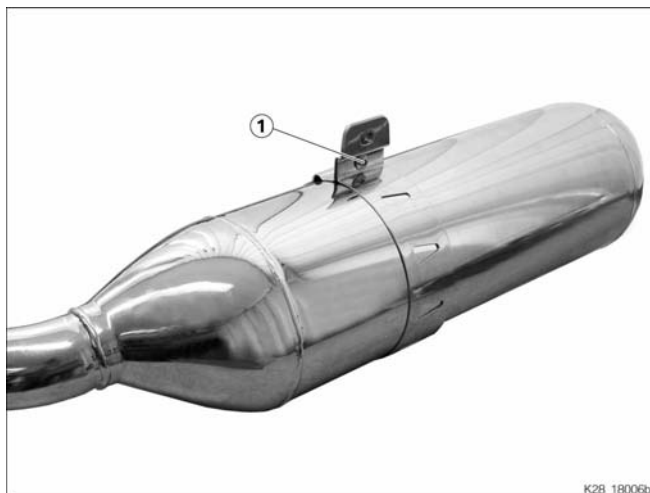
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



! Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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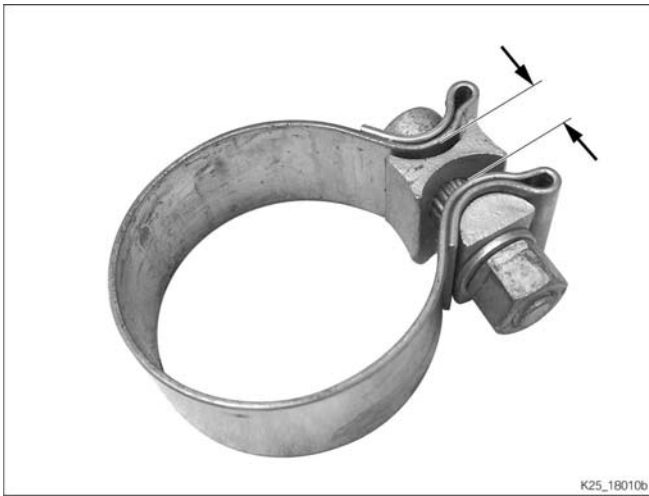



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.


Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.

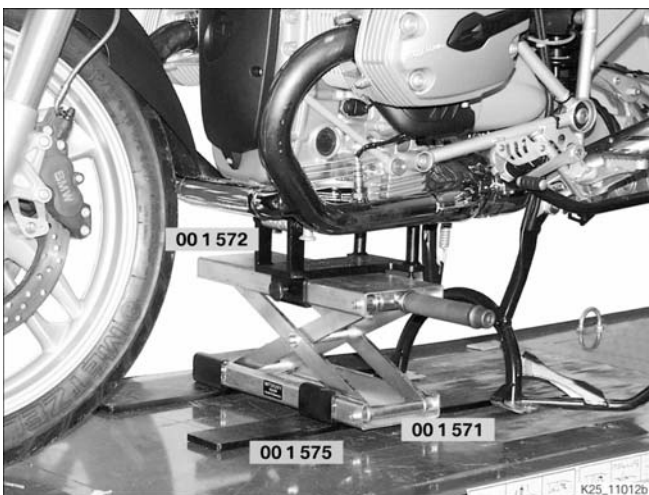


 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

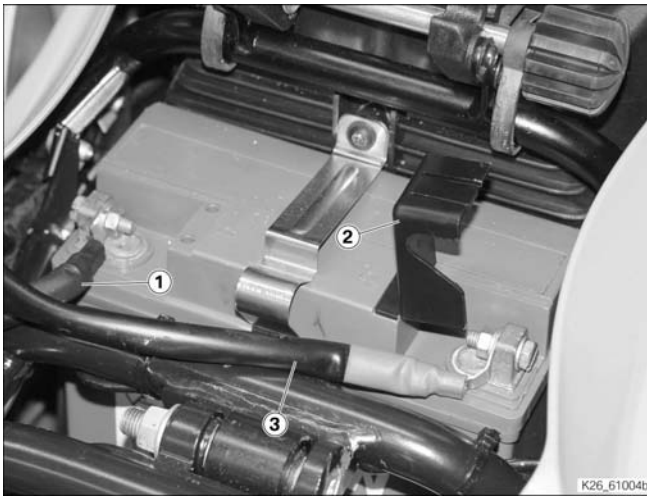


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

 **Attention**

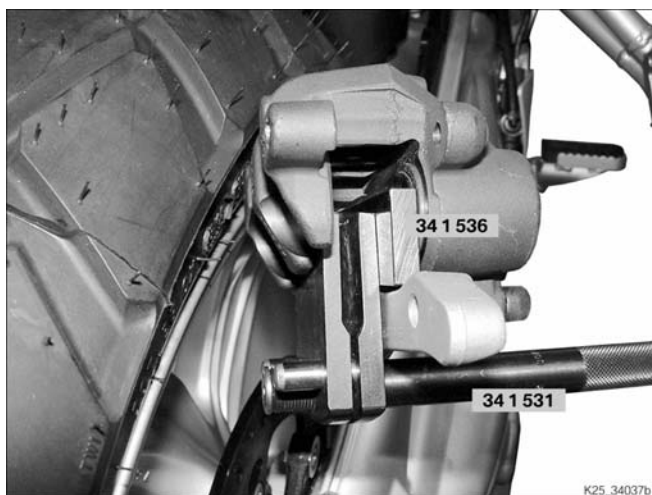
Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

 **Attention**

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.


Avoidance: Do not disconnect the plugs from the pressure modulator.



- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .

- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



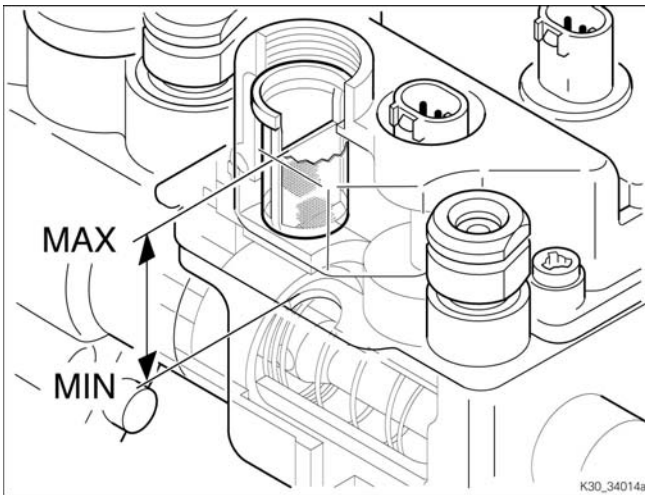
Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



 **Warning**

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.

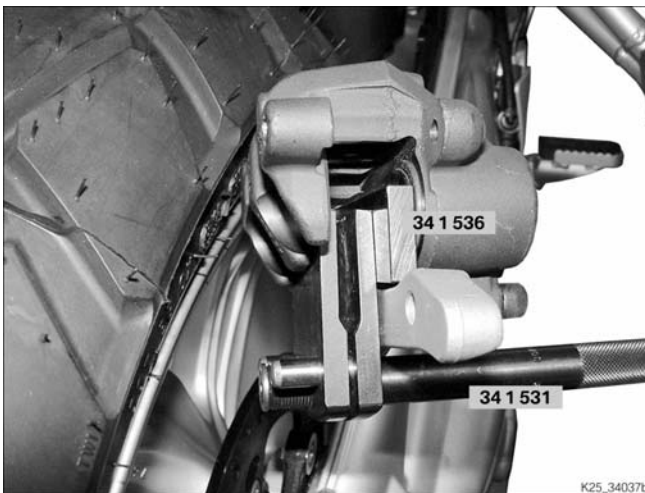
► **Instructions for filling rear wheel circuit reservoir**

- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536), in the rear brake caliper.

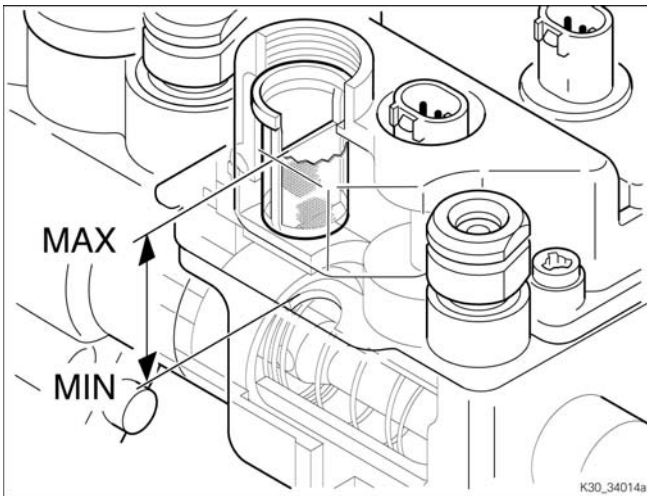
 **Warning**

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.



- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536).
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.



Consumables/lubricants

DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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- Hand-tighten the cap of the rear wheel-circuit reservoir.

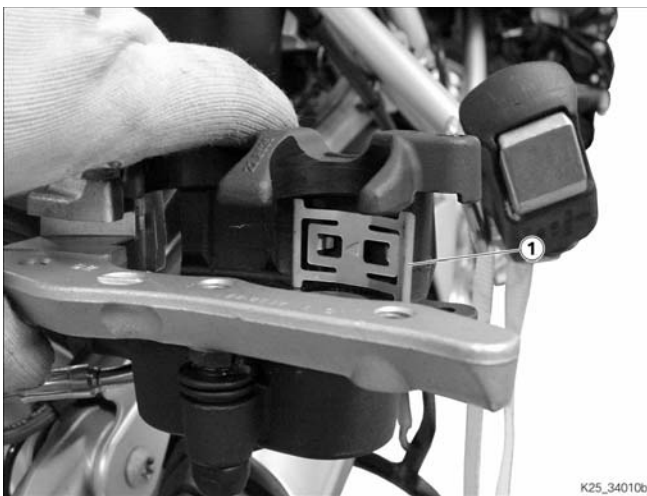
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536).

- Replace the rear brake pads after removal, if necessary

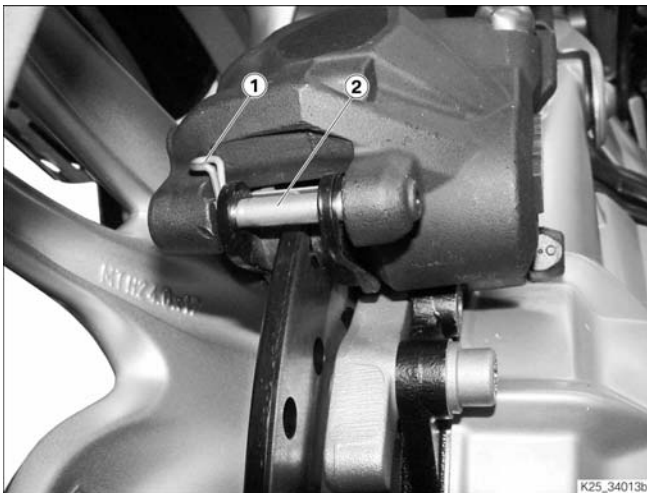
▷ **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.

» Arrow points in direction of travel.

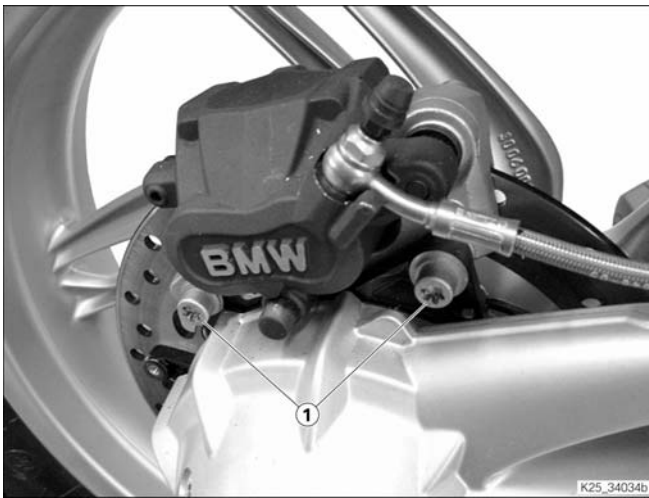


- Install the brake pads.
- Manually install retaining pin (2).



▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).



Tightening torques

Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	
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Warning

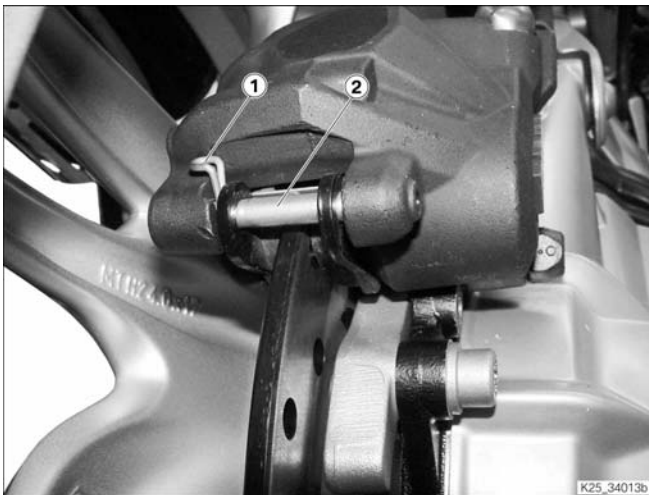
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure

to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.

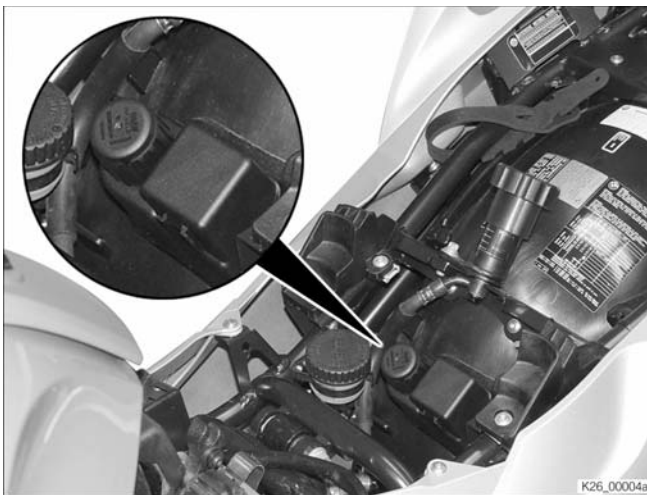


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



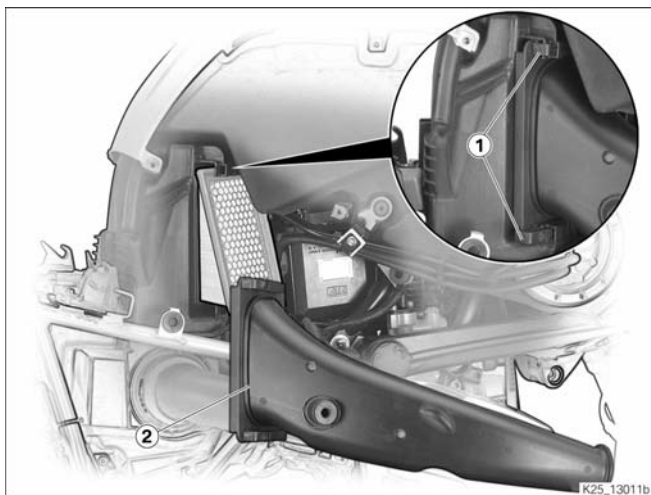
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

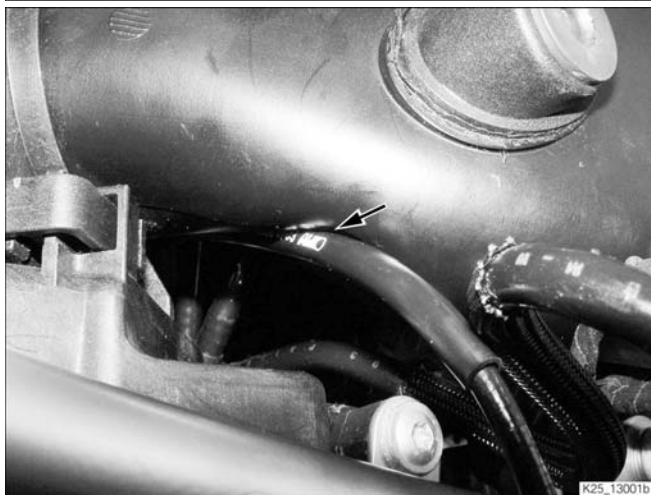
Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

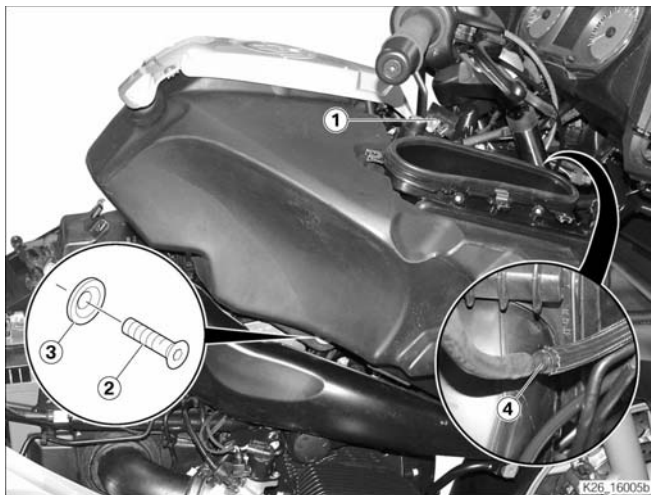
(-) Installing intake air pipe



- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.




- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

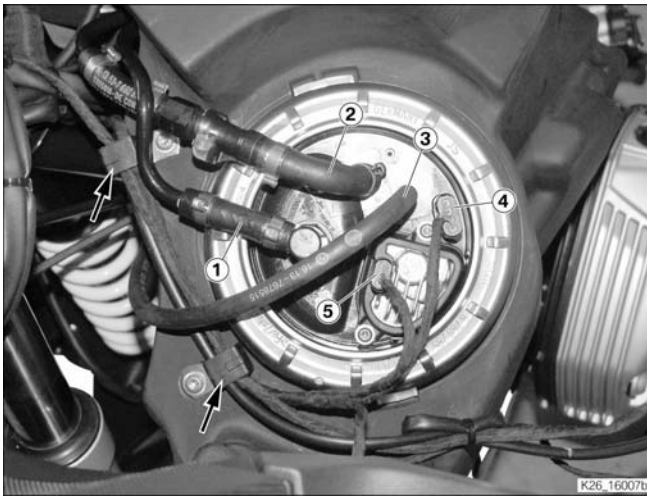


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).



- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

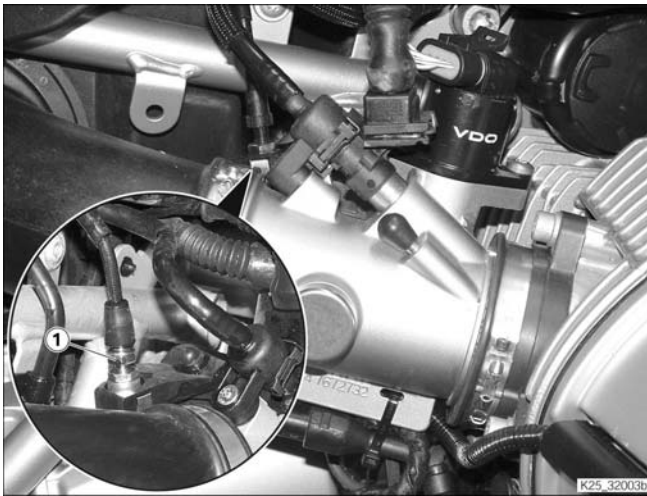
Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.


In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.



- >> Both throttle valves reach the idle stops.
- >> Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

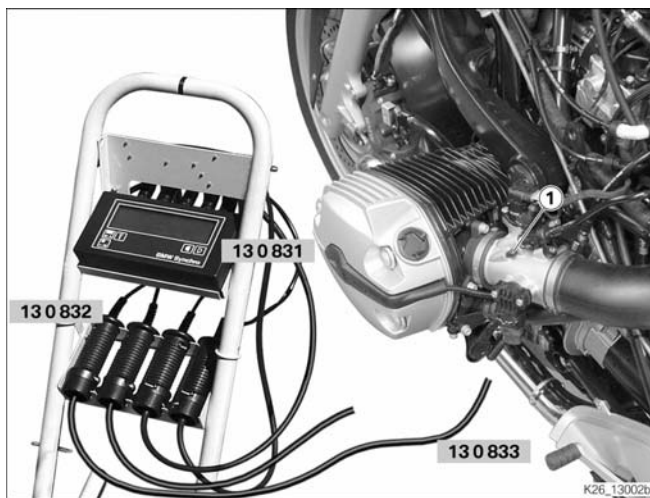


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- >> The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



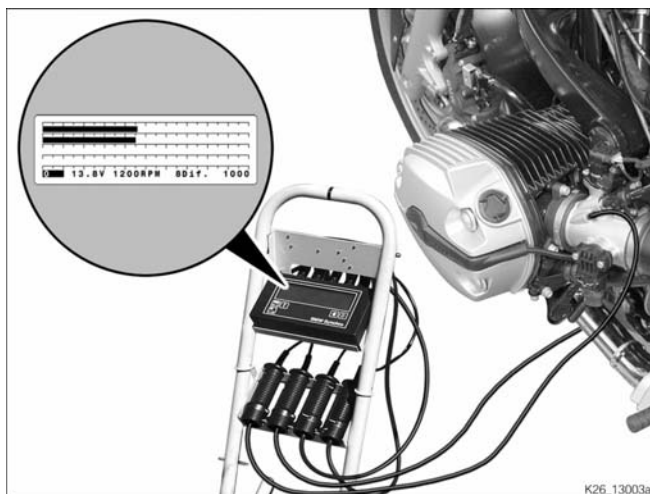
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

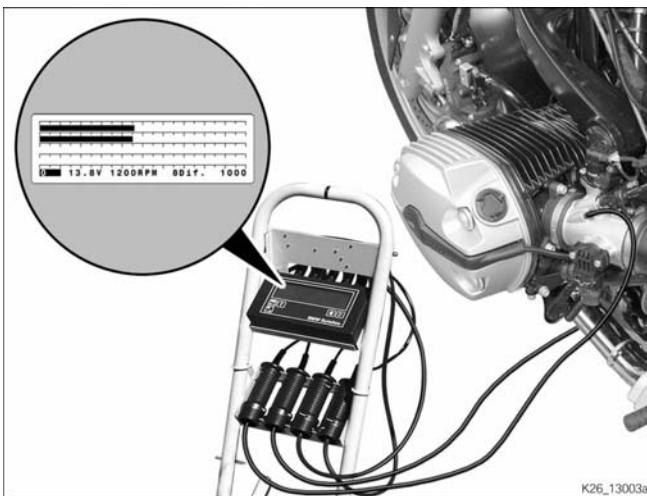
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmetered air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

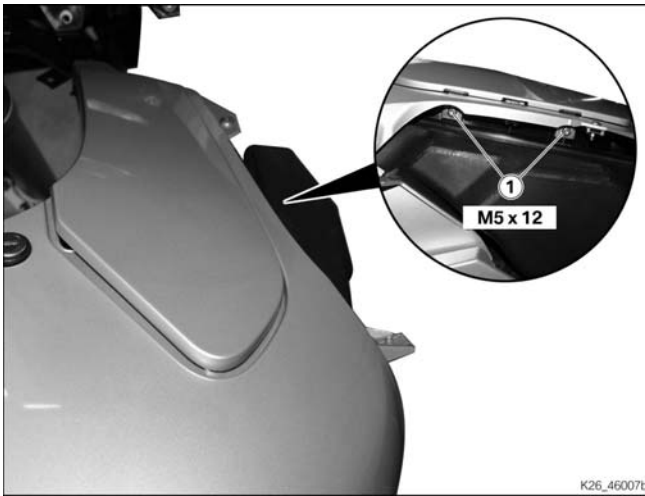
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

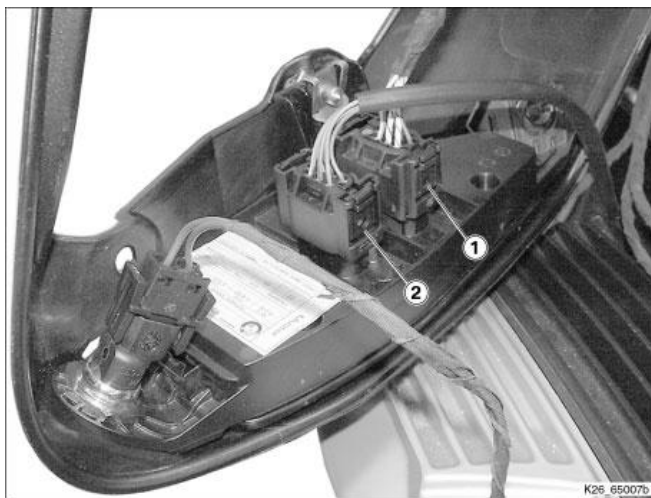
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



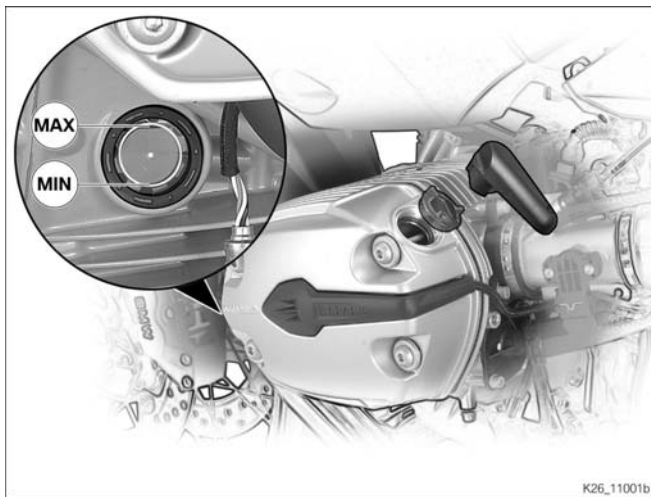
Variant, Seat heating


- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

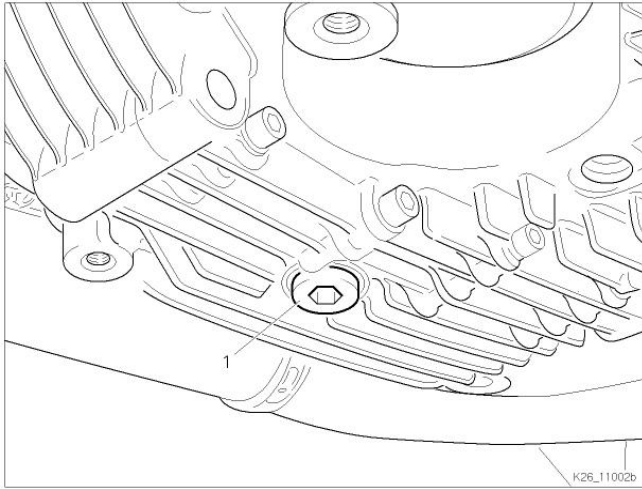
- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

📁 11 27 036 Replacing bearing for balancing shaft in timing case cover

(-) Draining engine oil



Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the engine.
- Remove oil drain plug (1) and drain the oil.
- Dispose of used oil in an environmentally friendly manner.
- Remove the old sealing ring from the drain plug.

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



K26_46009b

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

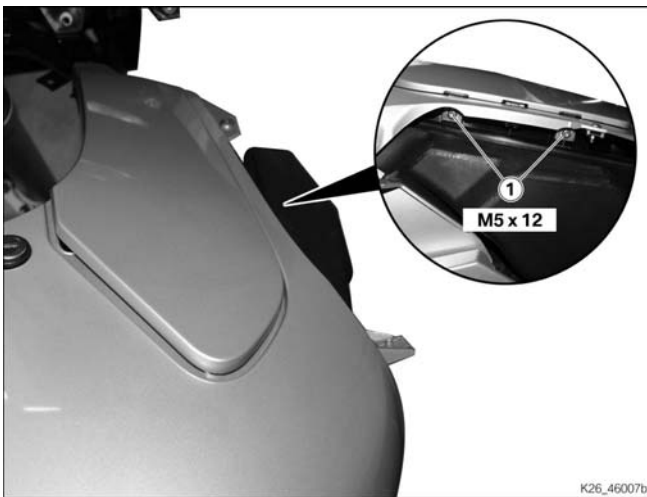
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



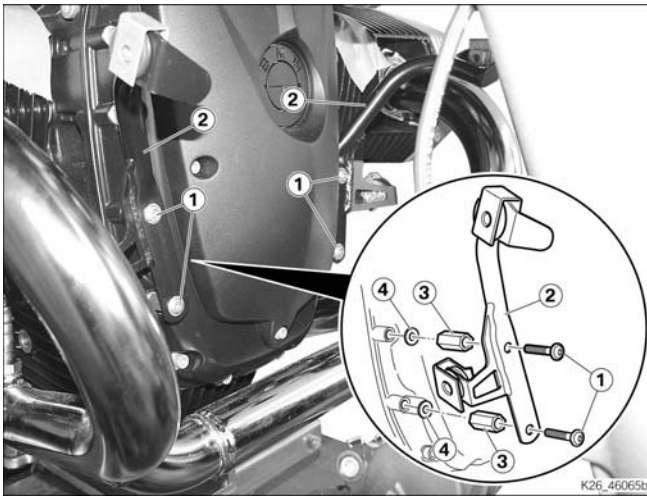
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



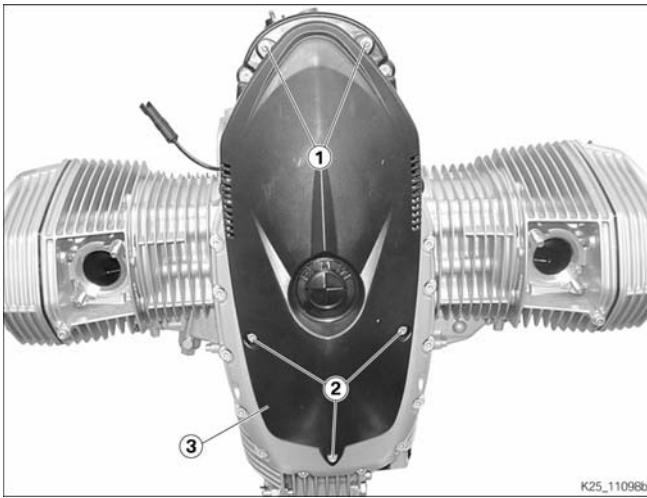
(-) Removing left and right fairing bracket

- Remove screws (1).
- Remove fairing bracket (2) with sleeves (3) and washers (4).



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

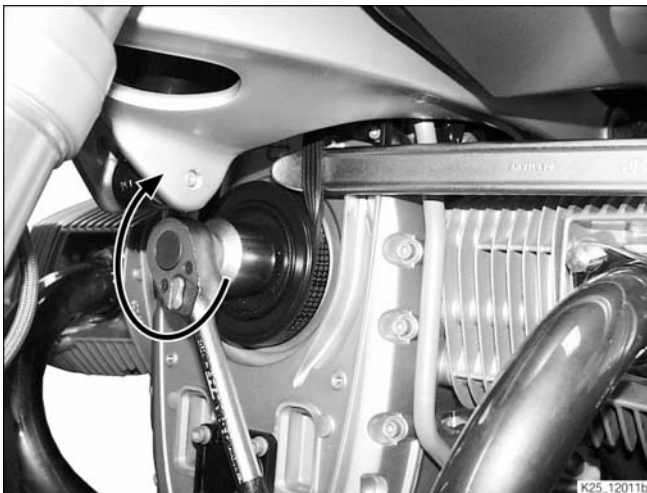
- Gearbox in neutral.



Warning

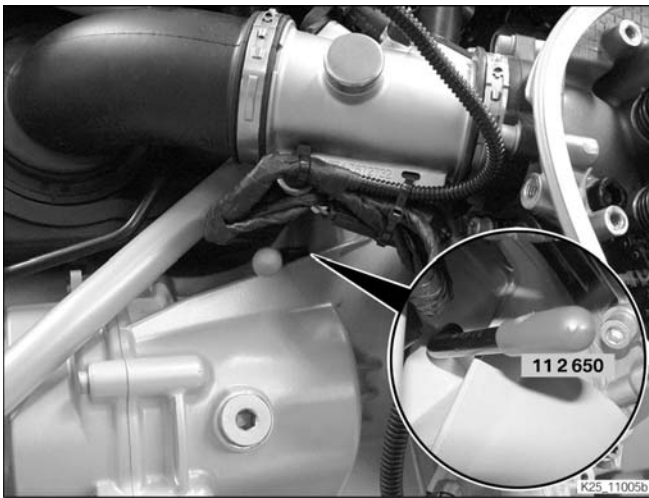
Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



(-) Locking engine at TDC

- By means of the crankshaft pulley, turn the engine in



- the normal direction of rotation until it is at TDC (TDC = top dead centre).
- » The inlet and exhaust valves of one cylinder are closed; those of the other cylinder are at overlap.
 - » The TDC locating pin can be inserted.
 - Insert locating pin (No. 11 2 650) to lock the engine in position.

(-) Removing cover for counterbalance shaft

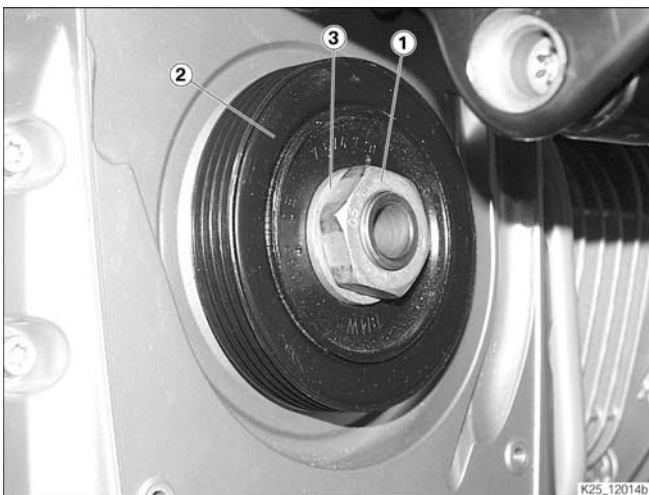


- Remove screws (1) and remove cover.

(-) Removing crankshaft belt pulley

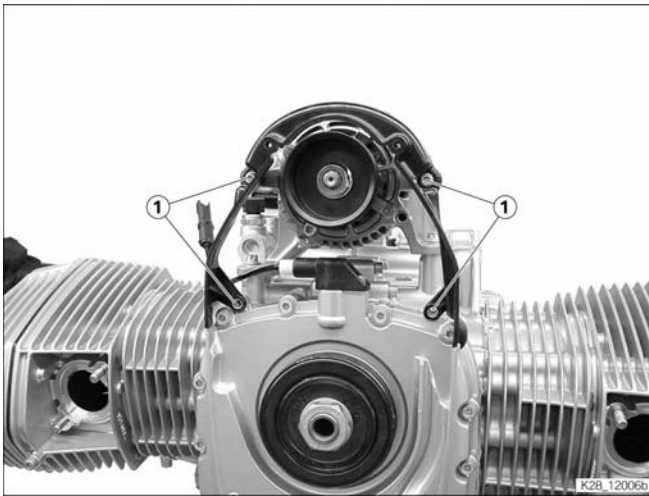
Precondition

- Engine locked.



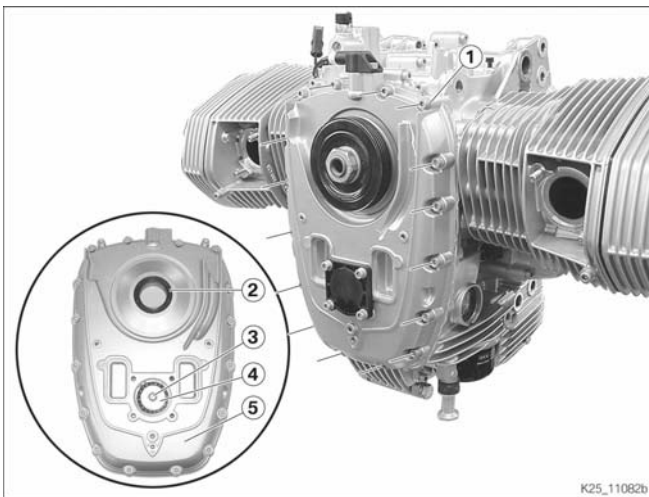
- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

(-) Removing belt cover, rear, from engine and alternator



- Remove screws (1).

(-) Removing time case cover



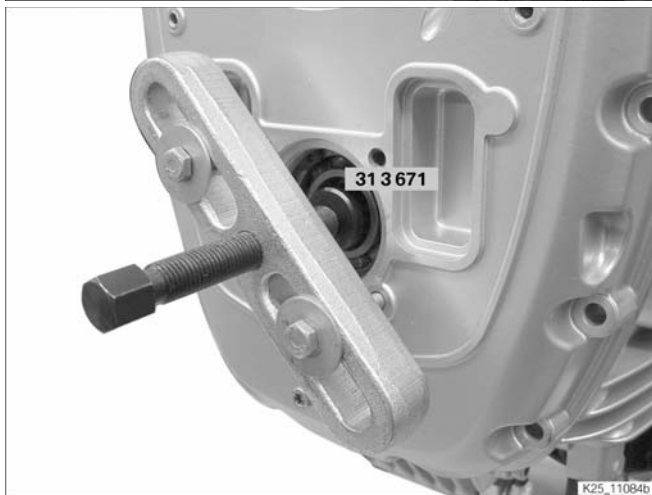
- Remove screw (3) and washer (4).
- Remove screws (1).



- Install the puller and thrust piece (No. 31 3 671) .
- Remove the timing case cover, noting the inductive sensor of the crankshaft, which is still fixed in position.

► Releasing crankshaft inductive sensor from timing case cover

- Remove screw and remove crankshaft inductive sensor (2) from the timing case cover.



- Remove puller and thrust piece (No. 31 3 671) .

(-) Replacing bearing for balancing shaft in timing case cover

- Remove circlip (2).
- Heat the timing case cover around the bearing.



Technical data



Release/mating temperature		100 °C	
----------------------------	--	--------	--



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Drive out bearing (3) from behind, using a suitable mandrel.
- If necessary, reheat the timing case cover around the bearing.



Technical data

Release/mating temperature		100 °C	
----------------------------	--	--------	--



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

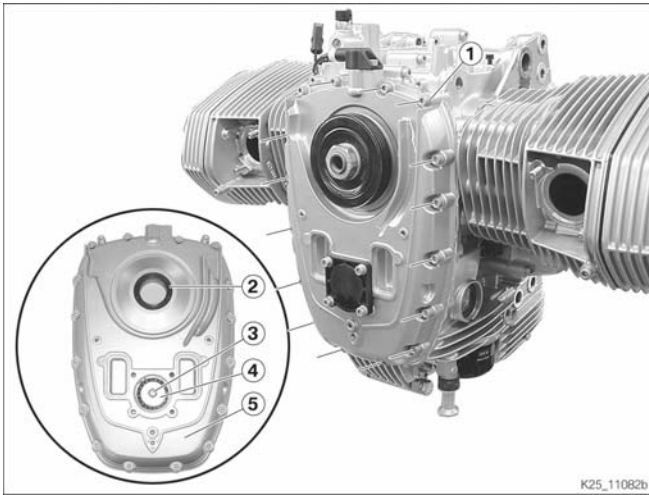
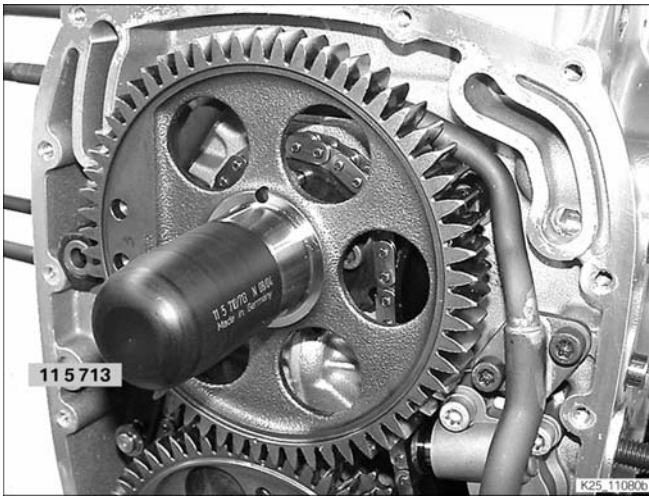
- Drive in new bearing (1) using handle (No. 00 5 500) and drift (No. 23 4 660) .




- Install circlip (2).

(-) Installing timing case cover

- Install sliding sleeve (No. 11 5 713) .




- Make sure the sealing surface of the timing case cover is clean and free of grease and run a uniform bead of sealant round the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376


► **Securing crankshaft inductive sensor in timing case cover**

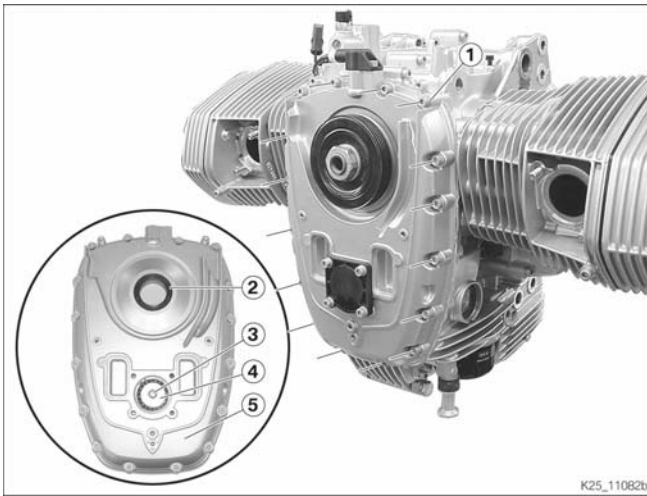
- Position inductive sensor for crankshaft (2) on the timing case cover and install the screw.

 Tightening torques		
Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	



- Place timing case cover (5) in position.
- Install screws (1).

 Tightening torques		
Timing case cover to	8 Nm	



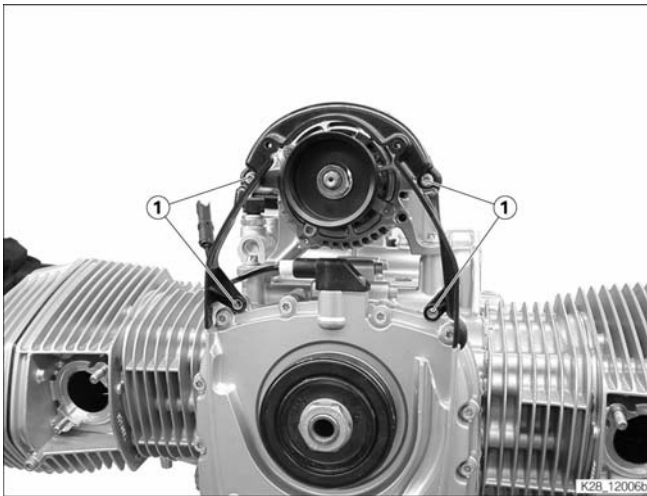
crankcase, M6		
---------------	--	--

- Remove sliding sleeve (No. 11 5 713) .
- Install screw (3) and washer (4).

 Tightening torques		
---	--	--

Gear wheel to balancing shaft, M8 x 50	19 Nm	
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(-) Securing belt cover, rear, to engine and alternator



- Install screws (1).

 Tightening torques		
---	--	--

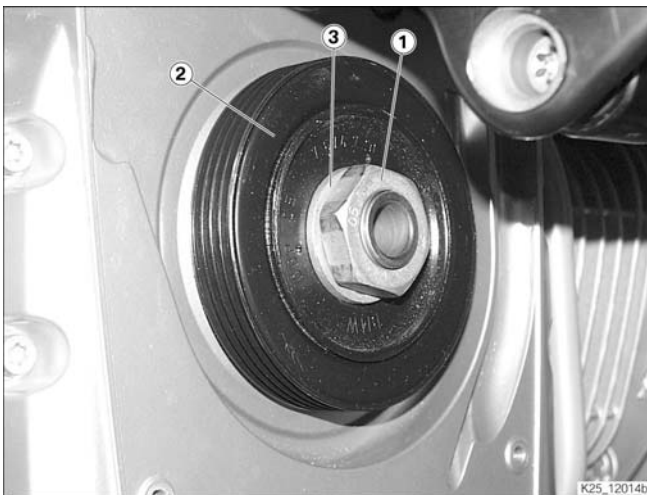
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
--	------	--

Belt cover to alternator, M5 x 16	5 Nm	
-----------------------------------	------	--

(-) Installing crankshaft belt pulley

Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

 Tightening torques		
---	--	--

Belt pulley to crankshaft, M22 x 1.5	140 Nm	
--------------------------------------	--------	--


- Remove TDC locating pin (No. 11 2 650) .



(-) Installing counter balance shaft cover

- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).



 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.



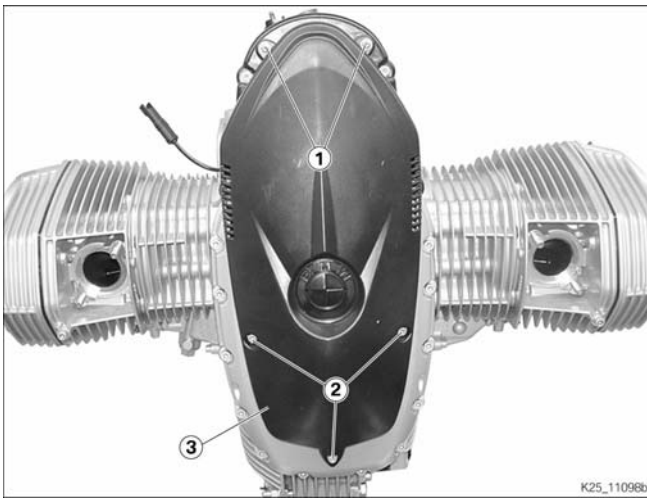
⚠ Attention

Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

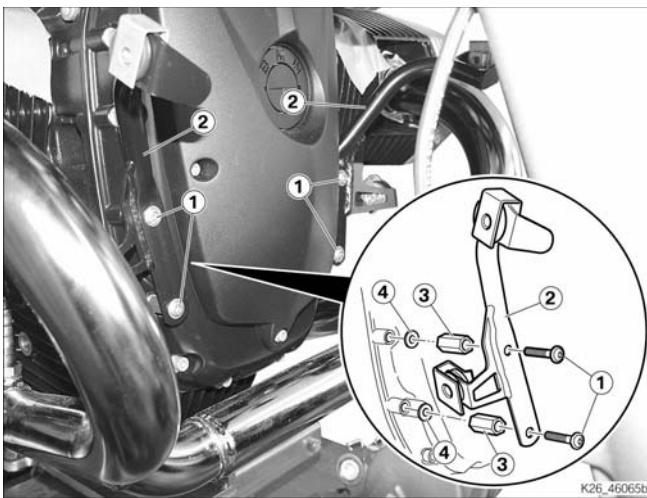
(-) Installing belt guard



- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing fairing bracket on left and right



- Hold fairing bracket (2) with sleeves (3) and washers (4) in position.
- Install screws (1).

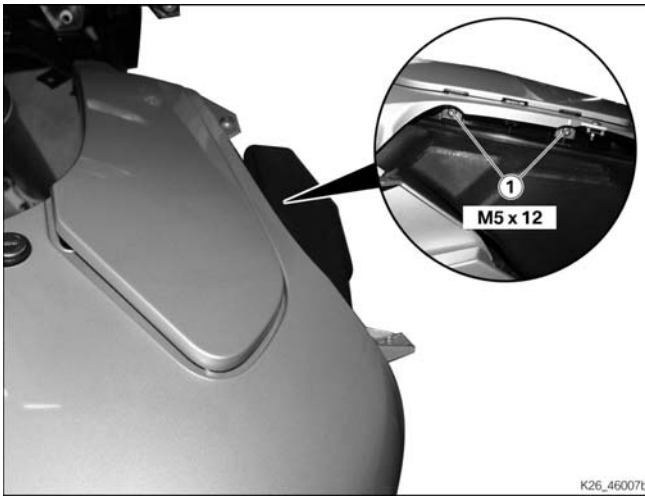
(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

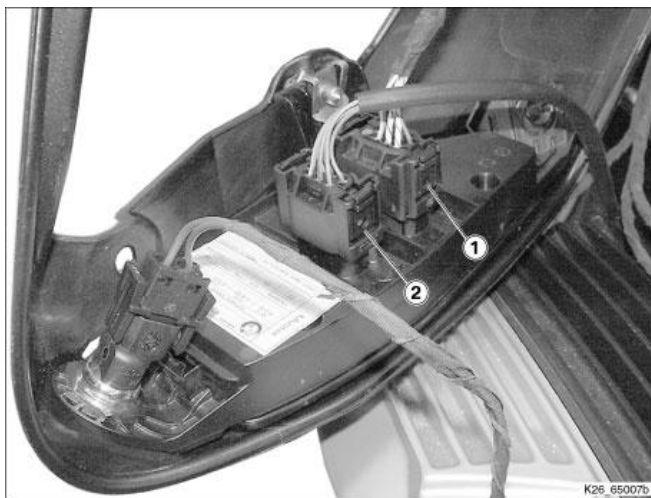
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



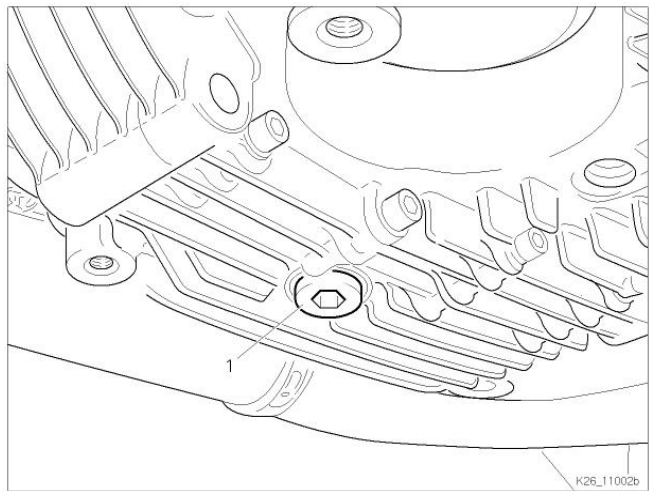
Variant, Seat heating


- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



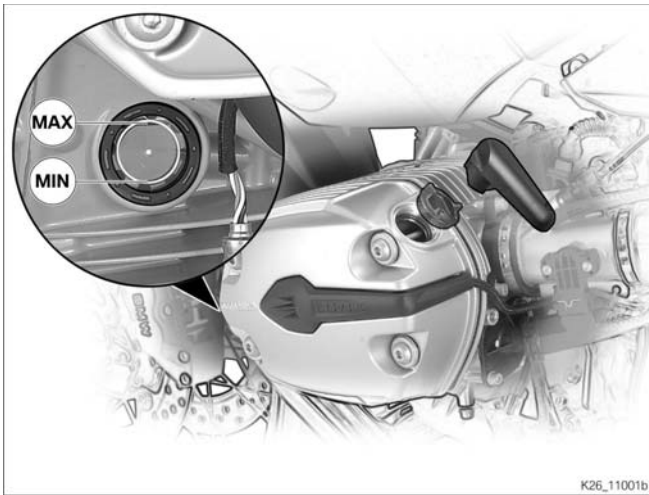
(-) Pouring engine oil into engine


- Replace the sealing ring of oil drain plug (1).
- Screw in oil drain plug.



 Tightening torques		
Oil drain plug, M16 x 1.5	Initial torque,	23 Nm
	Final torque,	32 Nm

- Open oil filler plug using spanner from toolkit.
- Pour engine oil into the engine until the level reaches the MAX mark.



 Technical data		
Oil capacity, engine	with filter change	max. 4 l
	Difference between Min. / Max. marks	0.5 l
Consumables/lubricants		
Engine oil, 20W-50		

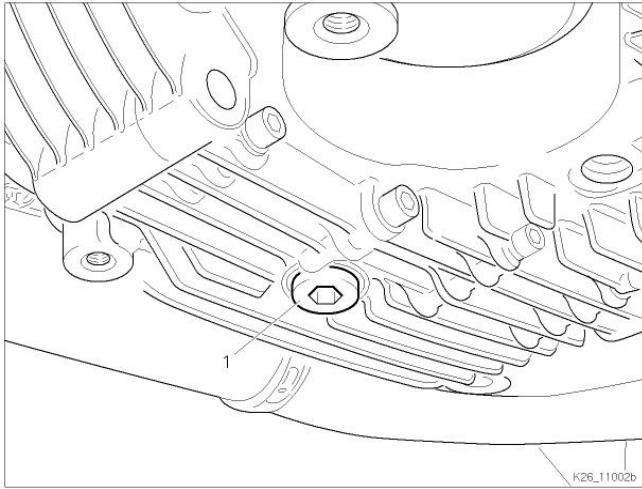


Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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📁 11 31 040 Replacing timing chain, crankshaft / countershaft

(-) Draining engine oil



Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the engine.
- Remove oil drain plug (1) and drain the oil.
- Dispose of used oil in an environmentally friendly manner.
- Remove the old sealing ring from the drain plug.

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

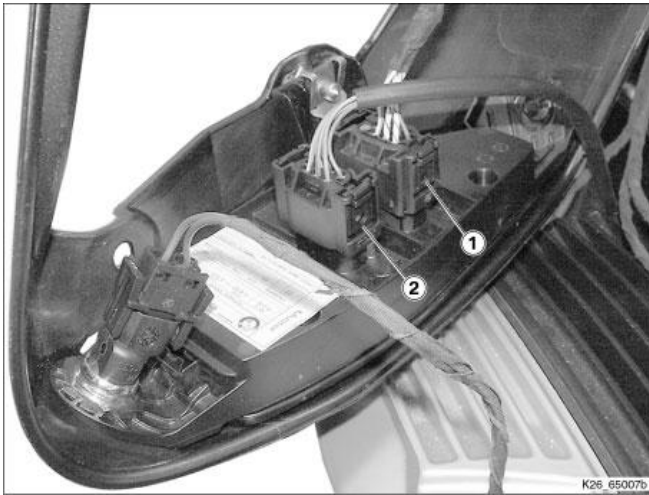
- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

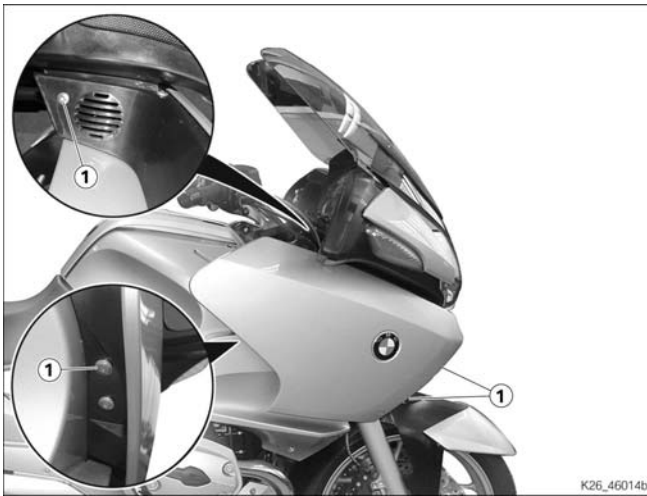
- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

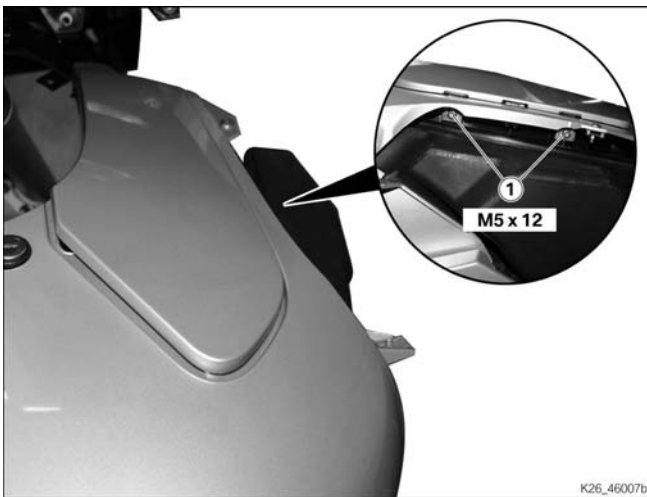
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



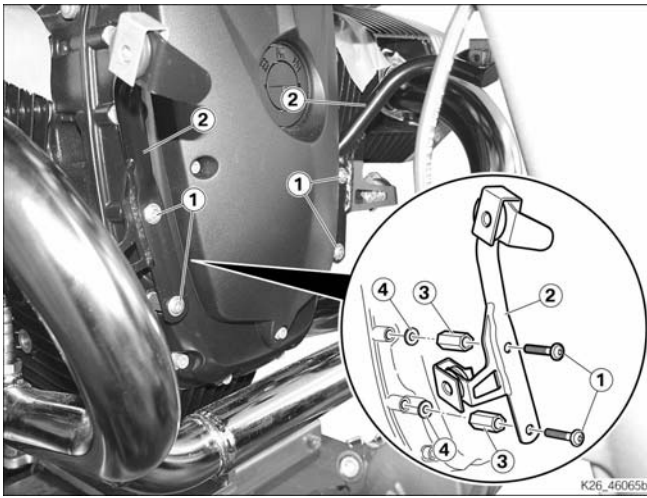
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



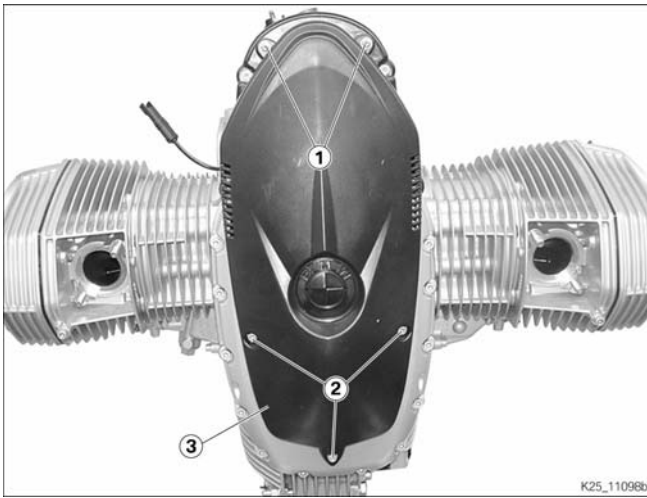
(-) Removing left and right fairing bracket

- Remove screws (1).
- Remove fairing bracket (2) with sleeves (3) and washers (4).



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

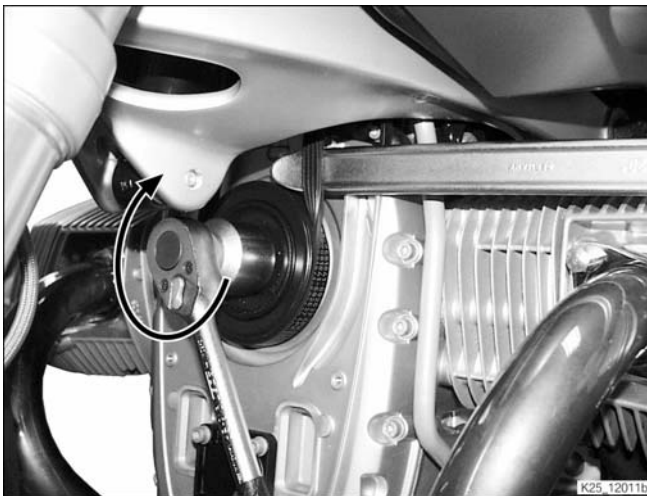
- Gearbox in neutral.



Warning

Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



(-) Removing cover for counterbalance shaft

- Remove screws (1) and remove cover.



(-) Locking engine at TDC



- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until it is at TDC (TDC = top dead centre).
- » The inlet and exhaust valves of one cylinder are closed; those of the other cylinder are at overlap.
- » The TDC locating pin can be inserted.
- Insert locating pin (No. 11 2 650) to lock the engine in position.

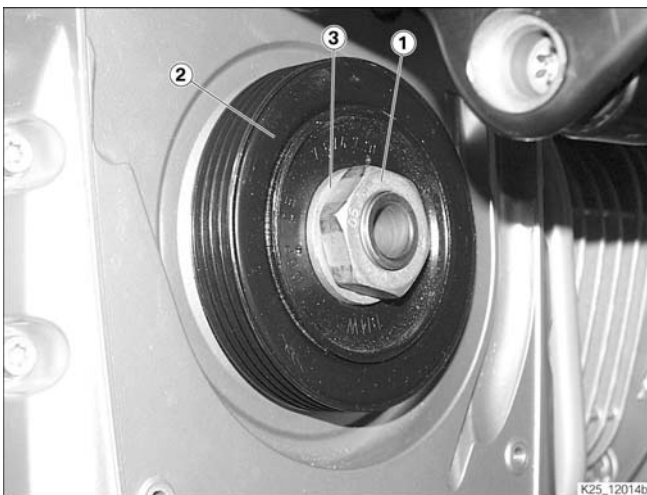
(-) Removing crankshaft belt pulley

Precondition

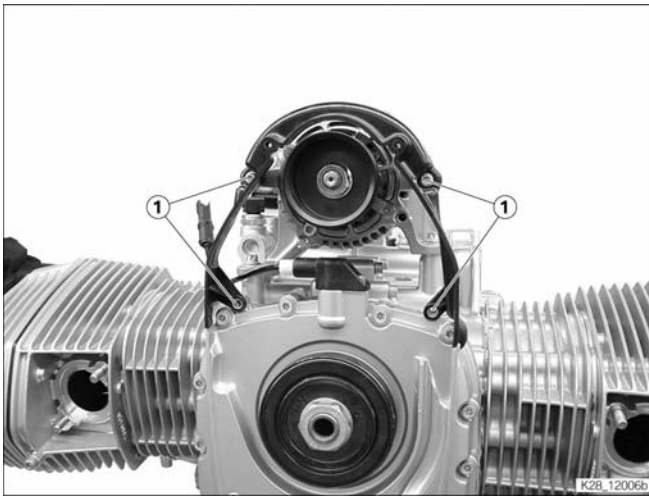
- Engine locked.



- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

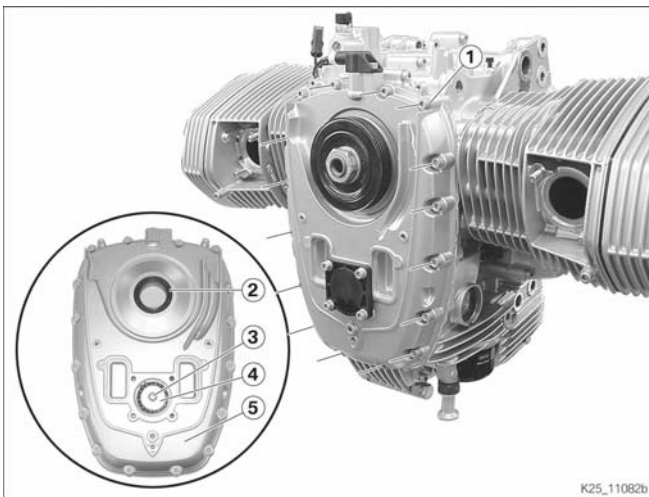


(-) Removing belt cover, rear, from engine and alternator



- Remove screws (1).

(-) Removing time case cover



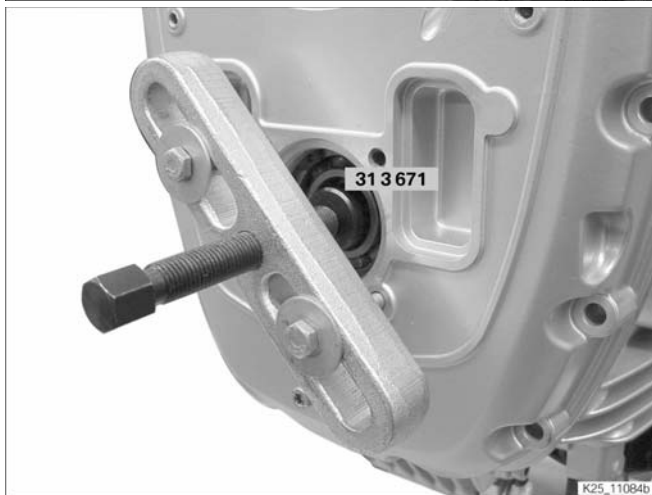
- Remove screw (3) and washer (4).
- Remove screws (1).



- Install the puller and thrust piece (No. 31 3 671) .
- Remove the timing case cover, noting the inductive sensor of the crankshaft, which is still fixed in position.

► Releasing crankshaft inductive sensor from timing case cover

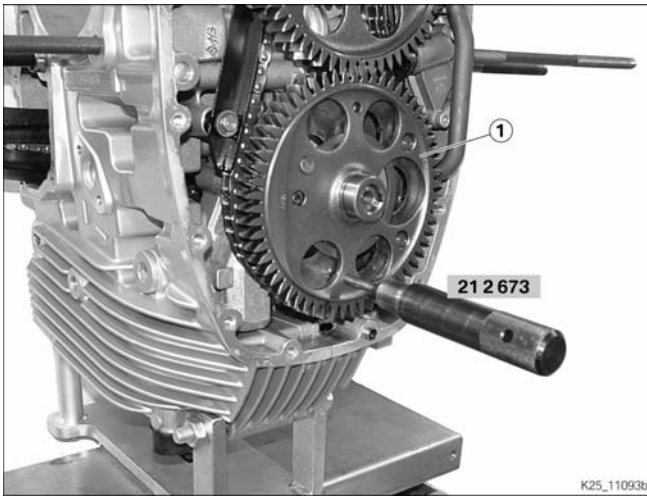
- Remove screw and remove crankshaft inductive sensor (2) from the timing case cover.



- Remove puller and thrust piece (No. 31 3 671) .

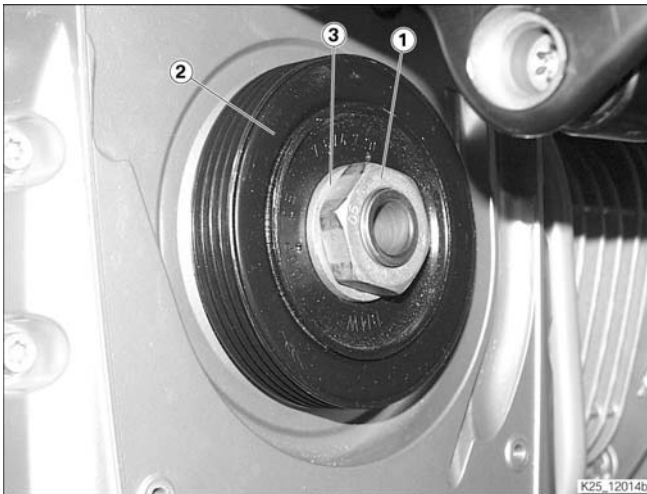
(-) Removing tensioning wheel

- Use clutch centring pin (No. 21 2 673) to fix the tensioning wheel in position.
- Remove tensioning wheel (1).



(-) Removing drive gear on counterbalance shaft

- Tighten nut (1) until hand-tight.



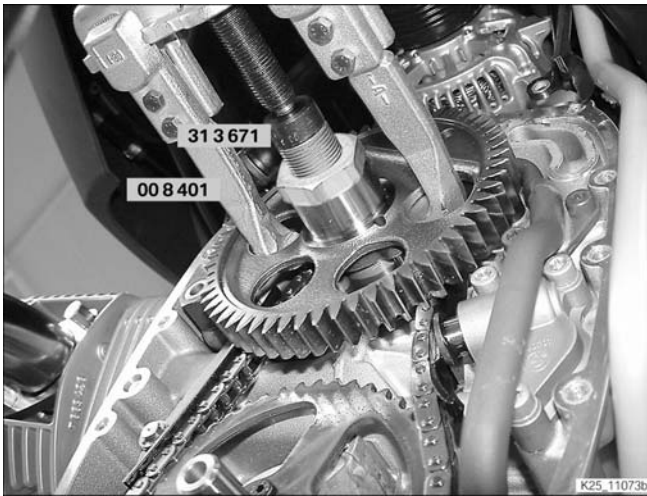
- Remove TDC locating pin (No. 11 2 650) .



- Engage the highest gear and turn the rear wheel until puller (No. 00 8 401) and thrust piece (No. 31 3 671) can be installed.
- Install puller and thrust piece and pretension.

⚠ Attention

Nature: Once the gear has been heated it can



work loose suddenly and damage components in the vicinity.

Avoidance: Cover components in the vicinity and protect them against damage.

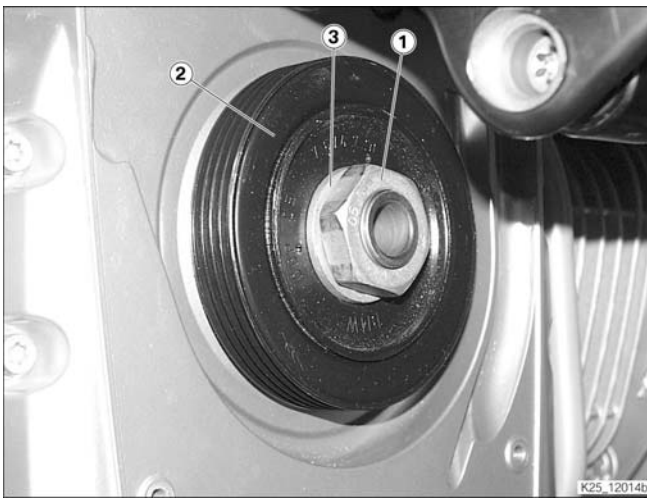
- Heat the drive gear for the balancing shaft at the crankshaft and tap it to release.



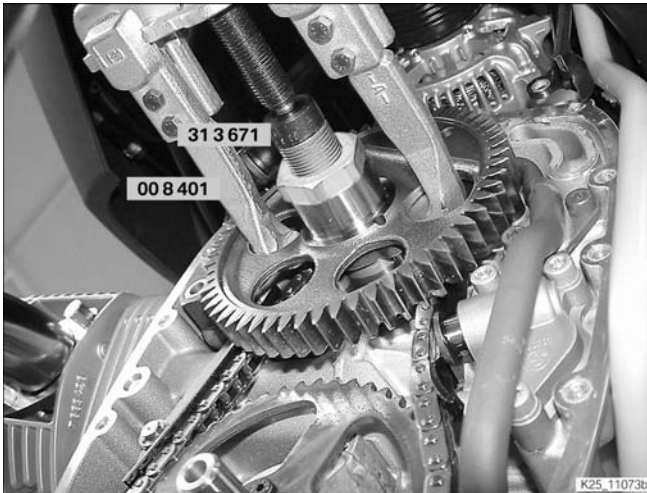
Technical data

Release temperature, drive gear for balancing shaft on crankshaft

80 °C



- Remove nut (1).



Warning

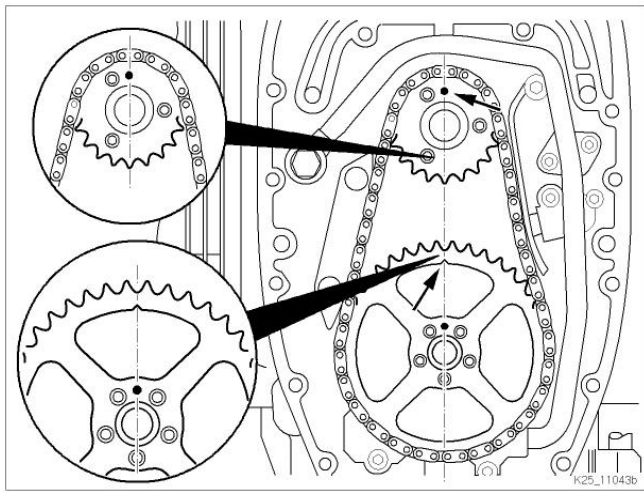
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Remove the drive gear for the balancing shaft and remove puller (No. 00 8 401) and thrust piece (No. 31 3 671) .

► Adjusting crankshaft and auxiliary shaft to ignition TDC

- Make sure that the crankshaft and countershaft are in the "firing TDC, right cylinder" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.

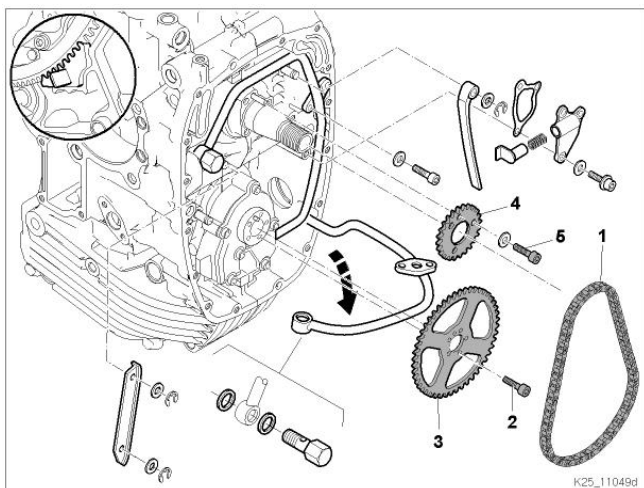


» The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



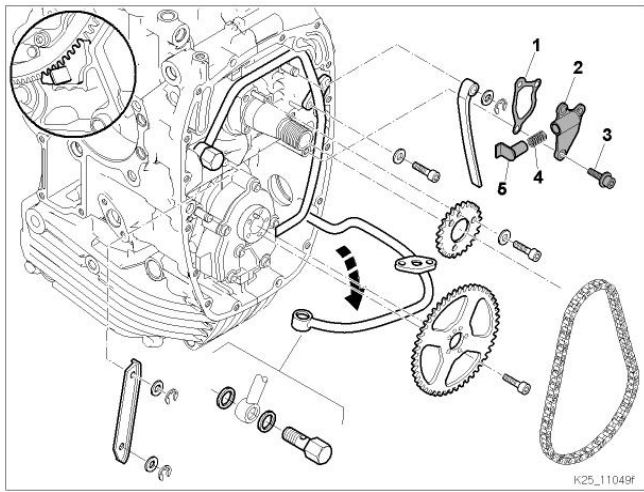
◀ Install TDC locating pin (No. 11 2 650) .

(-) Replacing timing chain, crankshaft/auxiliary shaft

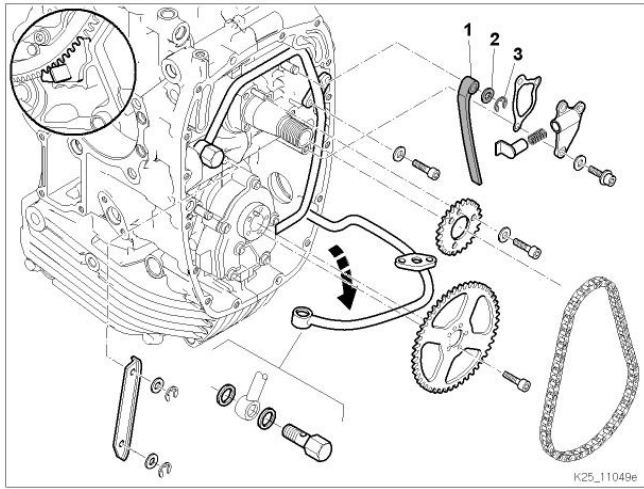


- Remove screws (5).
- Remove screws (2).
- Remove pinion (4) and timing chain (1) with sprocket (3).

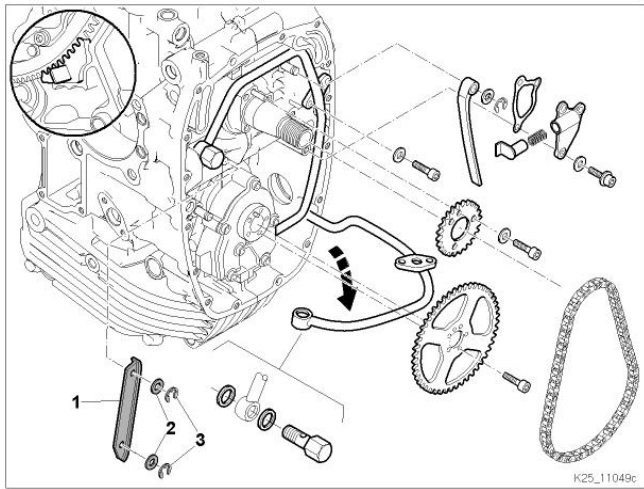
- Remove piston (5) and spring (4).



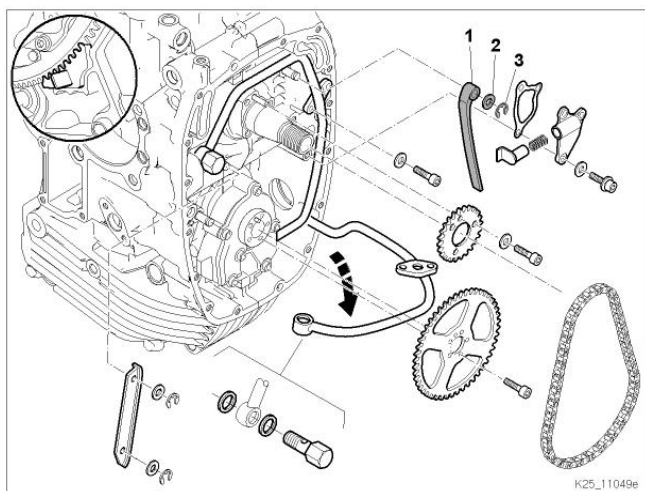
- Remove retaining washer (3) and lift off spacer (2).
- Remove timing-chain tensioning rail (1).



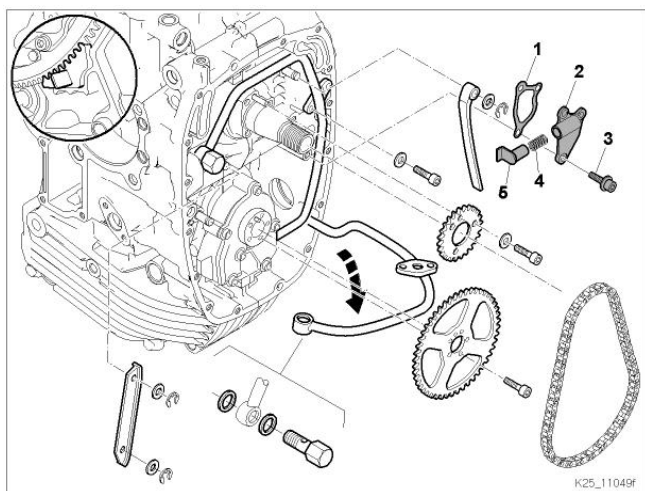
- Remove retaining washers (3) and lift off spacers (2).
- Remove timing-chain guide rail (1).
- Install new timing-chain guide rail (1).
- Install spacers (2) and retaining washers (3).



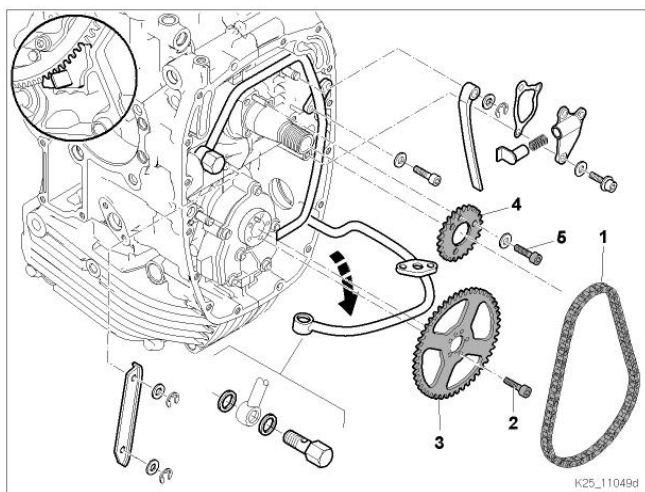
- Install new timing-chain tensioning rail (1).
- Install spacer (2) and retaining washer (3).



K25_11049e




K25_11049f




K25_11049d

- Install spring (4) and piston (5), making sure that the piston is angled toward the rear.

- Install new pinion (4) and new timing chain (1) with new sprocket (3), making sure that the locating pin of the crankshaft engages the locating bore of the timing-chain pinion and the locating pin of the auxiliary shaft engages the locating bore in the sprocket of the auxiliary shaft.
- Install new screws (2).

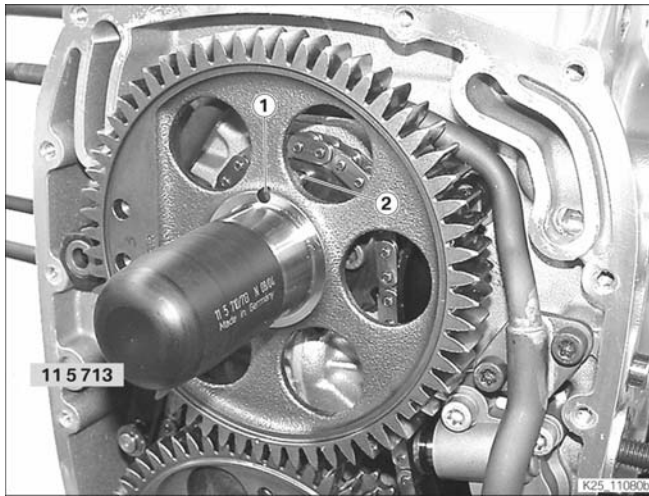
 Tightening torques		
Sprocket to auxiliary shaft, M5 x 16, Replace screws	8 Nm	

- Install screws (5).

 Tightening torques		
Chain sprocket to crankshaft, M6 x 16	8 Nm	

(-) Installing counterbalance shaft drive gear

- Clean inner taper of counterbalance drive gear and outer taper of crankshaft, **both must be free of oil and grease.**



Install the drive gear for the balancing shaft, making sure that straight pin (2) of the crankshaft engages hole (1) in the drive gear.

- Install a suitable tool for holding the drive gear and preventing it from turning.

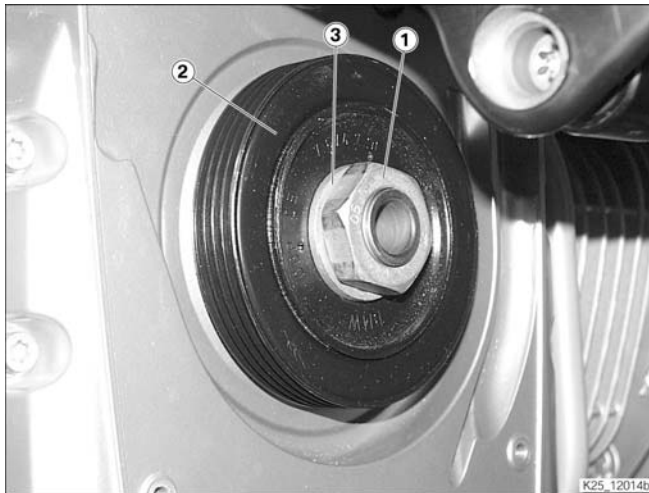
► **Installing crankshaft belt pulley**


Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

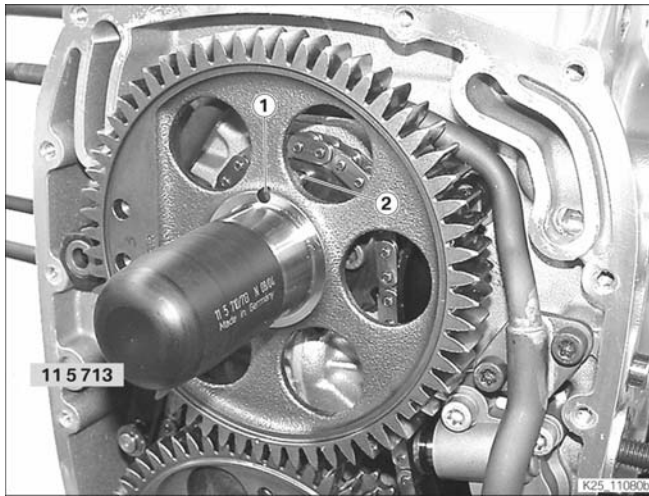


 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	

- Remove TDC locating pin (No. 11 2 650) .



- Remove the tool for holding the drive gear and preventing it from turning.



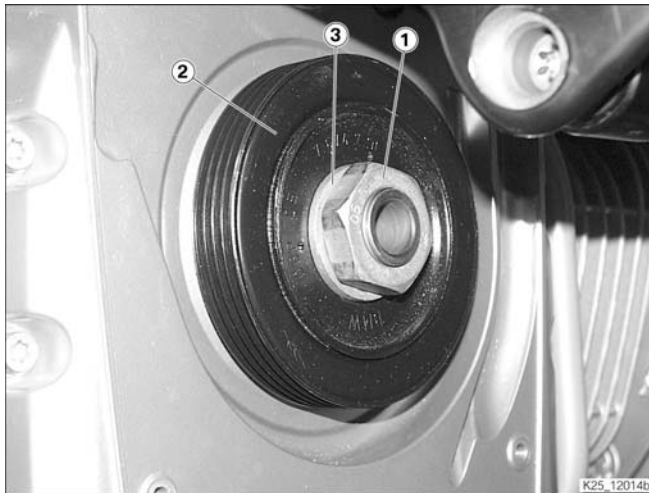
► **Removing crankshaft belt pulley**

Precondition

- Engine locked.

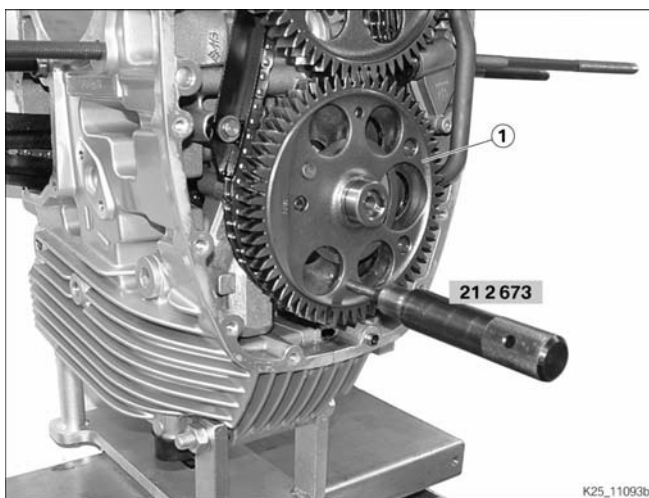


- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.



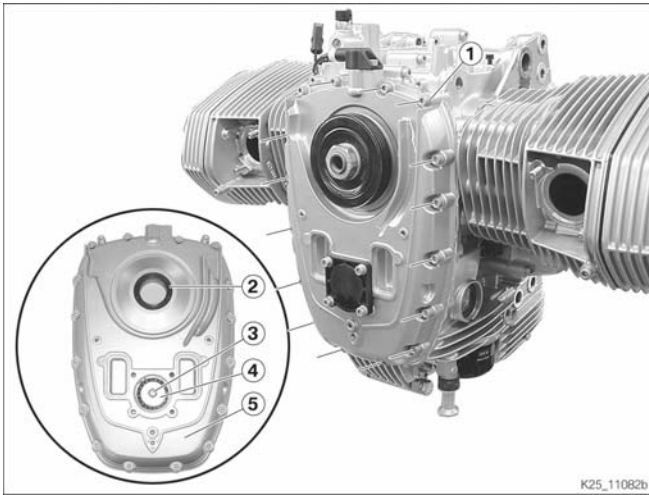
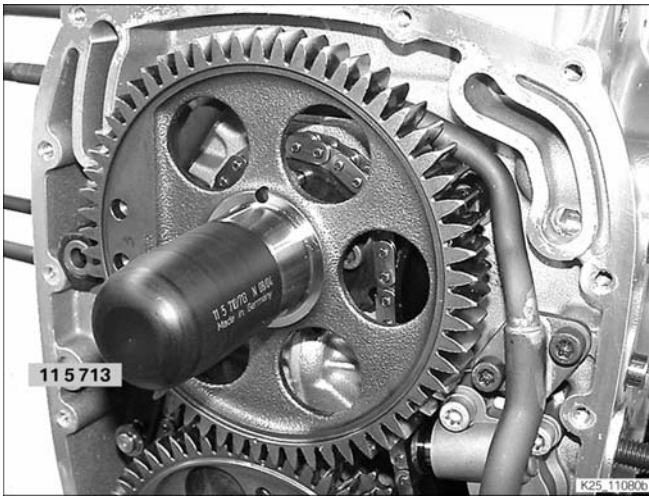
(-) Installing tensioning wheel

- Install tensioning gear (1), if necessary noting the feather key in the balancing shaft.
- Remove clutch centring pin (No. 21 2 673) .



(-) Installing timing case cover

- Install sliding sleeve (No. 11 5 713) .



- Make sure the sealing surface of the timing case cover is clean and free of grease and run a uniform bead of sealant round the face.



Consumables/lubricants

3 - Bond 1209	Surface sealant	07 58 9 062 376
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► **Securing crankshaft inductive sensor in timing case cover**

- Position inductive sensor for crankshaft (2) on the timing case cover and install the screw.



Tightening torques

Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	
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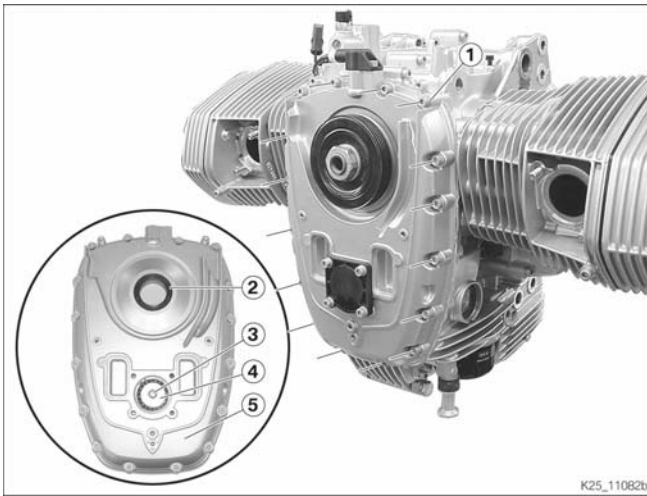


- Place timing case cover (5) in position.
- Install screws (1).



Tightening torques

Timing case cover to	8 Nm	
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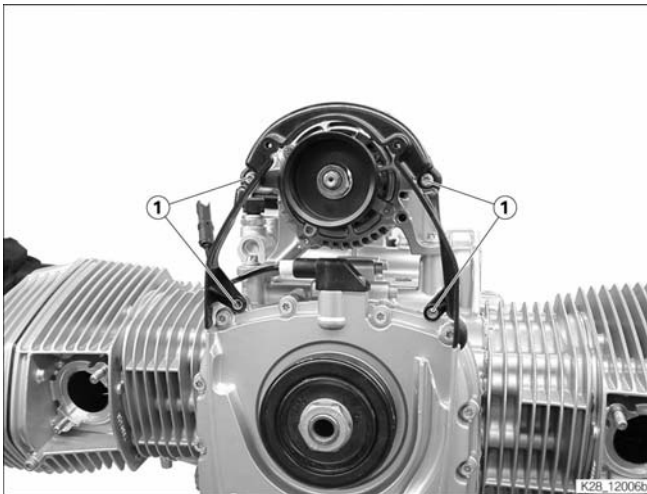
crankcase, M6		
---------------	--	--

- Remove sliding sleeve (No. 11 5 713) .
- Install screw (3) and washer (4).

 Tightening torques		
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Gear wheel to balancing shaft, M8 x 50	19 Nm	
--	-------	--

(-) Securing belt cover, rear, to engine and alternator



- Install screws (1).

 Tightening torques		
---	--	--

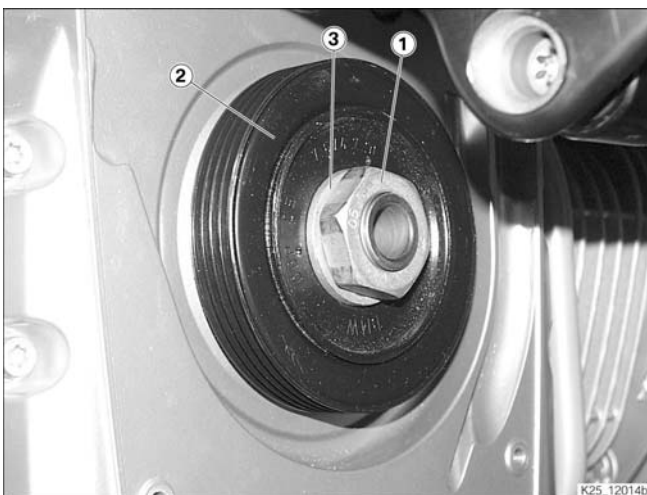
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
--	------	--

Belt cover to alternator, M5 x 16	5 Nm	
-----------------------------------	------	--

(-) Installing crankshaft belt pulley

Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

 Tightening torques		
---	--	--

Belt pulley to crankshaft, M22 x 1.5	140 Nm	
--------------------------------------	--------	--


- Remove TDC locating pin (No. 11 2 650) .



(-) Installing counter balance shaft cover

- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).



 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.



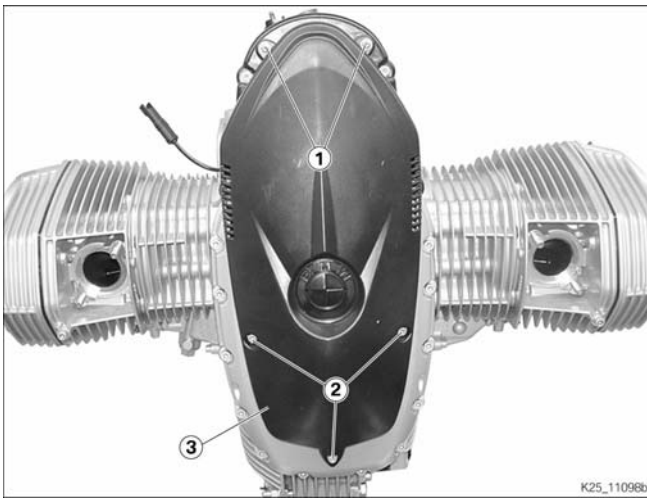
⚠ Attention

Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

(-) Installing belt guard

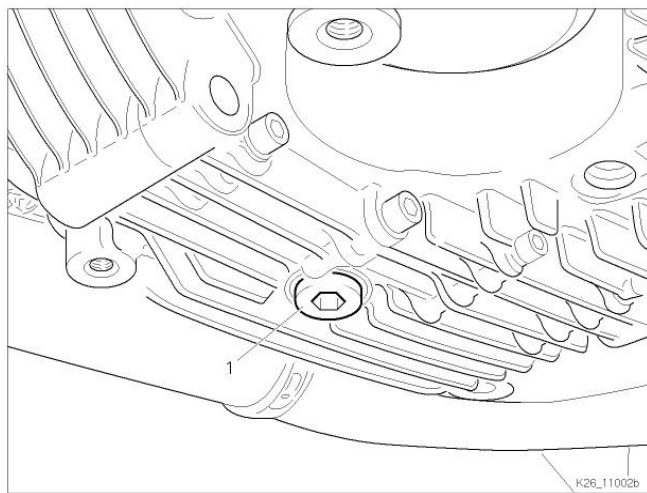



- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Pouring engine oil into engine


- Replace the sealing ring of oil drain plug (1).
- Screw in oil drain plug.



 Tightening torques		
Oil drain plug, M16 x 1.5	Initial torque, 23 Nm	
	Final torque, 32 Nm	



- Open oil filler plug using spanner from toolkit.
- Pour engine oil into the engine until the level reaches the MAX mark.

 Technical data		
Oil capacity, engine	with filter change	max. 4 l
	Difference between Min. / Max. marks	0.5 l
Consumables/lubricants		
Engine oil, 20W-50		



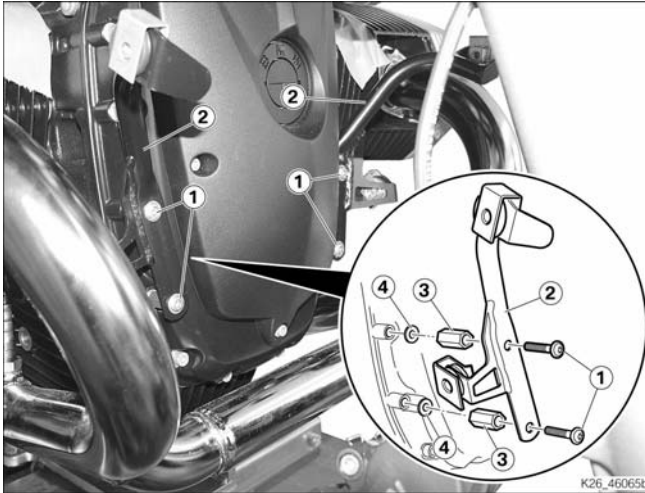
Consumables/lubricants

Engine oil, 20W-50

Engine oil

81 22 9
407 685

(-) Installing fairing bracket on left and right



- Hold fairing bracket (2) with sleeves (3) and washers (4) in position.
- Install screws (1).

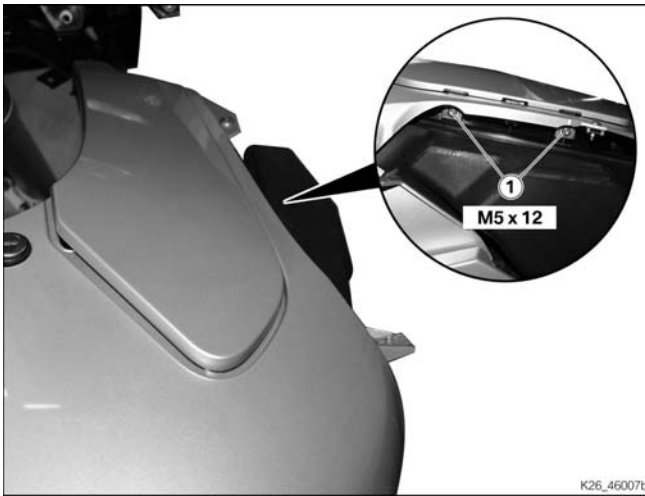
(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



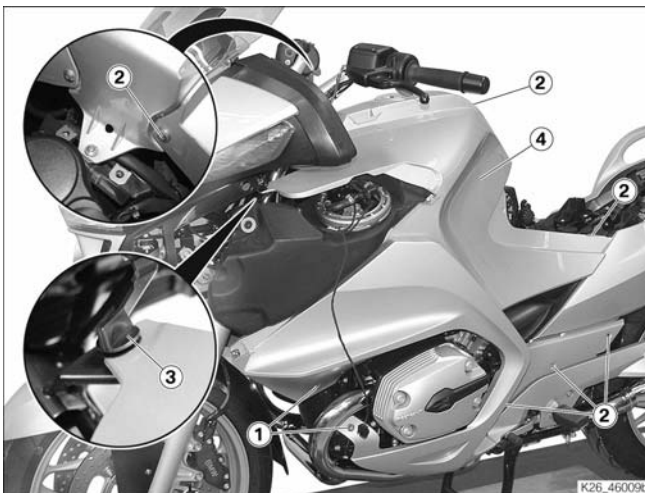
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

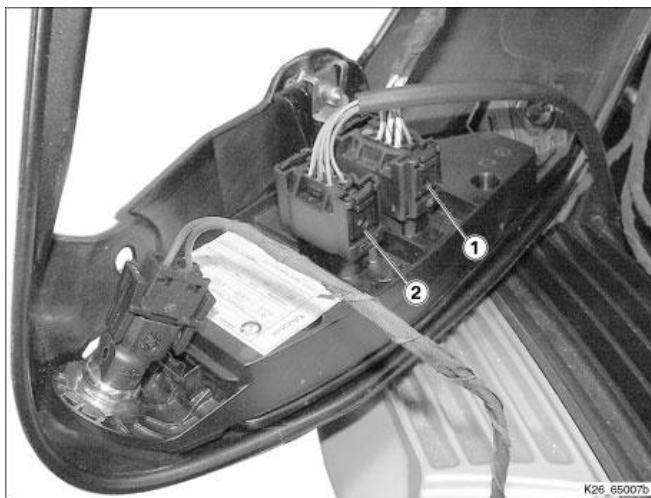
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



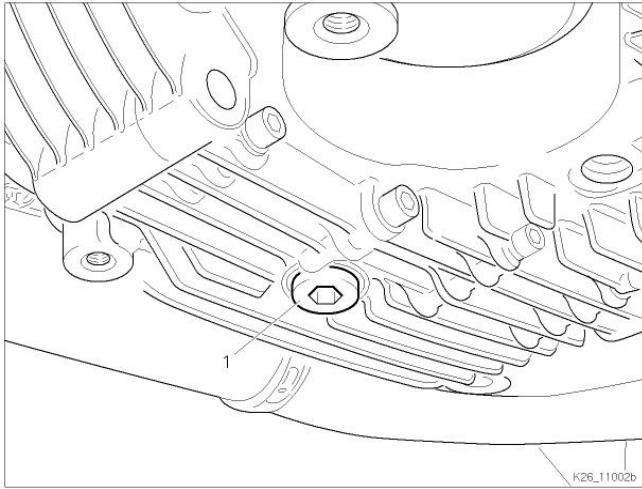
(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

📁 11 31 043 Replacing chain tensioner, crankshaft / countershaft

(-) Draining engine oil



Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the engine.
- Remove oil drain plug (1) and drain the oil.
- Dispose of used oil in an environmentally friendly manner.
- Remove the old sealing ring from the drain plug.

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

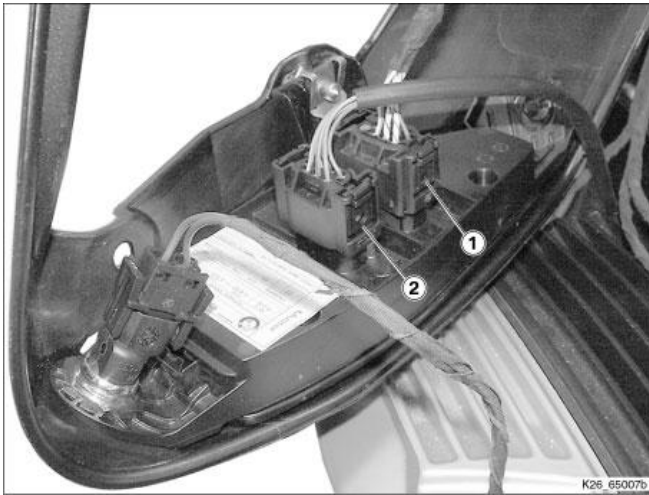
- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

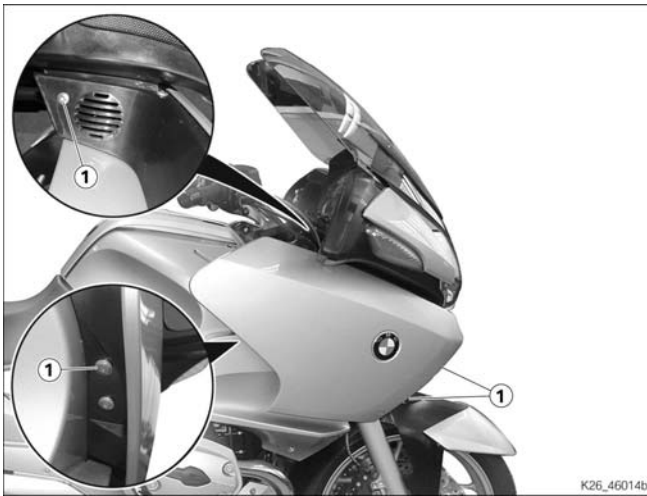
- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

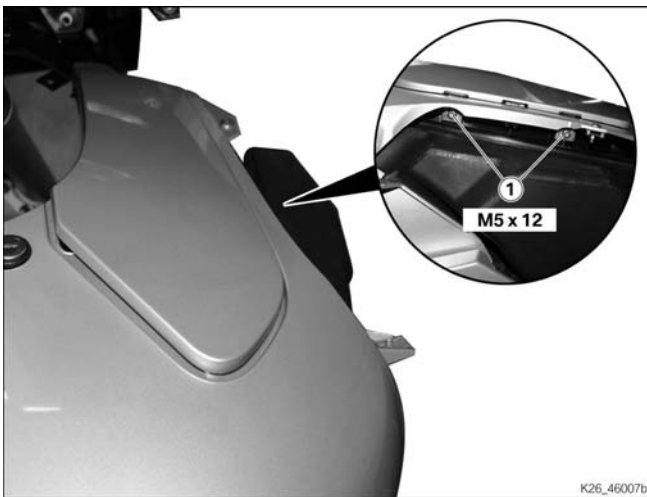
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



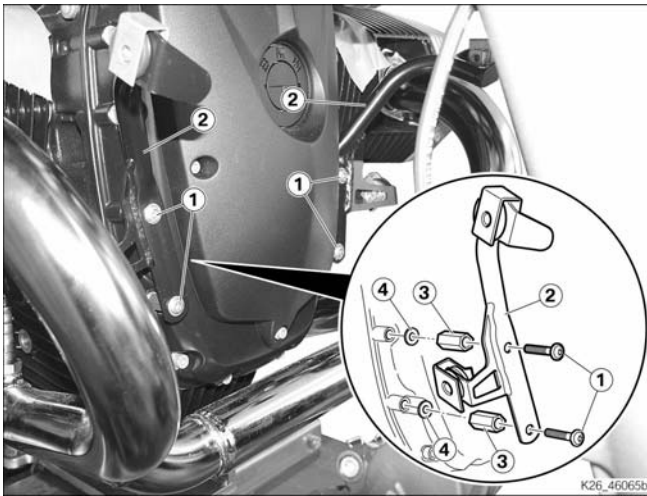
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



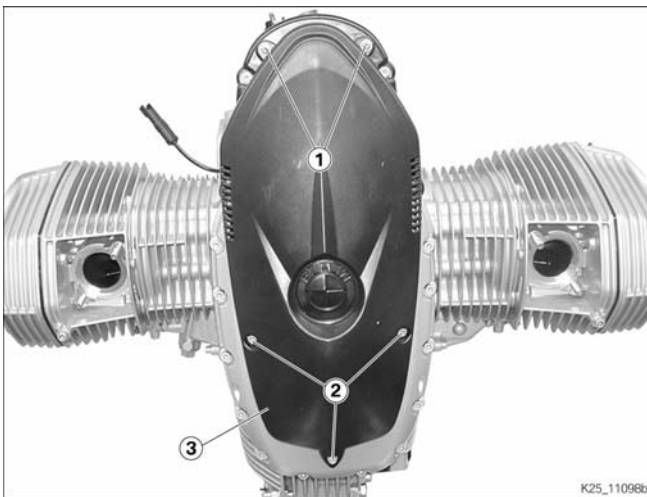
(-) Removing left and right fairing bracket

- Remove screws (1).
- Remove fairing bracket (2) with sleeves (3) and washers (4).



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

- Gearbox in neutral.



Warning

Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



(-) Removing cover for counterbalance shaft

- Remove screws (1) and remove cover.



(-) Locking engine at TDC



- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until it is at TDC (TDC = top dead centre).
- » The inlet and exhaust valves of one cylinder are closed; those of the other cylinder are at overlap.
- » The TDC locating pin can be inserted.
- Insert locating pin (No. 11 2 650) to lock the engine in position.

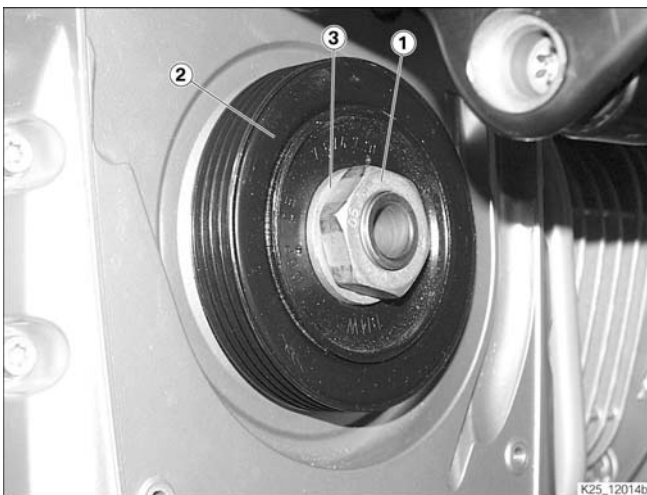
(-) Removing crankshaft belt pulley

Precondition

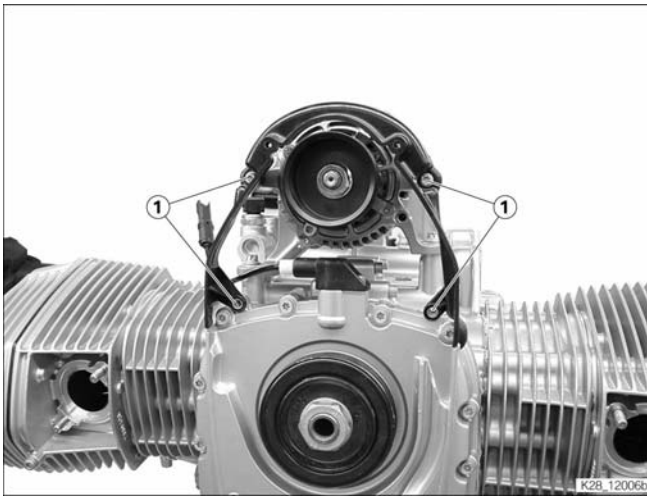
- Engine locked.



- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

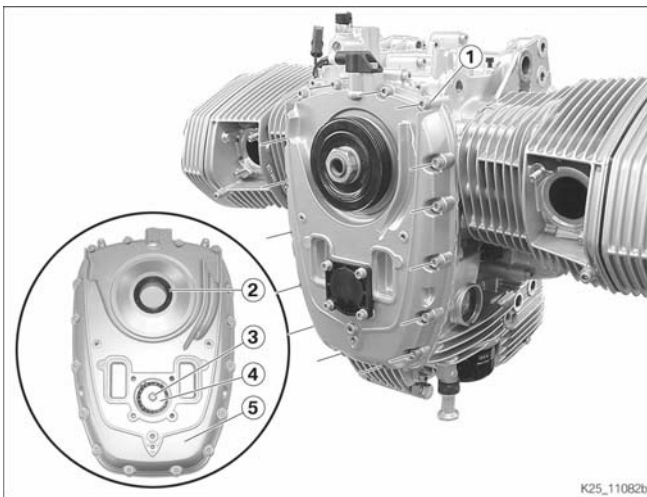


(-) Removing belt cover, rear, from engine and alternator



- Remove screws (1).

(-) Removing time case cover



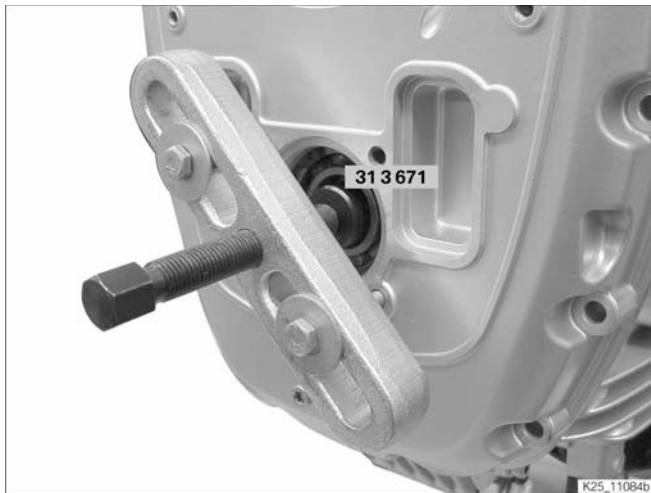
- Remove screw (3) and washer (4).
- Remove screws (1).



- Install the puller and thrust piece (No. 31 3 671) .
- Remove the timing case cover, noting the inductive sensor of the crankshaft, which is still fixed in position.

► Releasing crankshaft inductive sensor from timing case cover

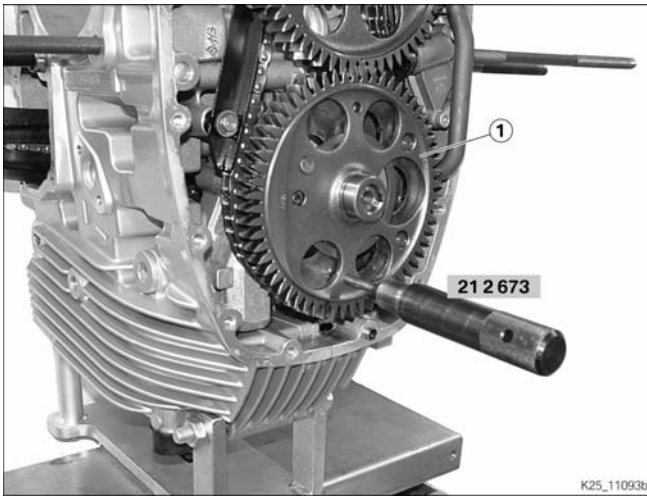
- Remove screw and remove crankshaft inductive sensor (2) from the timing case cover.



- Remove puller and thrust piece (No. 31 3 671) .

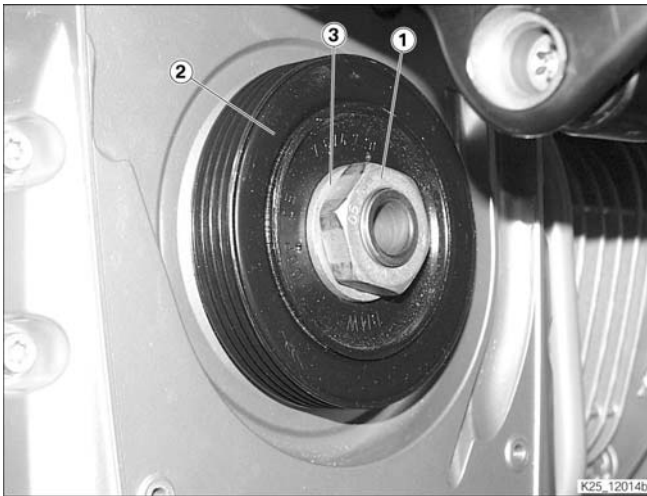
(-) Removing tensioning wheel

- Use clutch centring pin (No. 21 2 673) to fix the tensioning wheel in position.
- Remove tensioning wheel (1).



(-) Removing drive gear on counterbalance shaft

- Tighten nut (1) until hand-tight.



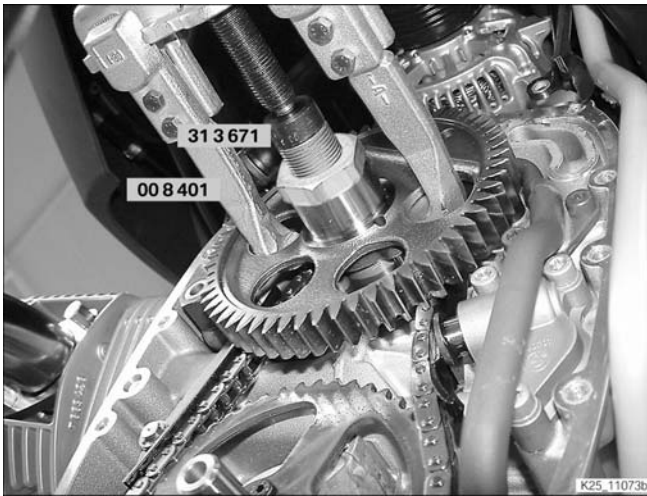
- Remove TDC locating pin (No. 11 2 650) .



- Engage the highest gear and turn the rear wheel until puller (No. 00 8 401) and thrust piece (No. 31 3 671) can be installed.
- Install puller and thrust piece and pretension.

⚠ Attention

Nature: Once the gear has been heated it can



work loose suddenly and damage components in the vicinity.

Avoidance: Cover components in the vicinity and protect them against damage.

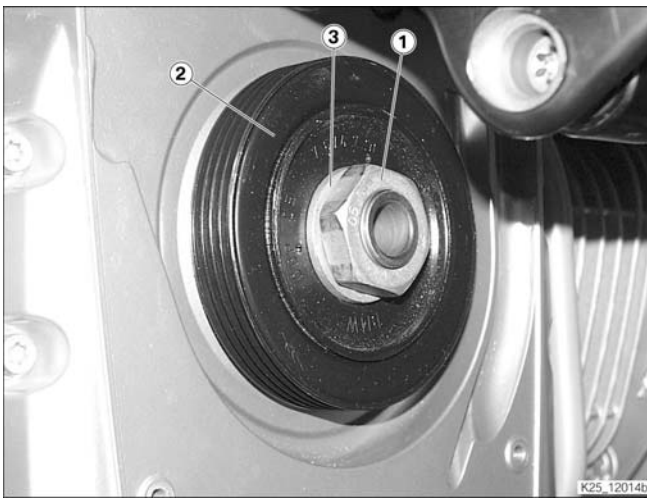
- Heat the drive gear for the balancing shaft at the crankshaft and tap it to release.



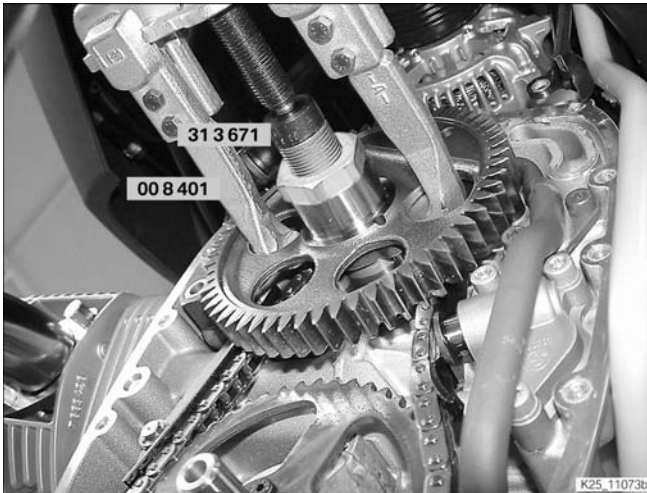
Technical data

Release temperature, drive gear for balancing shaft on crankshaft

80 °C



- Remove nut (1).



Warning

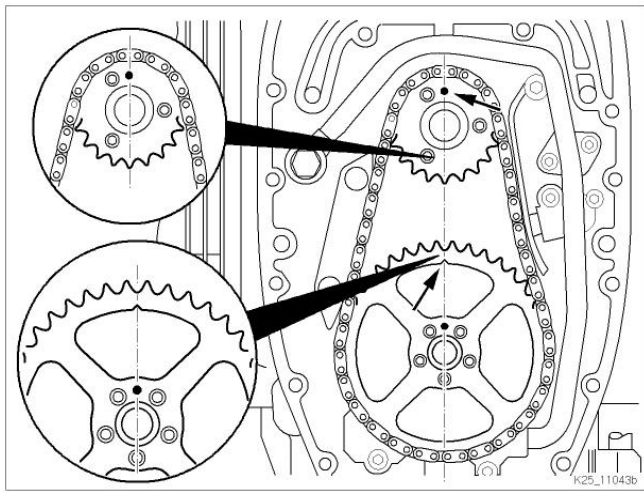
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Remove the drive gear for the balancing shaft and remove puller (No. 00 8 401) and thrust piece (No. 31 3 671) .

► Adjusting crankshaft and auxiliary shaft to ignition TDC

- Make sure that the crankshaft and countershaft are in the "firing TDC, right cylinder" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.

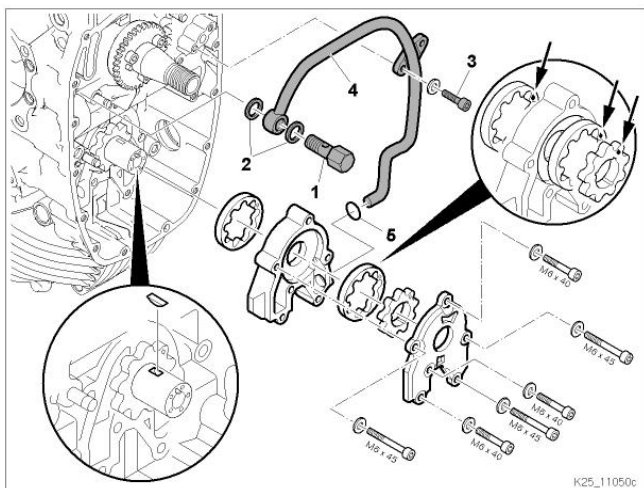


» The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



◀ Install TDC locating pin (No. 11 2 650) .

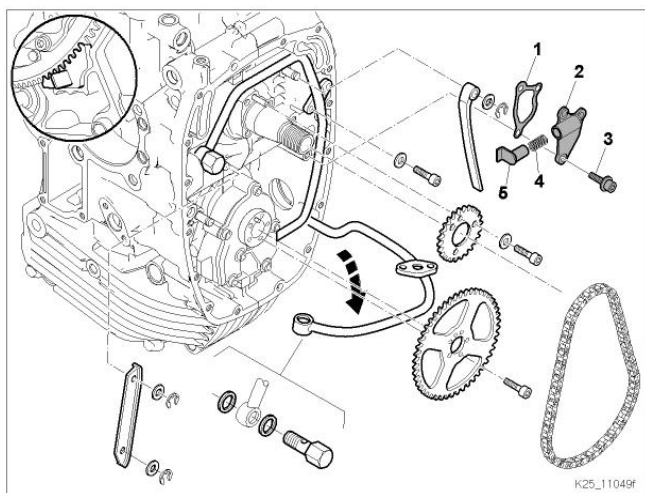
(-) Disconnecting cooling oil line from engine block



- Remove banjo bolt (1) with sealing rings (2).
- Remove screws (3).
- Swing the cooling oil line forward.

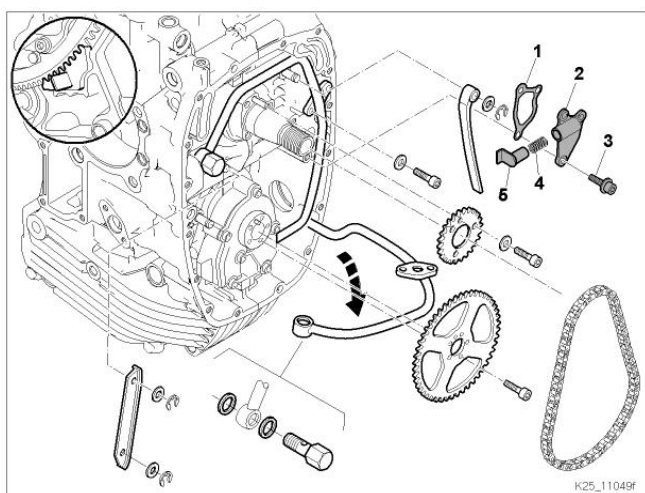
(-) Removing timing chain tensioner, crankshaft/auxiliary shaft


- Remove screws (3).
- Remove housing (2) with spring (4) and piston (5).
- Remove seal (1).



(-) Installing timing chain tensioner, crankshaft/auxiliary shaft

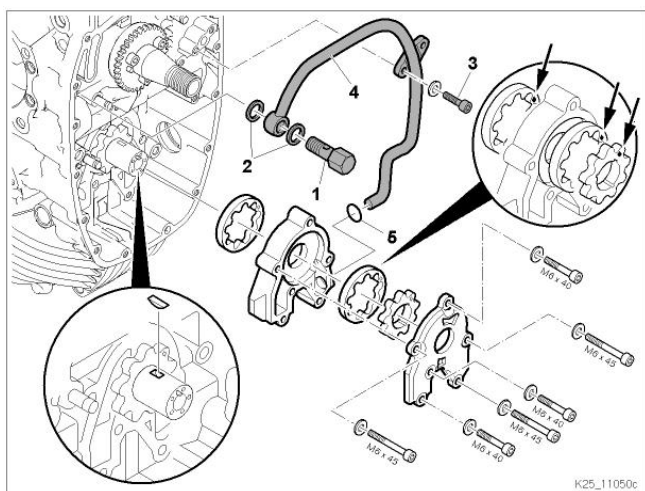
- Check gasket (1) for damage; replace if necessary.
- Install seal (1).
- Place housing (2) in position together with spring (4) and piston (5), making sure that the piston is angled toward the rear.
- Install screws (3).




 Tightening torques		
Housing for chain tensioner to crankcase, M6 x 25	8 Nm	


(-) Securing cooling oil line to engine block

- Swing the cooling oil line up.
- Install screws (3).



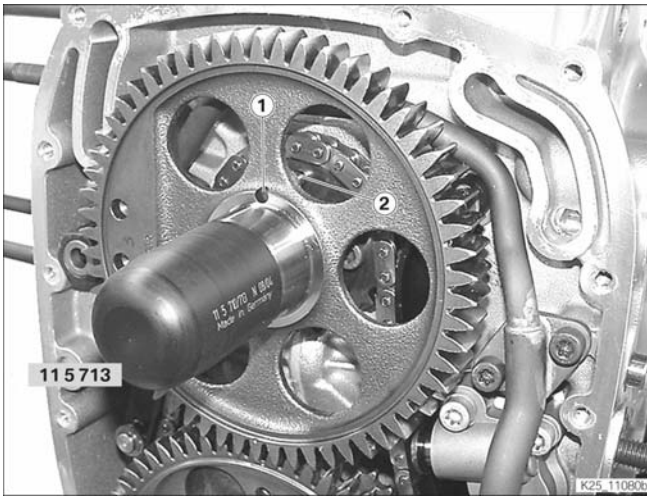
 Tightening torques		
Cooling oil line (inside engine) to crankcase, left, M6 x 16	8 Nm	

- Install banjo bolt (1) with new sealing rings (2).

 Tightening torques		
Banjo bolt, M14 x 4.5	25 Nm	

(-) Installing counterbalance shaft drive gear

- Clean inner taper of counterbalance drive gear and outer taper of crankshaft, **both must be free of oil and grease.**
- Install the drive gear for the balancing shaft, making



- sure that straight pin (2) of the crankshaft engages hole (1) in the drive gear.
- Install a suitable tool for holding the drive gear and preventing it from turning.

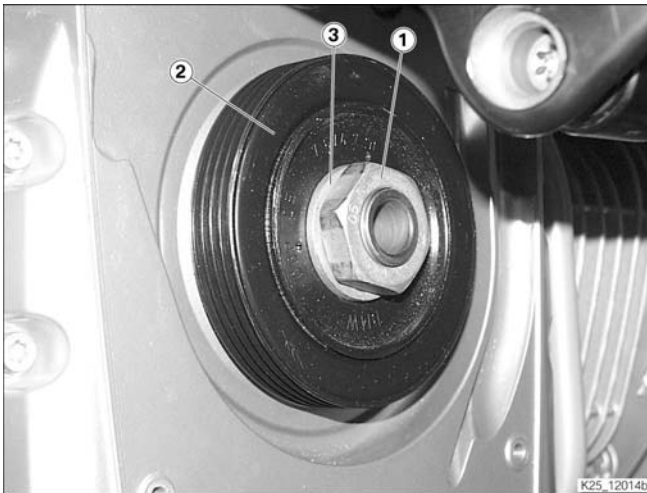
► **Installing crankshaft belt pulley**


Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.



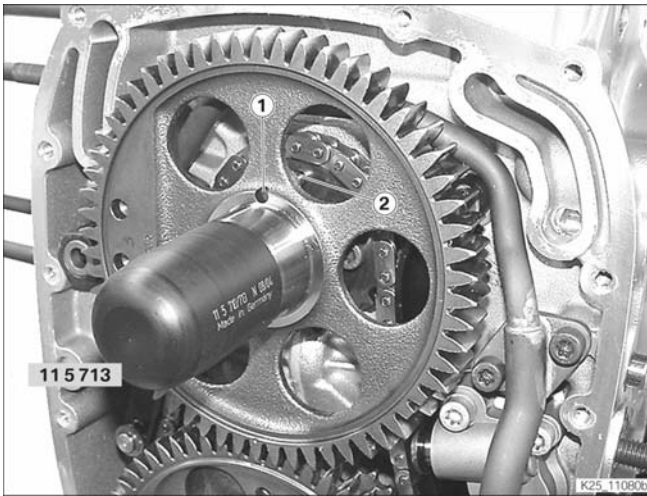
 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	



- Remove TDC locating pin (No. 11 2 650) .



- Remove the tool for holding the drive gear and preventing it from turning.



► **Removing crankshaft belt pulley**

Precondition

- Engine locked.

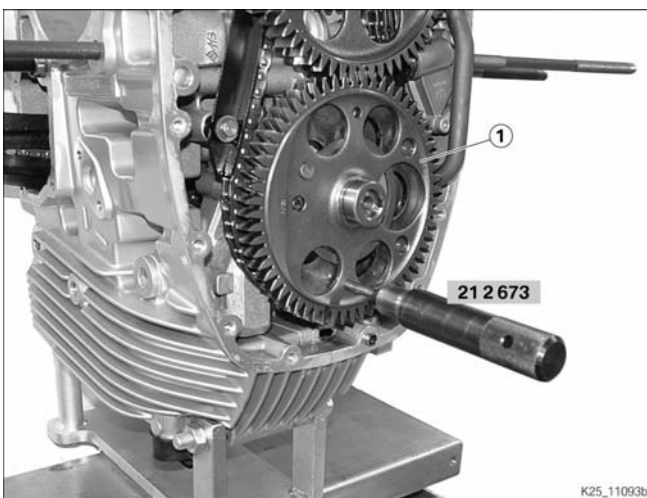


- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.



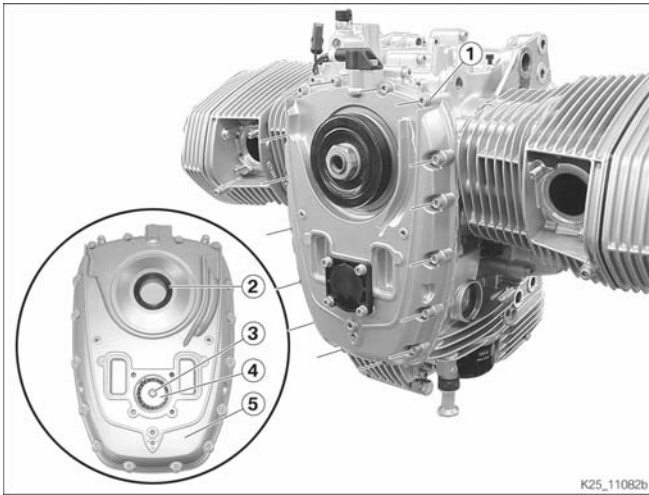
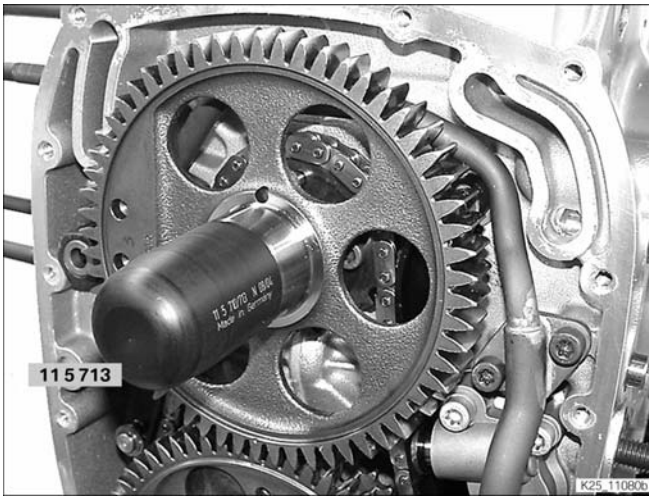
(-) Installing tensioning wheel

- Install tensioning gear (1), if necessary noting the feather key in the balancing shaft.
- Remove clutch centring pin (No. 21 2 673) .



(-) Installing timing case cover

- Install sliding sleeve (No. 11 5 713) .



- Make sure the sealing surface of the timing case cover is clean and free of grease and run a uniform bead of sealant round the face.



Consumables/lubricants

3 - Bond 1209	Surface sealant	07 58 9 062 376
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► **Securing crankshaft inductive sensor in timing case cover**

- Position inductive sensor for crankshaft (2) on the timing case cover and install the screw.



Tightening torques

Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	
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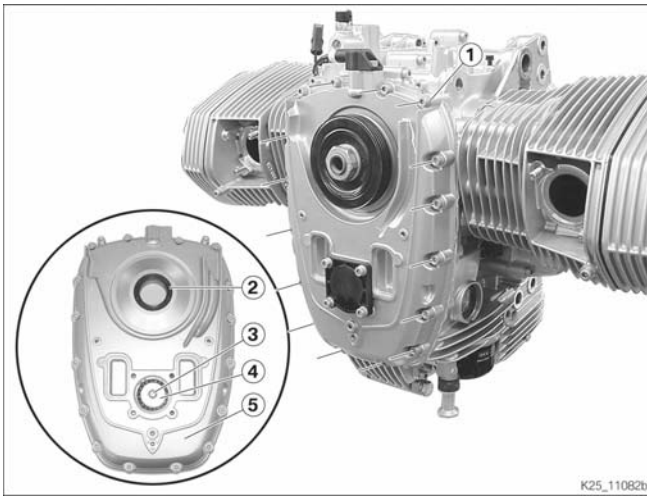


- Place timing case cover (5) in position.
- Install screws (1).



Tightening torques

Timing case cover to	8 Nm	
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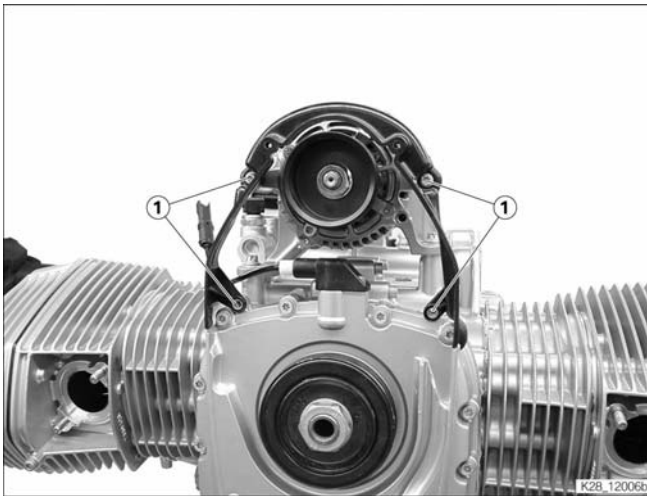
crankcase, M6		
---------------	--	--

- Remove sliding sleeve (No. 11 5 713) .
- Install screw (3) and washer (4).

 Tightening torques		
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Gear wheel to balancing shaft, M8 x 50	19 Nm	
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(-) Securing belt cover, rear, to engine and alternator



- Install screws (1).

 Tightening torques		
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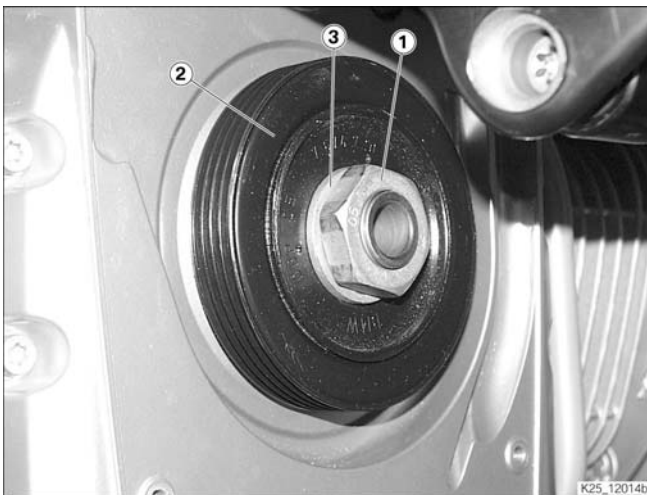
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
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Belt cover to alternator, M5 x 16	5 Nm	
-----------------------------------	------	--

(-) Installing crankshaft belt pulley

Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

 Tightening torques		
---	--	--

Belt pulley to crankshaft, M22 x 1.5	140 Nm	
--------------------------------------	--------	--


- Remove TDC locating pin (No. 11 2 650) .



(-) Installing counter balance shaft cover

- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).



 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.



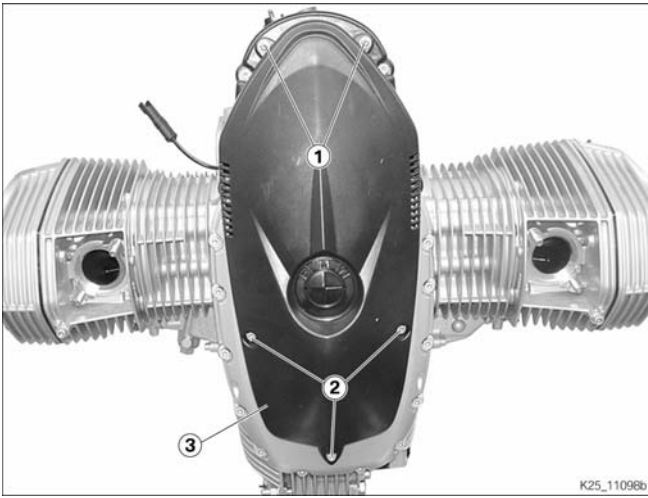
⚠ Attention

Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

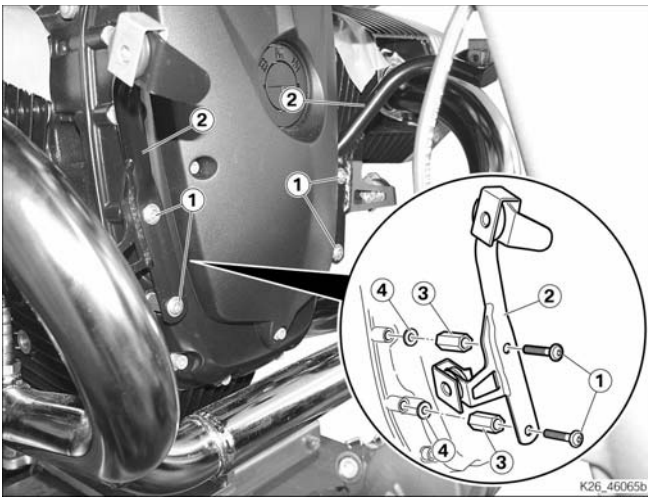
(-) Installing belt guard



- Install belt guard (3) and secure with screws (1) and (2).

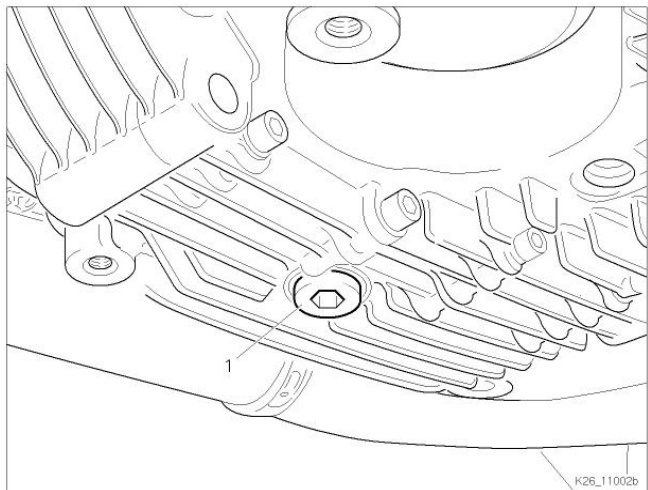
 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing fairing bracket on left and right




- Hold fairing bracket (2) with sleeves (3) and washers (4) in position.
- Install screws (1).

(-) Pouring engine oil into engine

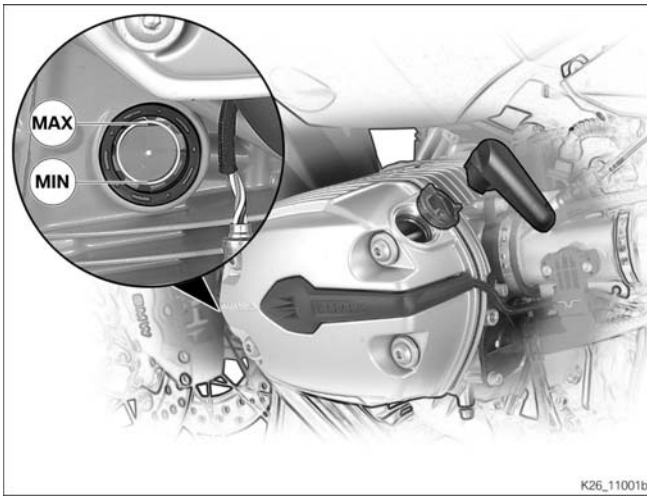


- Replace the sealing ring of oil drain plug (1).
- Screw in oil drain plug.


 Tightening torques		
Oil drain plug, M16 x 1.5	Initial torque, 23 Nm	
	Final torque, 32 Nm	

- Open oil filler plug using spanner from toolkit.
- Pour engine oil into the engine until the level reaches the MAX mark.

 Technical data		



Oil capacity, engine	with filter change	max. 4 l	
	Difference between Min. / Max. marks	0.5 l	
Consumables/lubricants			
Engine oil, 20W-50			

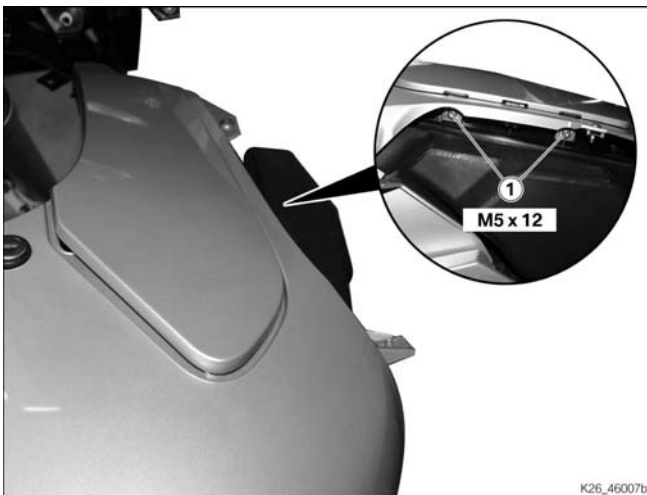
 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

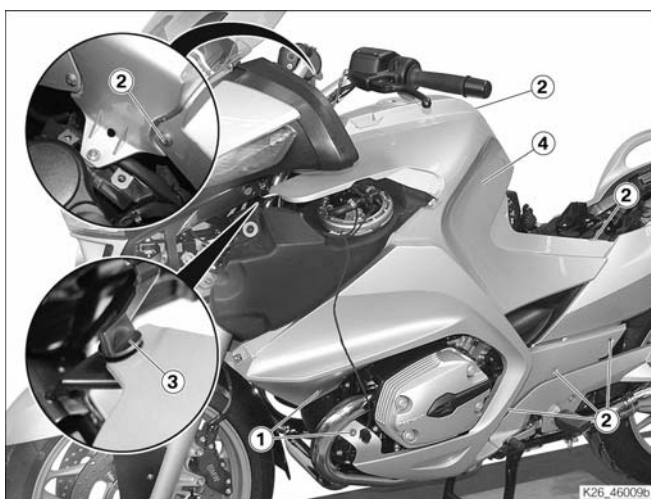
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

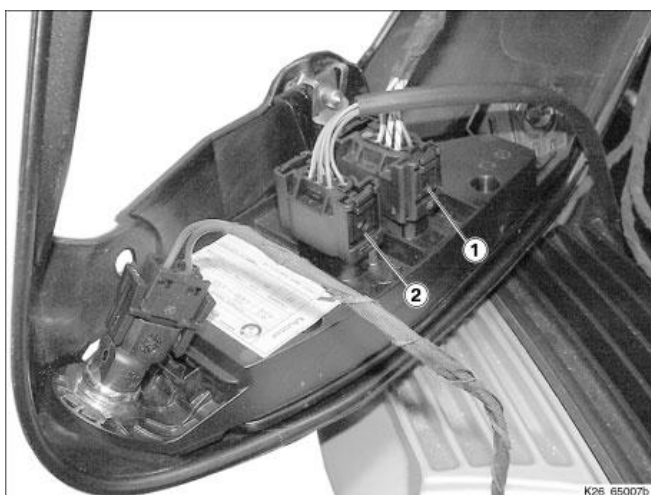
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



K26_46012b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



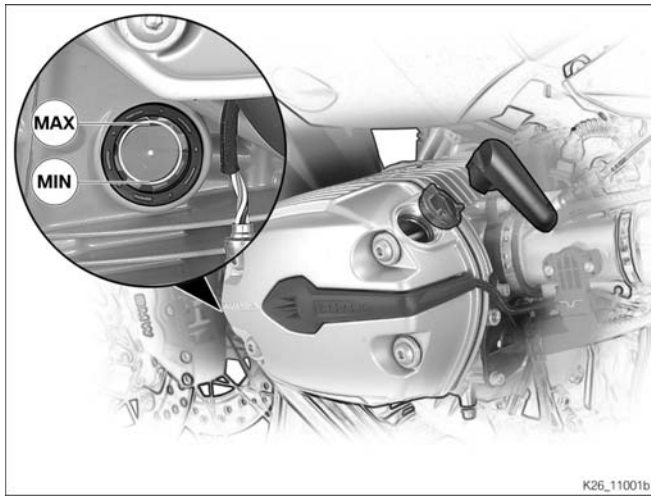
(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



Technical data

Technical data			



Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 31 200 Replacing left camshaft**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

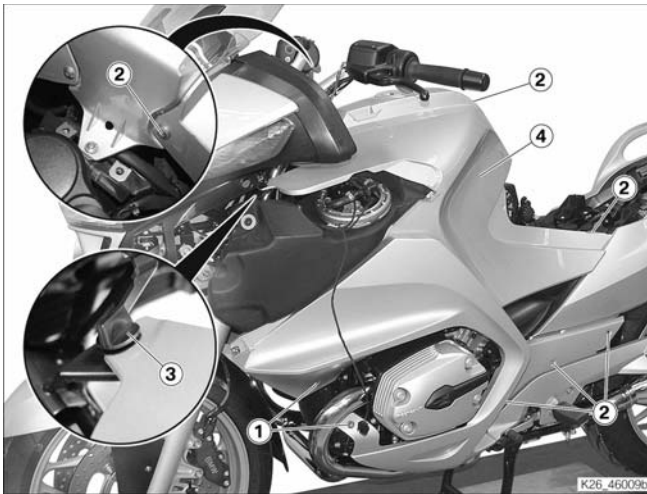


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

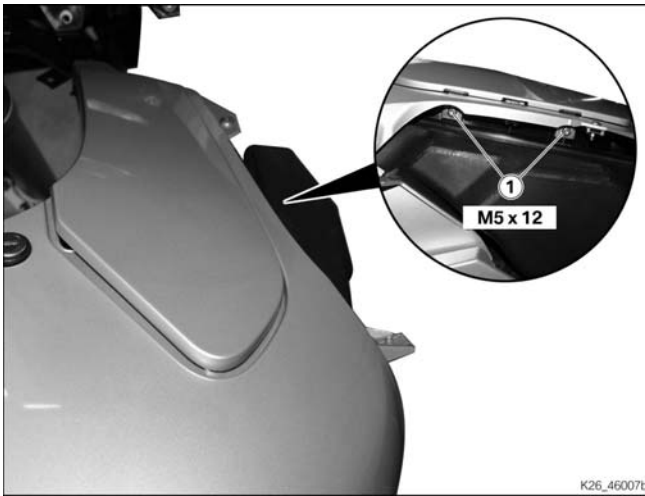
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing direct ignition coil

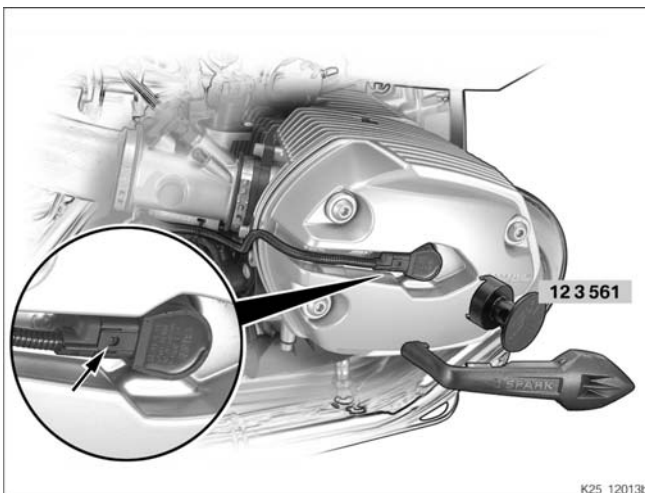
Precondition

- Ignition is switched OFF
- ▶
- Remove the primary spark plug cover.

⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

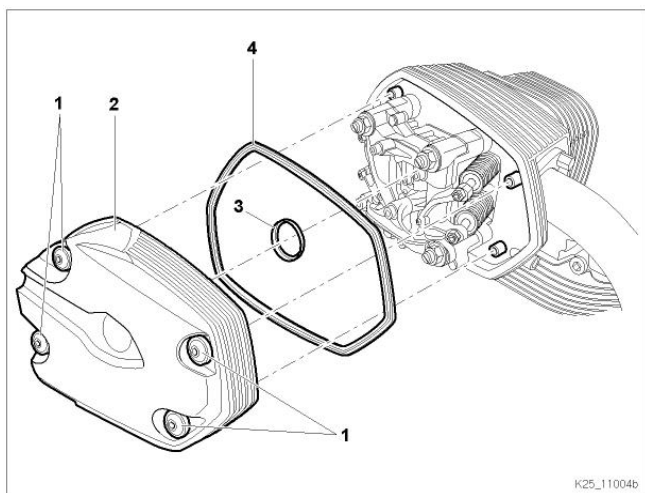
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

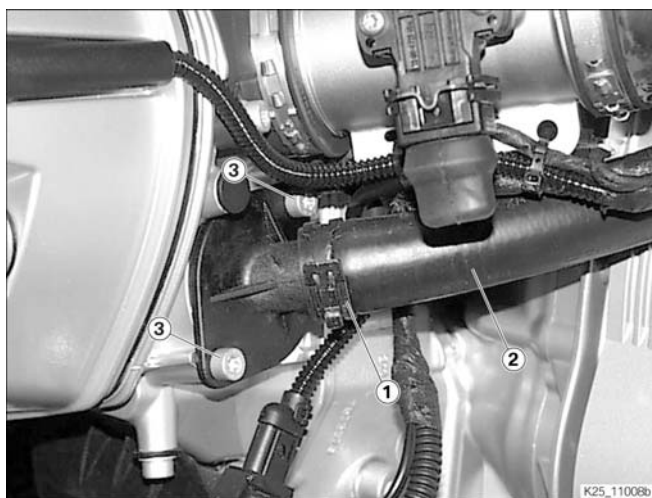
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

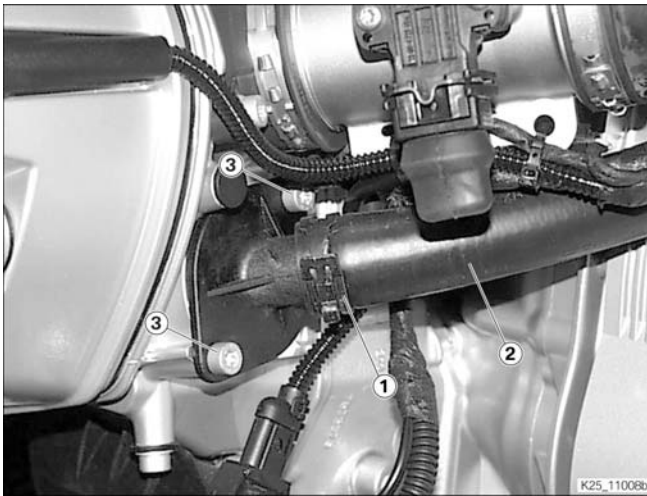
(-) Removing left camshaft cover

► **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.

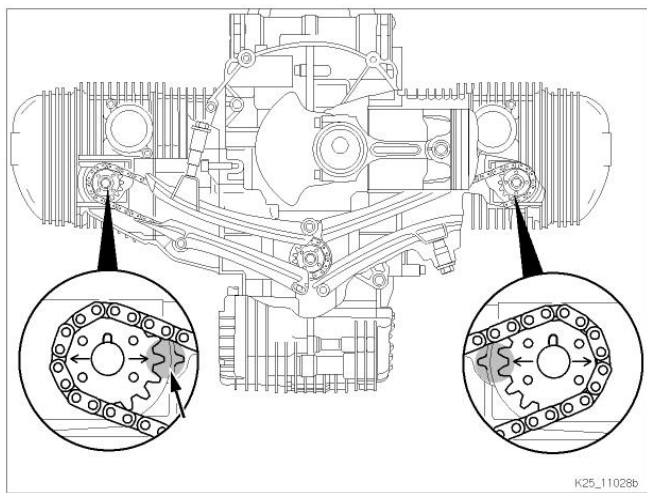


- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



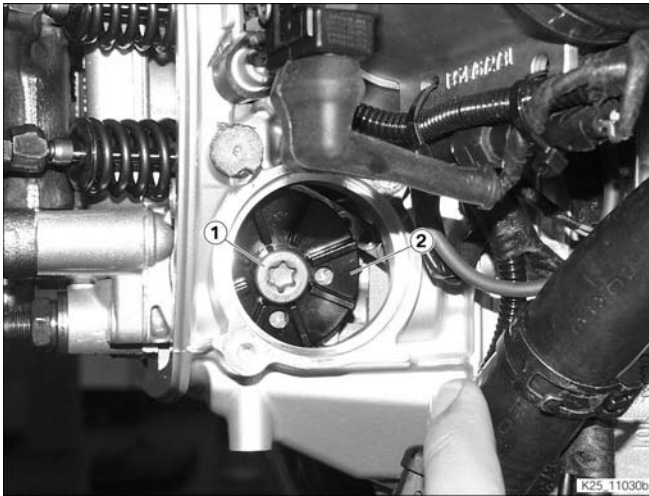
(-) Removing breather plate

- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



- Remove screw (1) with breather plate (2).

(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



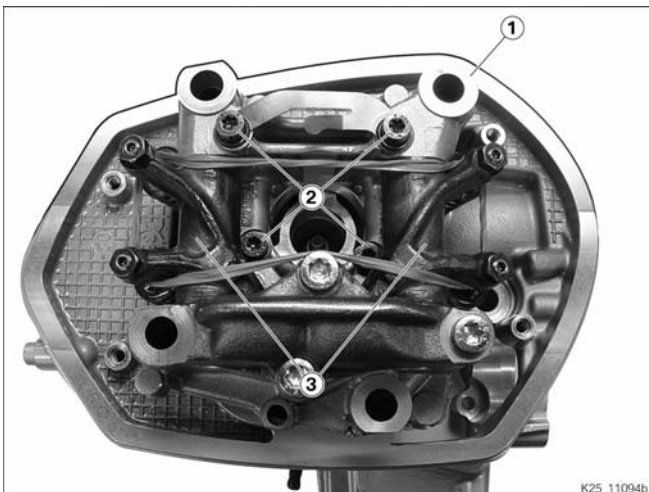
Note

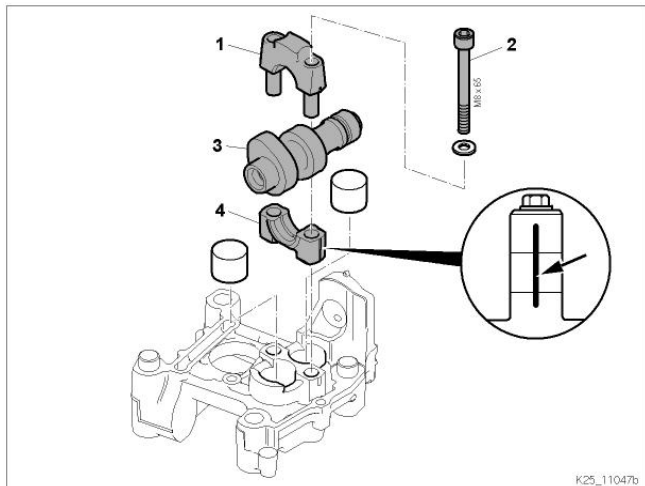
When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing timing-gear carrier

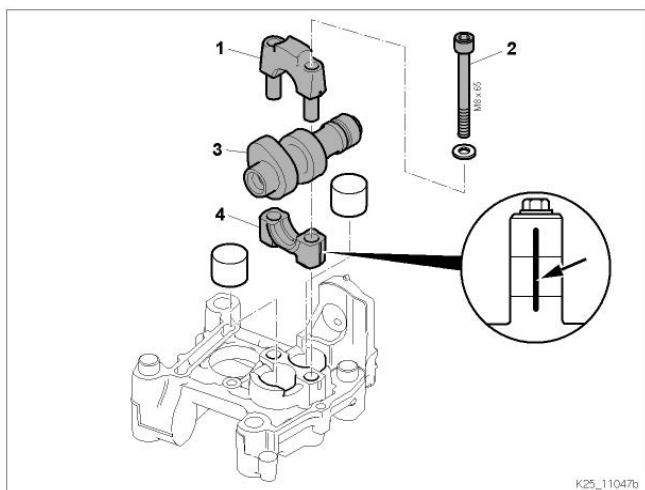
- Use a rubber band to hold rocker arm (3).
- Remove screws (2).
- Release timing-gear carrier (1) by tapping it lightly with a plastic-faced hammer and remove.






(-) Removing camshaft

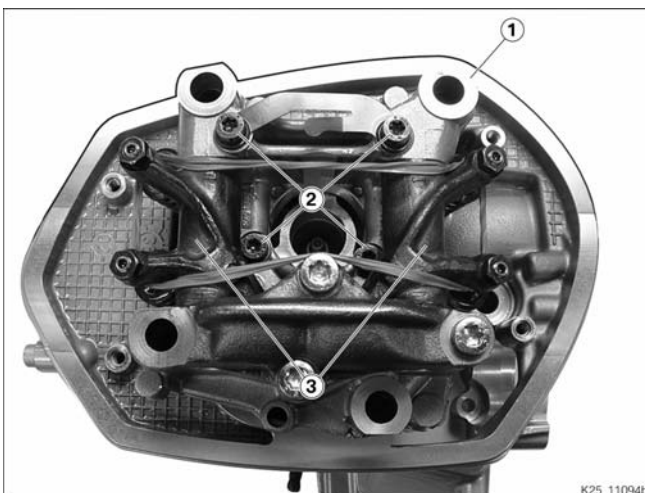
- Remove screws (2).
- Remove bearing cap (1).
- Remove camshaft (3).
- Remove step-bearing cap (4).



(-) Installing camshaft


- Position step-bearing cap (4) on the timing-gear carrier, noting the position of the mark (arrow).
- Install oiled camshaft (3).
- Install bearing cap (1), noting the position of the mark (arrow).
- Install screws (2).

 Tightening torques		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 30	19 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	



(-) Installing timing-gear carrier

- Install timing-gear carrier (1), making sure that the reamed sleeves of the timing-gear carrier are perfectly aligned with the holes in the cylinder head.
- Install screws (2), noting the different lengths of the screws.

 Tightening torques		
Timing-gear carrier to cylinder head left/right, M6 x30	8 Nm	
Timing-gear carrier to cylinder head left/right, M6 x 60	8 Nm	

- Remove the rubber bands securing the rocker arms.

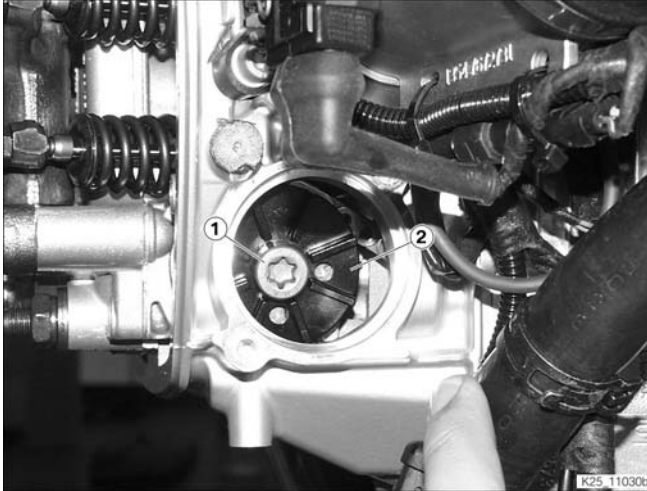
(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

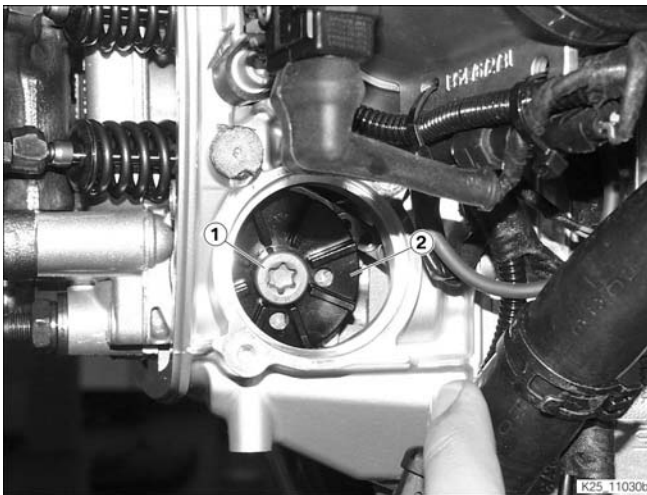
(-) Securing left camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).

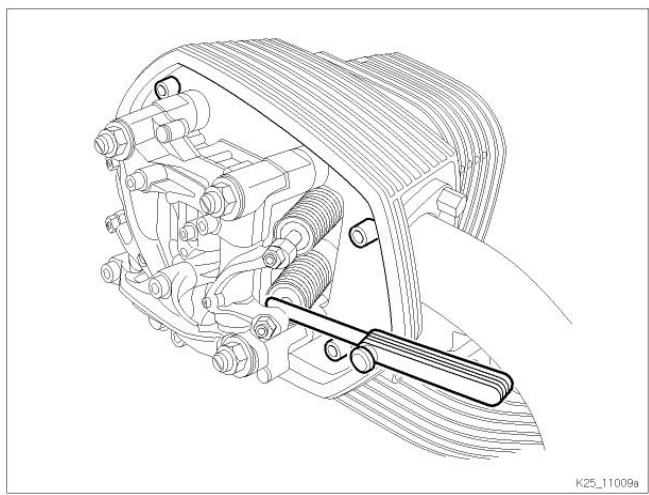
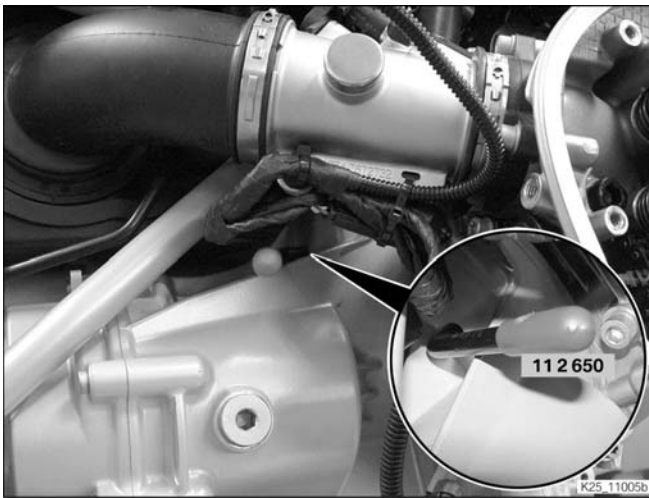


Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Removing TDC locating pin

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance

Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.



Technical data

Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.



Tightening torques

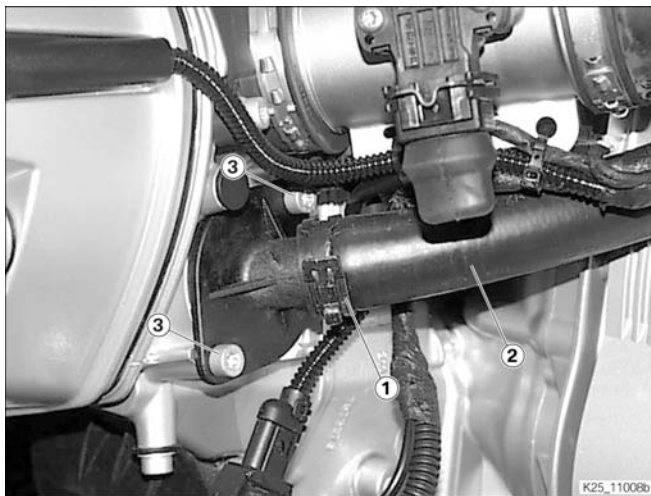
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	
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- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing left camshaft cover



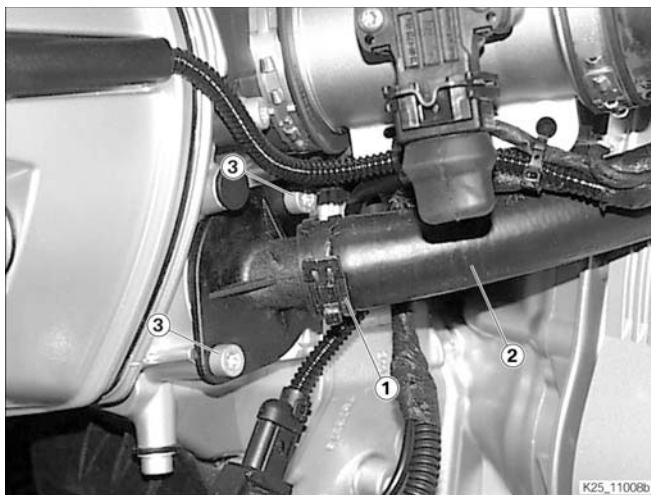
Attention



Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

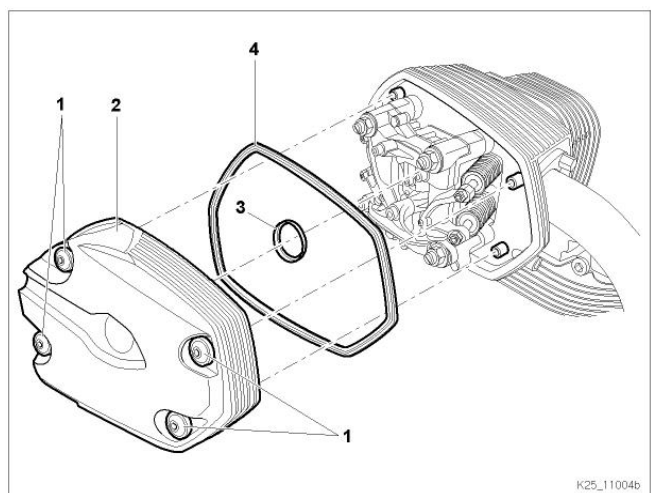
Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).




► **Connecting hose for crankcase breather**

- Connect hose (2) to the camshaft cover.
 - Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



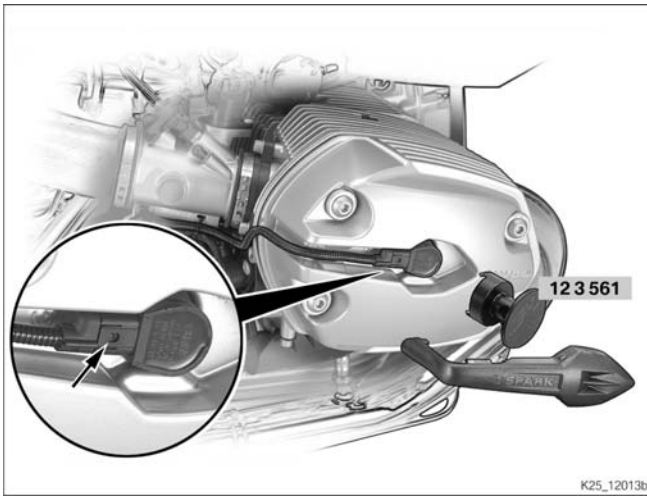
◄ **(-) Installing cylinder head cover**

- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.



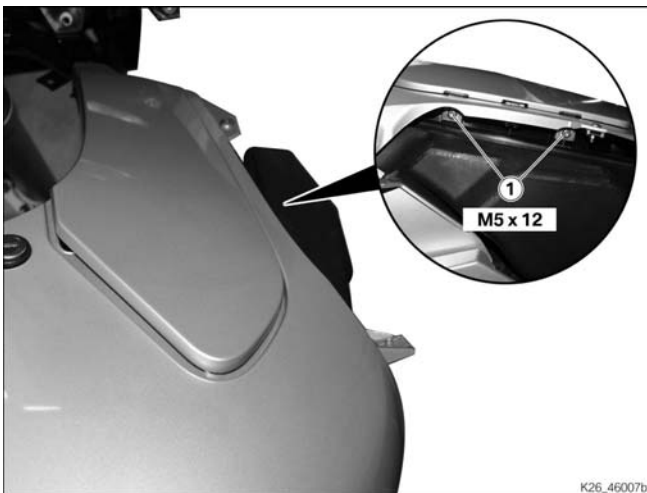
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

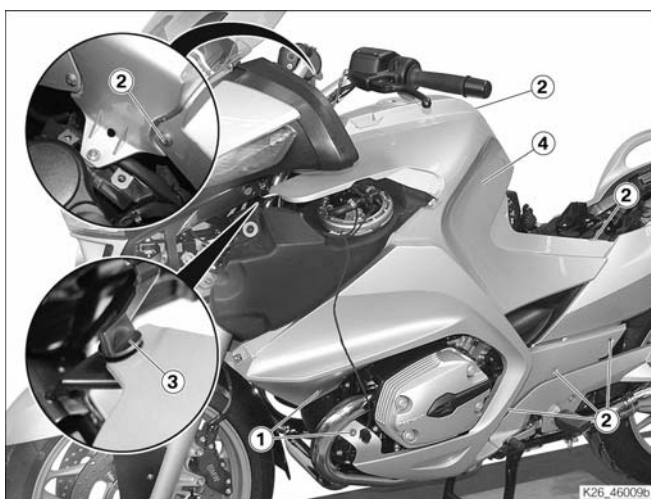
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

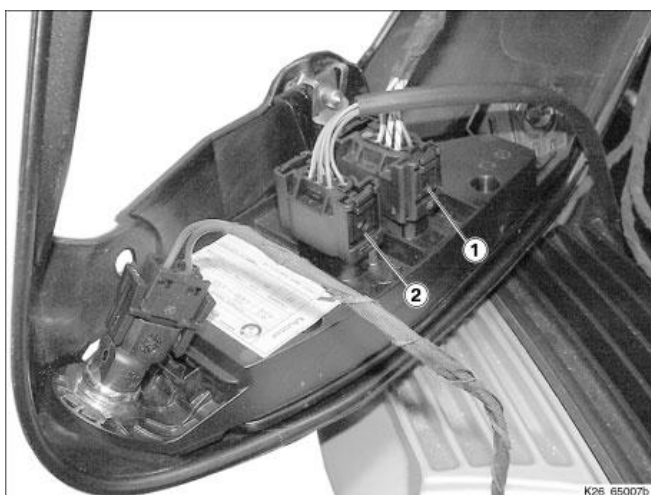
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.




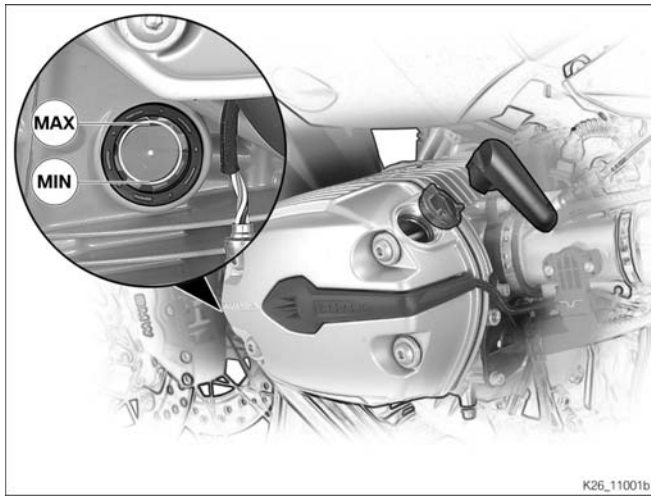
(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



Technical data

 Technical data			



K26_11001b

Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

11 31 205 Replacing right camshaft



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

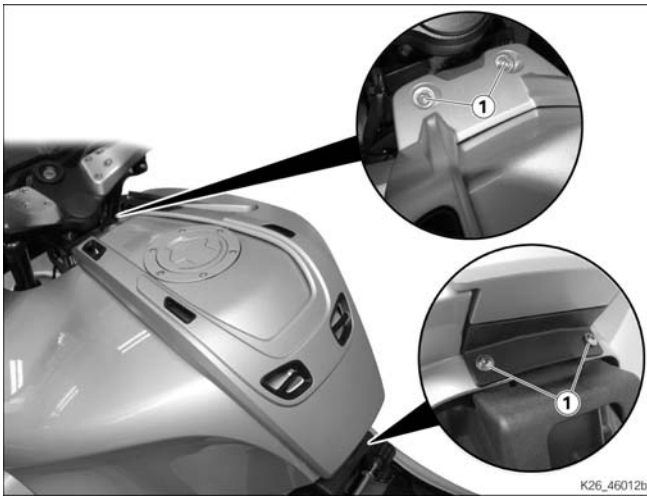


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



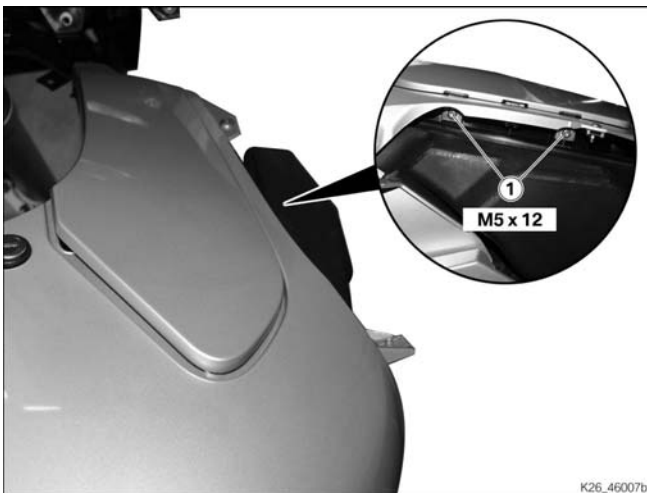
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

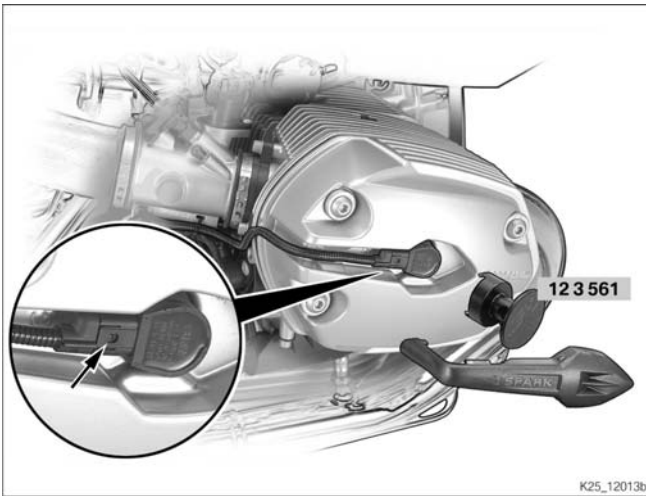


- Remove the primary spark plug cover.

⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

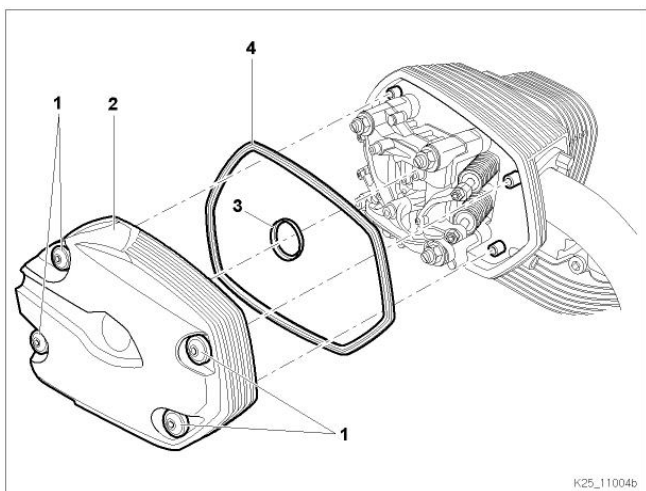
(-) Removing cylinder head cover


- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



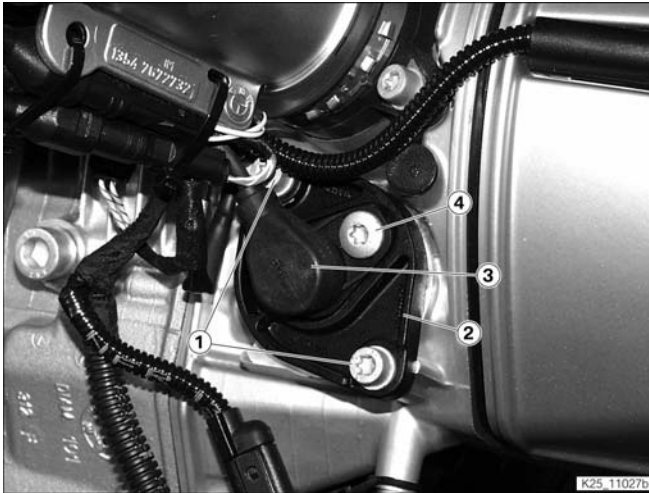
 Technical data			
Permissible projecting threaded length of the	free threaded length	max. 16.5 mm	

bottom left tiebolt on the inlet side			
---	--	--	--

- Remove gaskets (3) and (4).

(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).

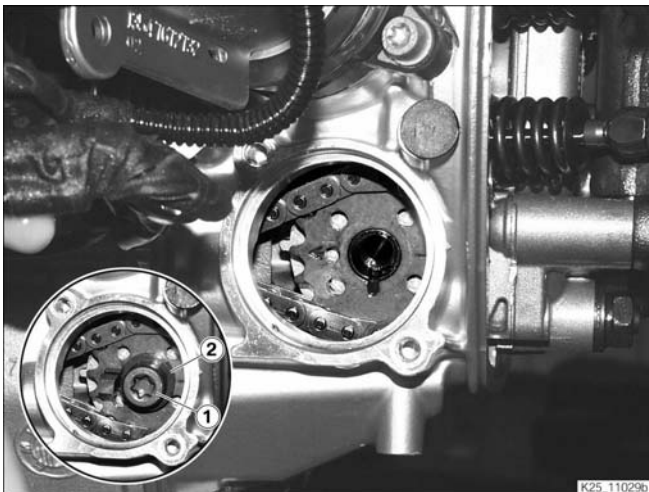


Note

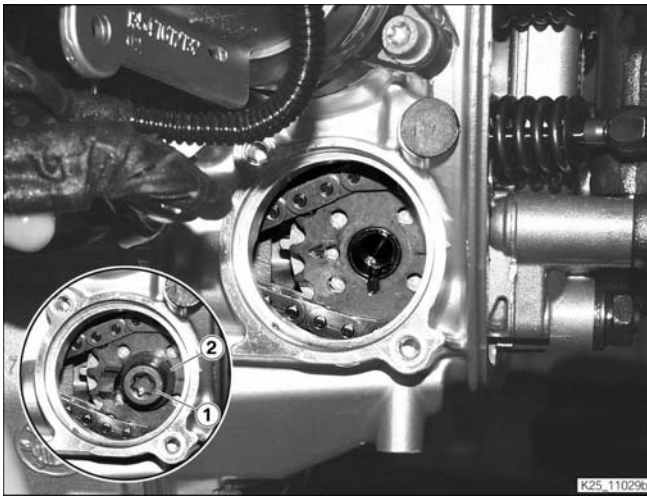
The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



(-) Removing trigger for camshaft sensor



- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with trigger for camshaft sensor (2).

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



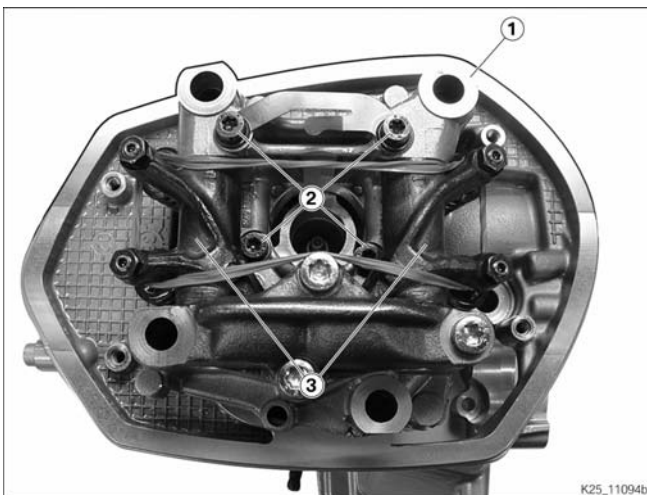
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

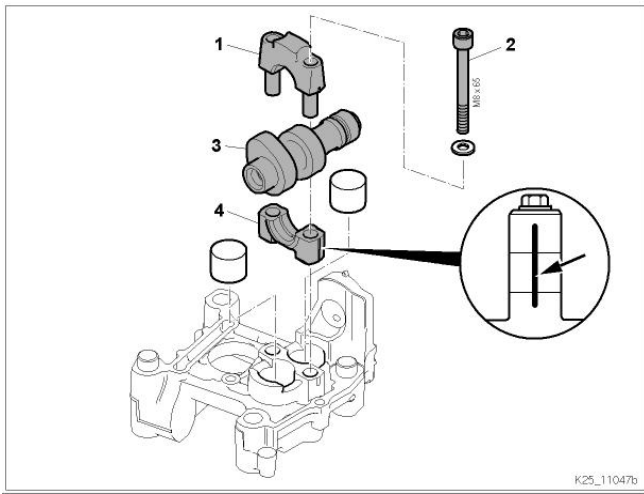
(-) Removing timing-gear carrier

- Use a rubber band to hold rocker arm (3).
- Remove screws (2).
- Release timing-gear carrier (1) by tapping it lightly with a plastic-faced hammer and remove.



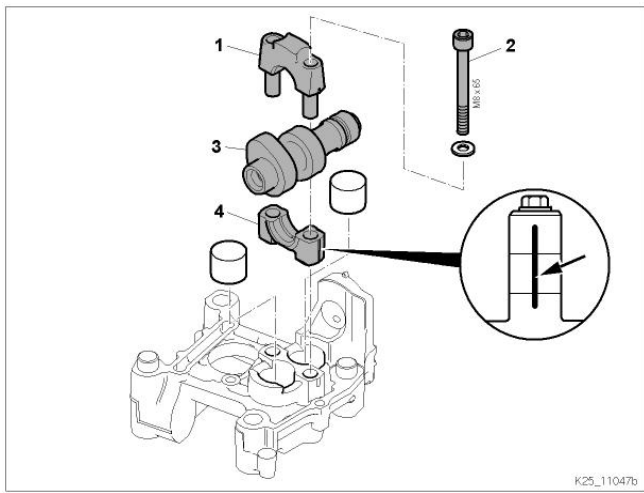
(-) Removing camshaft


- Remove screws (2).
- Remove bearing cap (1).
- Remove camshaft (3).
- Remove step-bearing cap (4).



(-) Installing camshaft

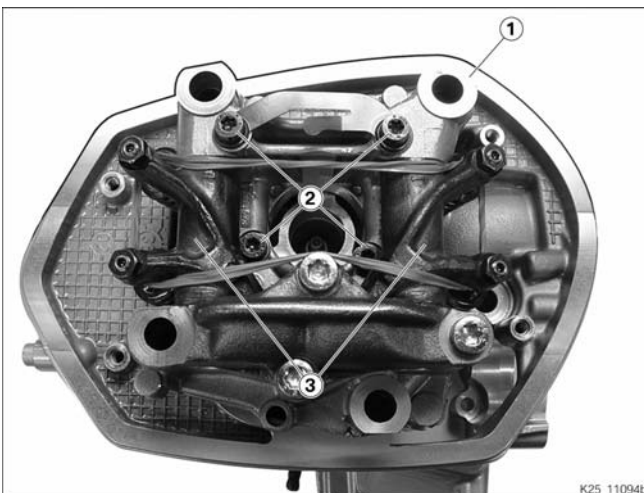
- Position step-bearing cap (4) on the timing-gear carrier, noting the position of the mark (arrow).
- Install oiled camshaft (3).
- Install bearing cap (1), noting the position of the mark (arrow).
- Install screws (2).




 Tightening torques		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 30	19 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	

(-) Installing timing-gear carrier

- Install timing-gear carrier (1), making sure that the reamed sleeves of the timing-gear carrier are perfectly aligned with the holes in the cylinder head.
- Install screws (2), noting the different lengths of the screws.



 Tightening torques		
Timing-gear carrier to cylinder head left/right, M6 x30	8 Nm	
Timing-gear carrier to cylinder head left/right, M6 x 60	8 Nm	

- Remove the rubber bands securing the rocker arms.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

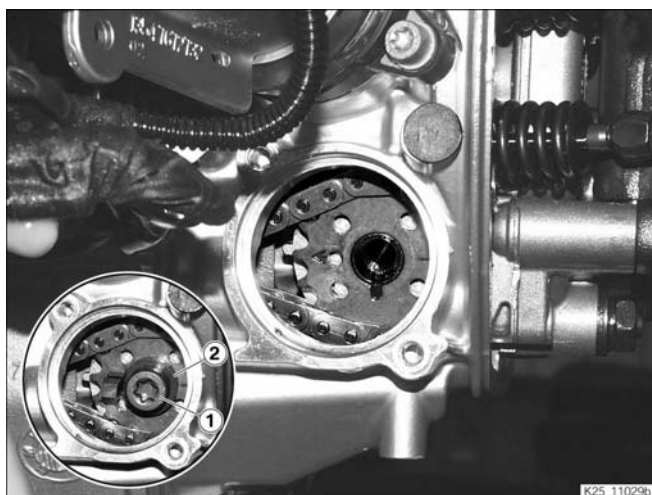


- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



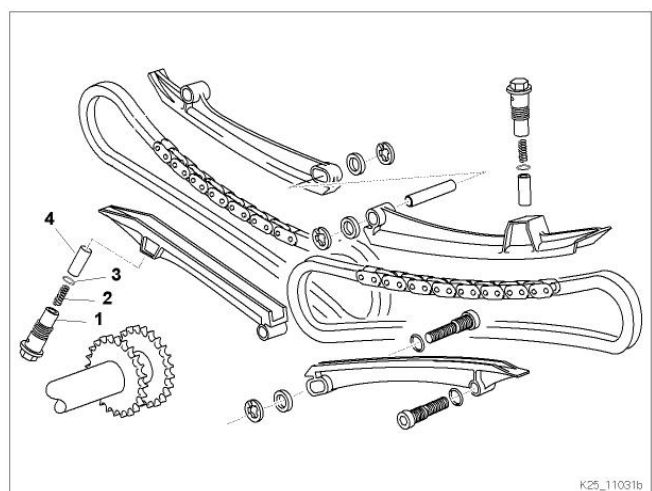
► Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



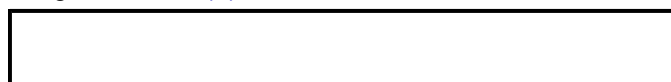
- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.

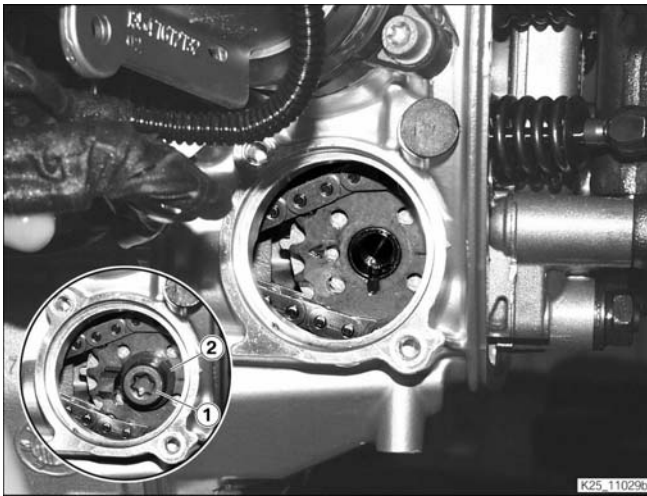


 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).





Tightening torques

Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	
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- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

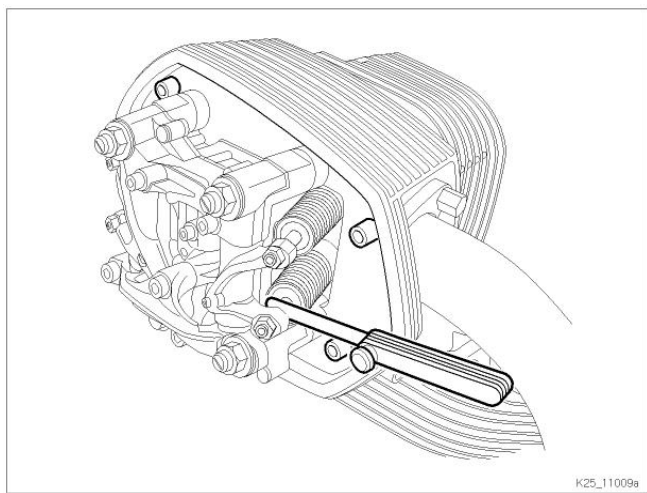
Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.



<p>Technical data</p>			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.



Tightening torques

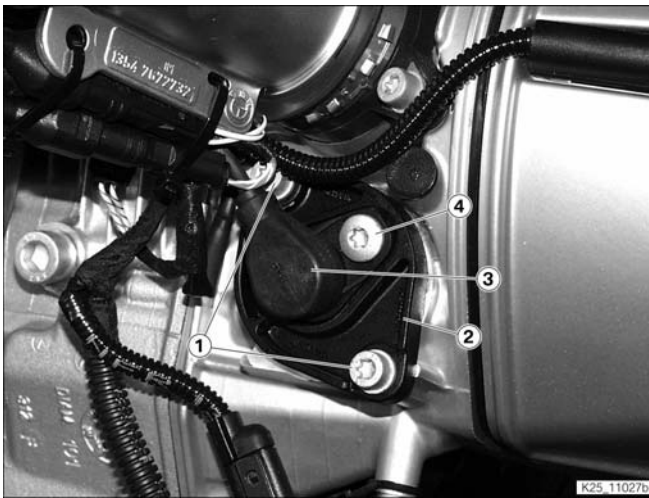
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	
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- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



Attention

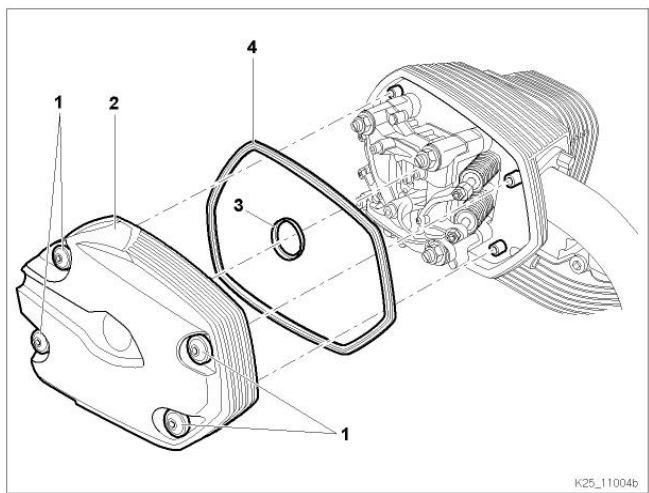


Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.


Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

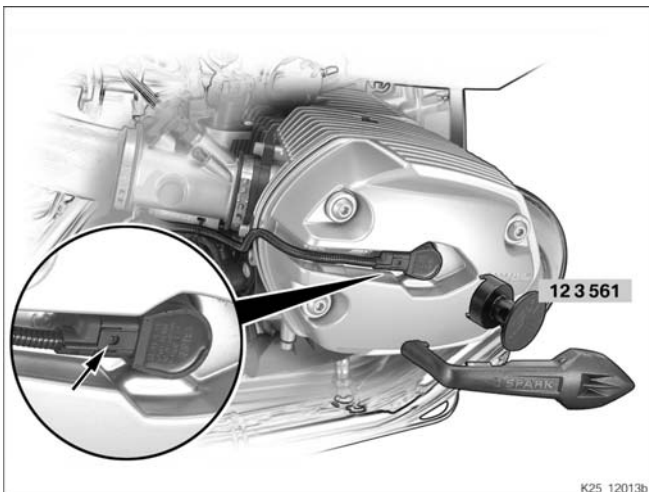
(-) Installing cylinder head cover



- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

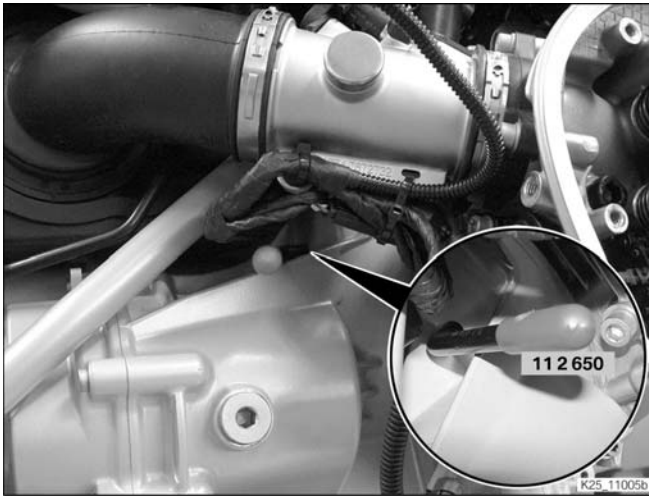
(-) Installing direct ignition coil



- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Removing TDC locating pin

- Remove TDC locating pin (No. 11 2 650) .



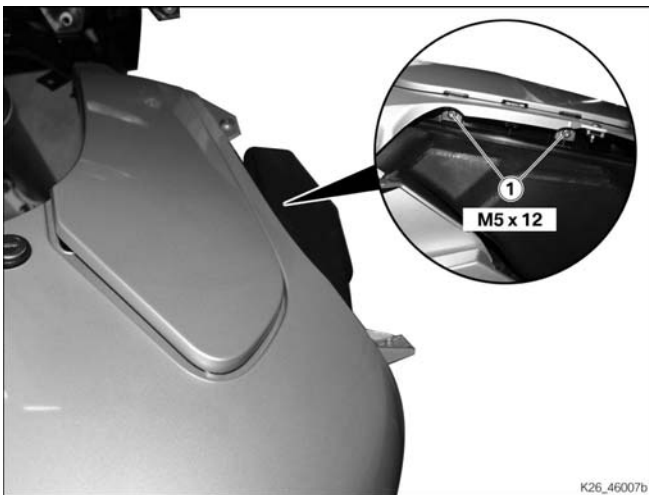
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



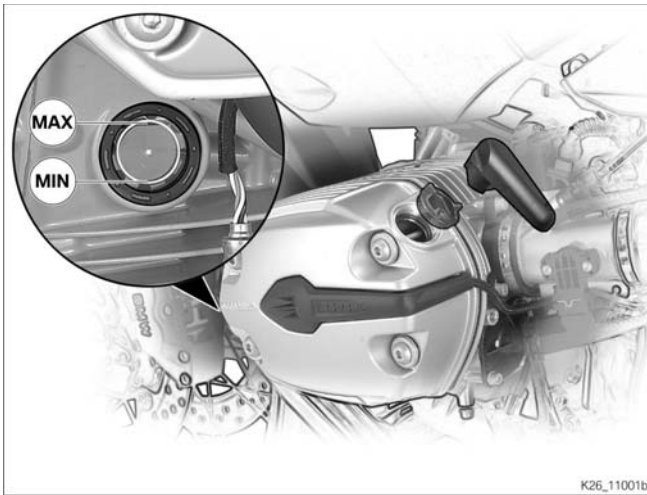
Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 31 210 Replacing all camshafts**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

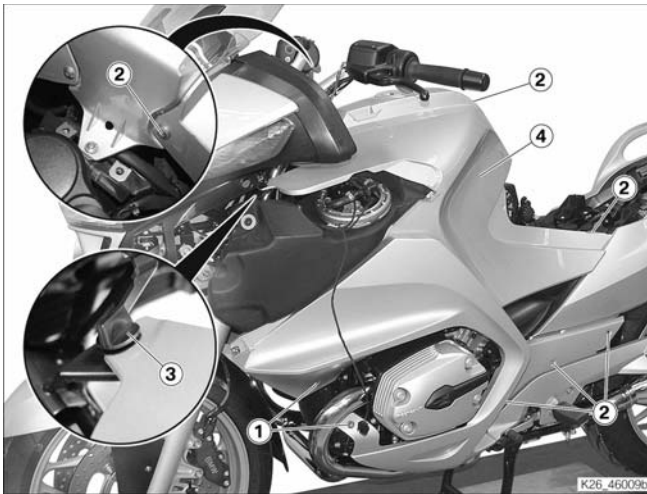


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

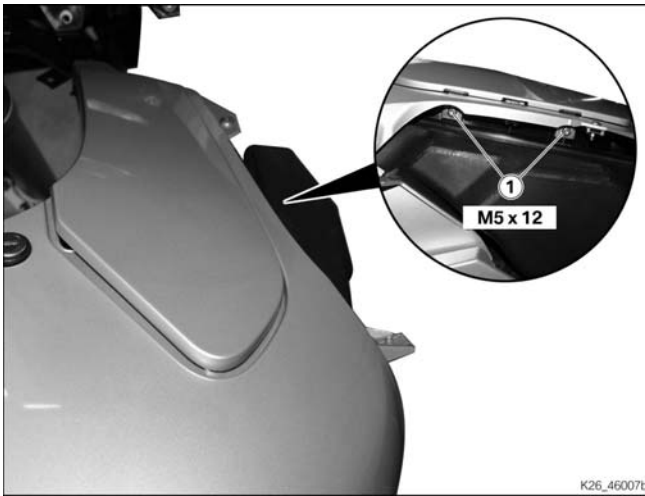
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.




(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing direct ignition coil

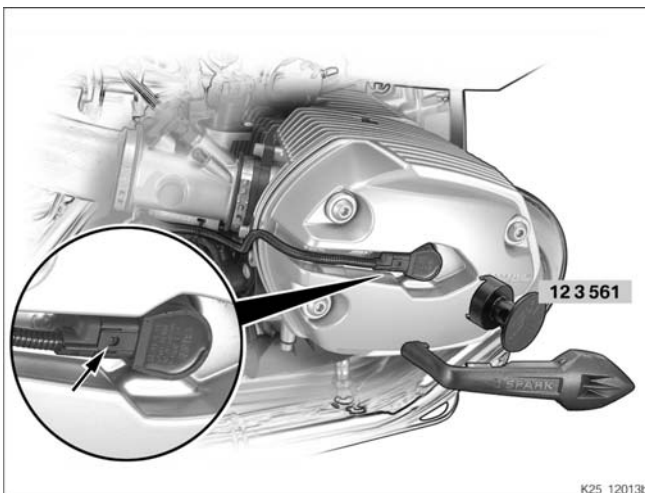
Precondition

- Ignition is switched OFF
- ▶ 
- Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

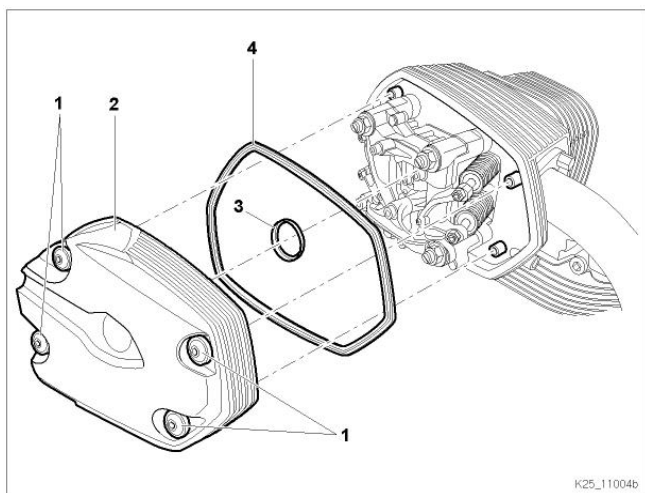
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

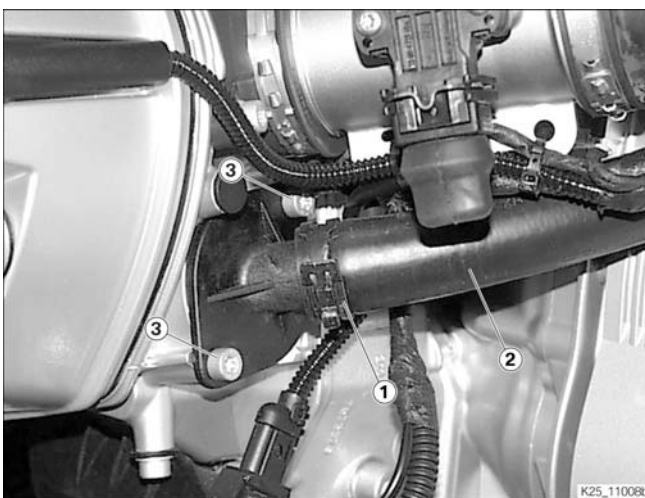


Technical data

Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

(-) Removing left camshaft cover

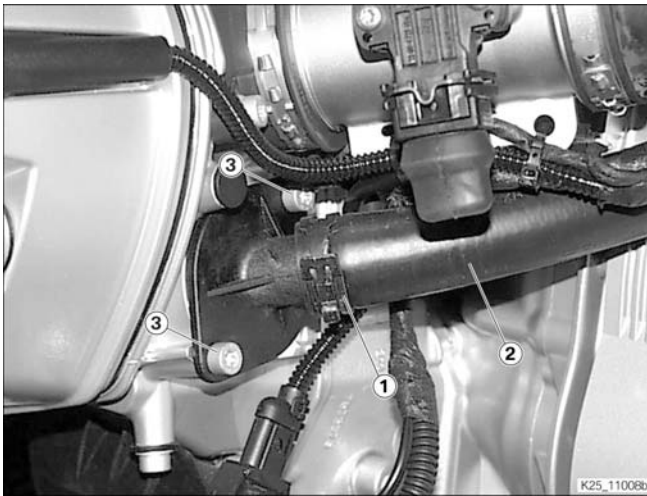


▶ **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.

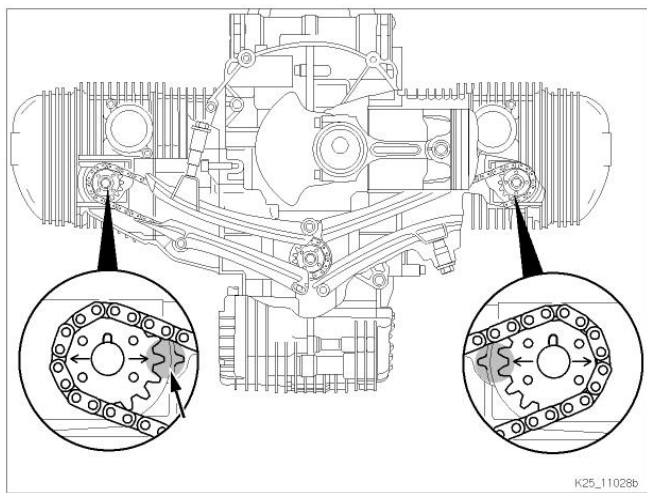


- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



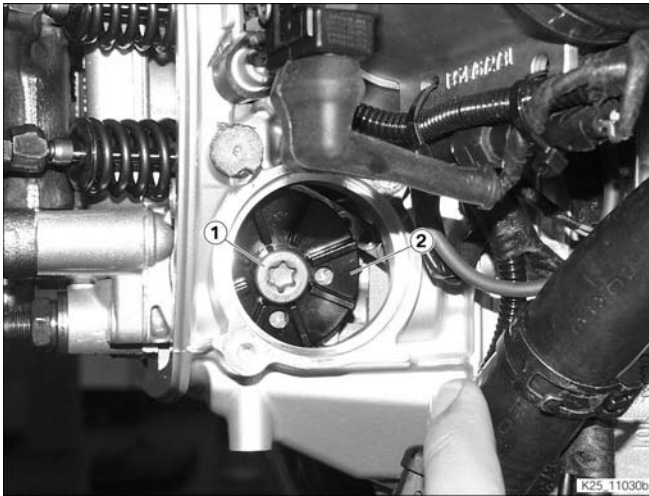
(-) Removing breather plate

- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



- Remove screw (1) with breather plate (2).

(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



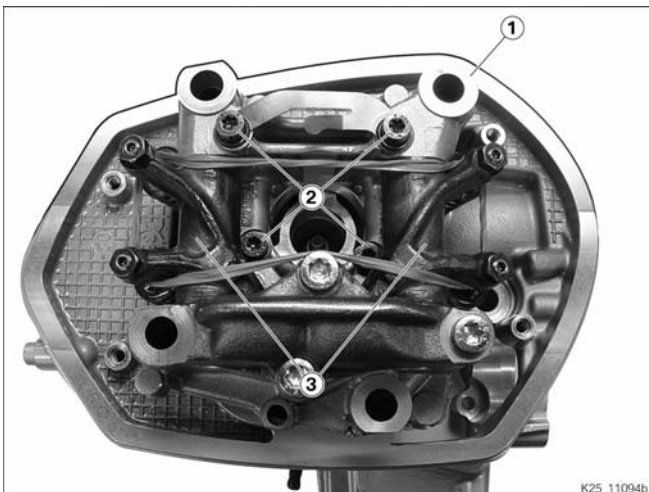
Note

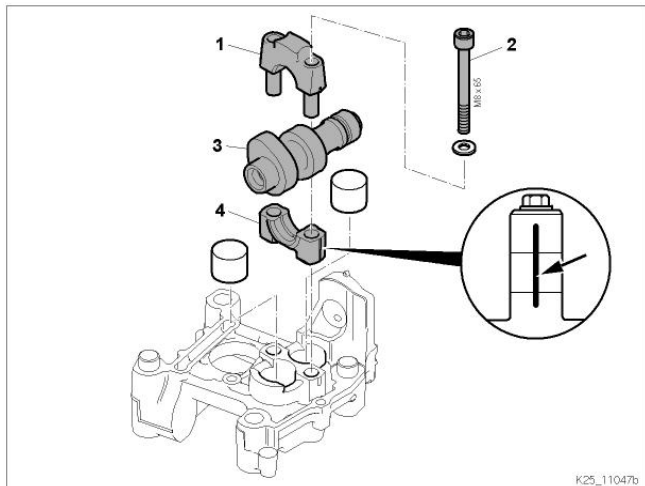
When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing timing-gear carrier

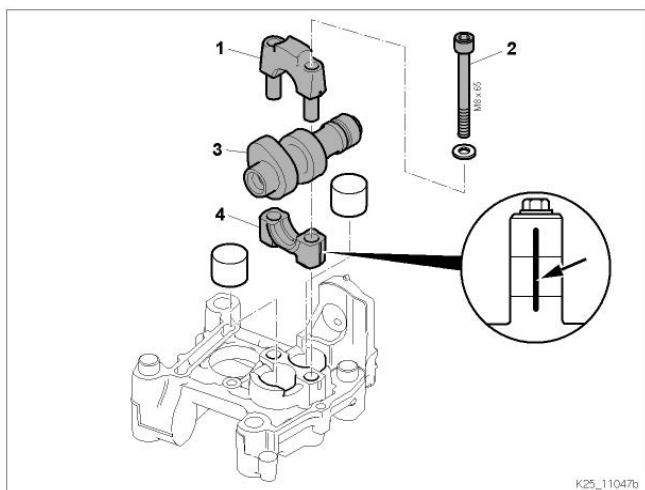
- Use a rubber band to hold rocker arm (3).
- Remove screws (2).
- Release timing-gear carrier (1) by tapping it lightly with a plastic-faced hammer and remove.






(-) Removing camshaft

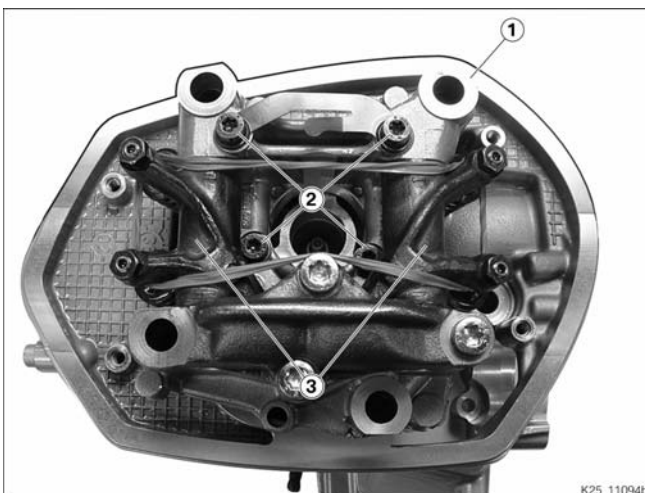
- Remove screws (2).
- Remove bearing cap (1).
- Remove camshaft (3).
- Remove step-bearing cap (4).



(-) Installing camshaft


- Position step-bearing cap (4) on the timing-gear carrier, noting the position of the mark (arrow).
- Install oiled camshaft (3).
- Install bearing cap (1), noting the position of the mark (arrow).
- Install screws (2).

 Tightening torques		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 30	19 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	



(-) Installing timing-gear carrier

- Install timing-gear carrier (1), making sure that the reamed sleeves of the timing-gear carrier are perfectly aligned with the holes in the cylinder head.
- Install screws (2), noting the different lengths of the screws.

 Tightening torques		
Timing-gear carrier to cylinder head left/right, M6 x30	8 Nm	
Timing-gear carrier to cylinder head left/right, M6 x 60	8 Nm	

- Remove the rubber bands securing the rocker arms.

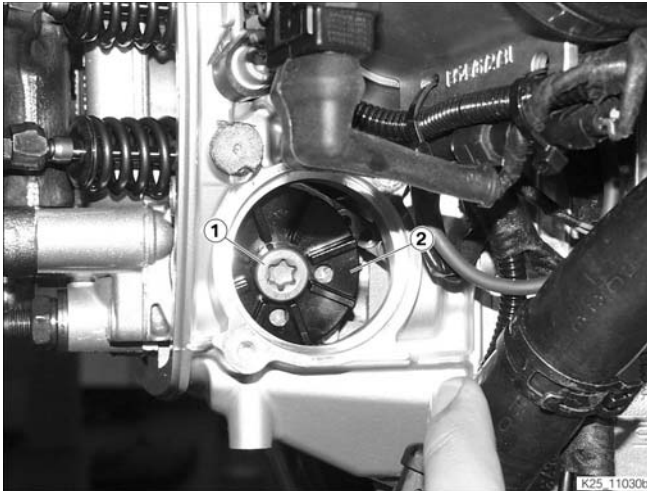
(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

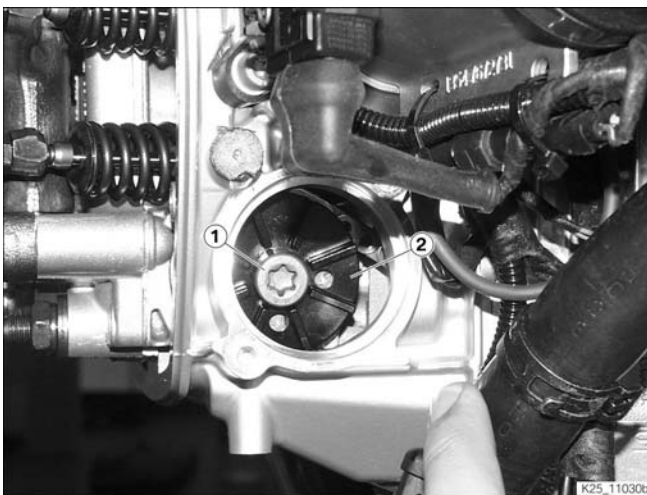
(-) Securing left camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).



Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

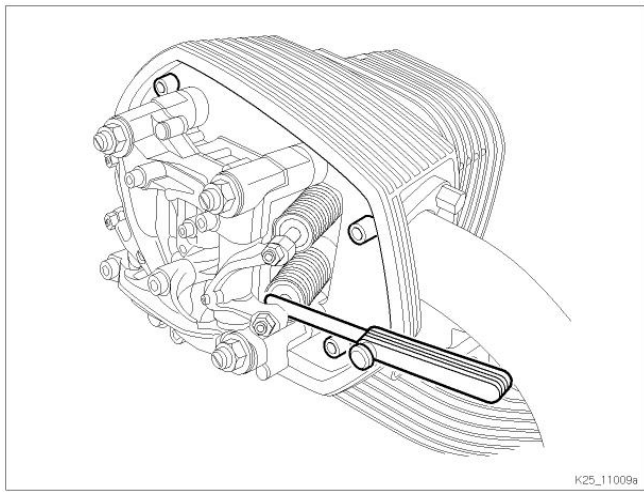
Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.



Technical data

Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.



Tightening torques

Locknut, valve adjusting screw, M6 x 0.5	8 Nm	
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- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

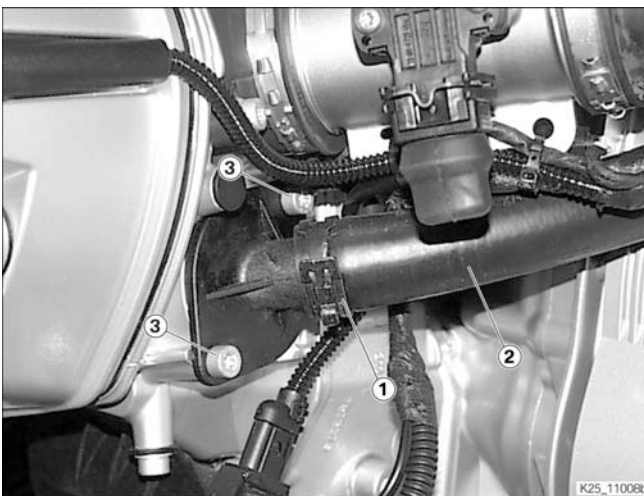
(-) Installing left camshaft cover



Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

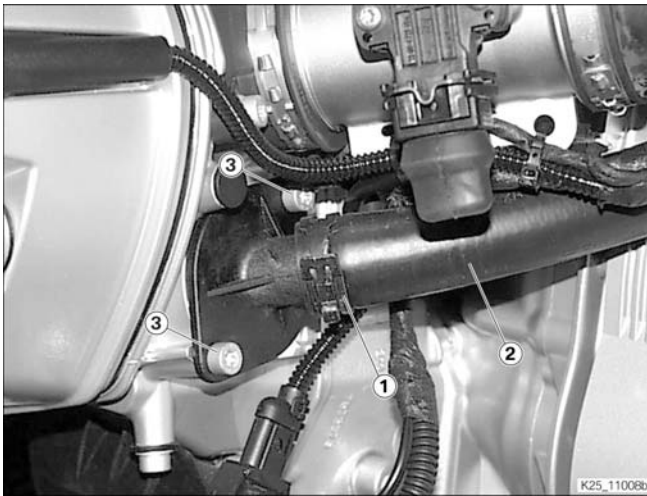
Avoidance: Deburr sharp edges of the housing.



- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

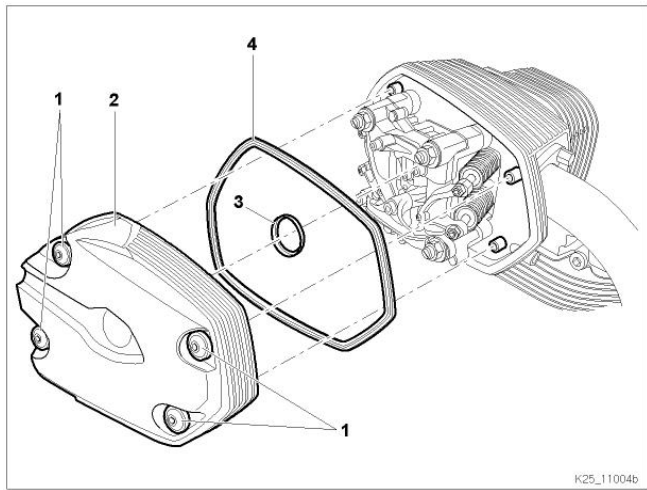
► Connecting hose for crankcase breather


- Connect hose (2) to the camshaft cover.
 - Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



(-) Installing cylinder head cover

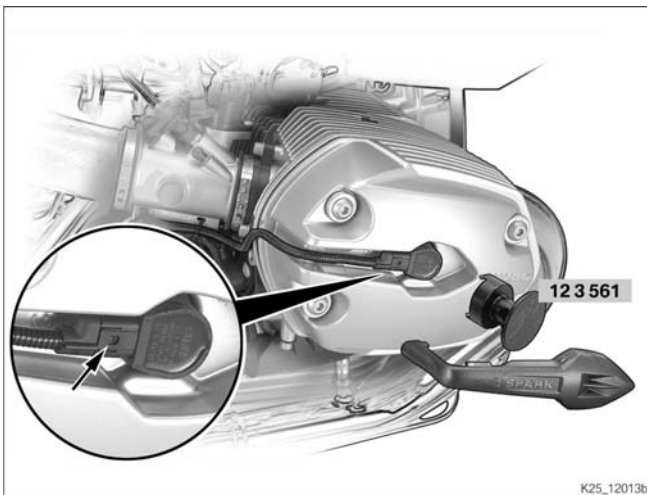
- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.



 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

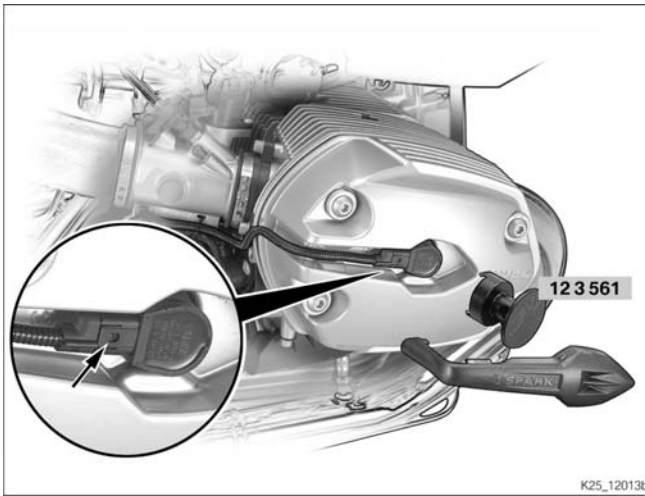


(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF





- Remove the primary spark plug cover.

⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

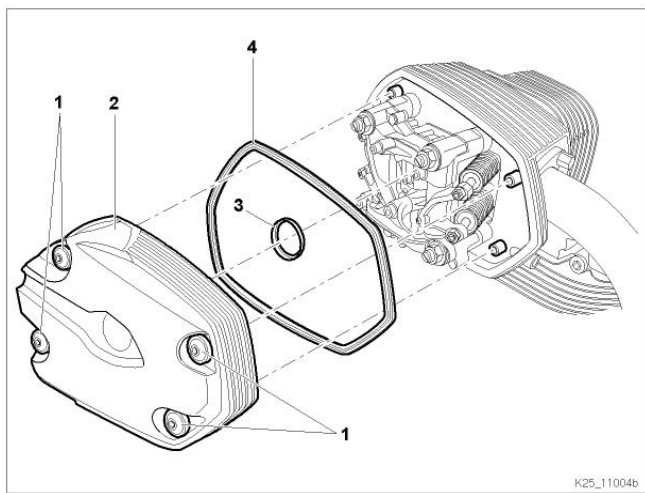
- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.


(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).

📄 Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

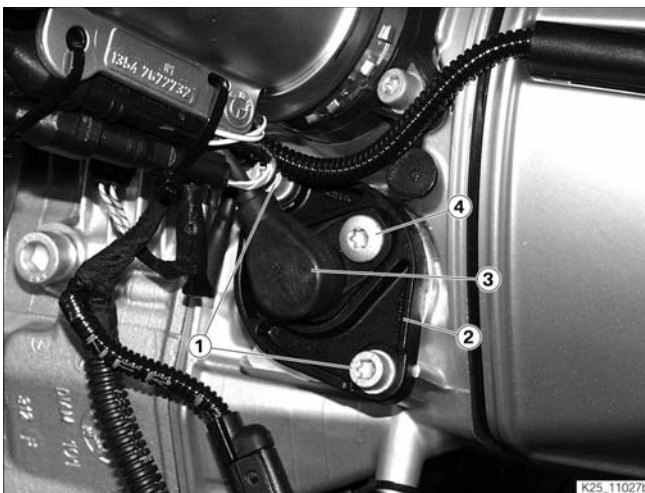


 Technical data			
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	

- Remove gaskets (3) and (4).

(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.





(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.

(-) Removing trigger for camshaft sensor

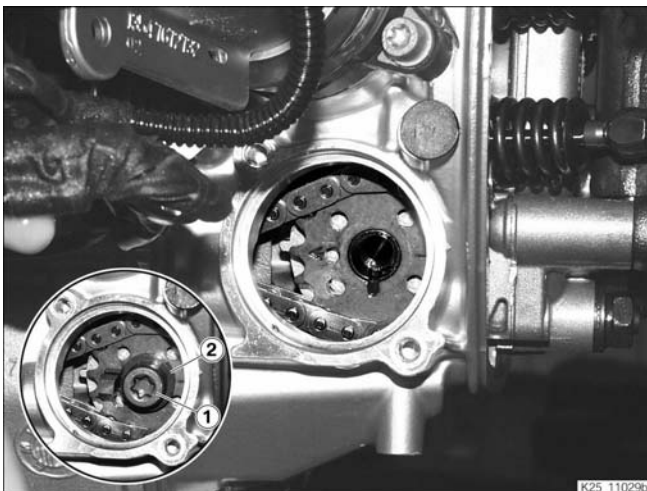
- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with trigger for camshaft sensor (2).



(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

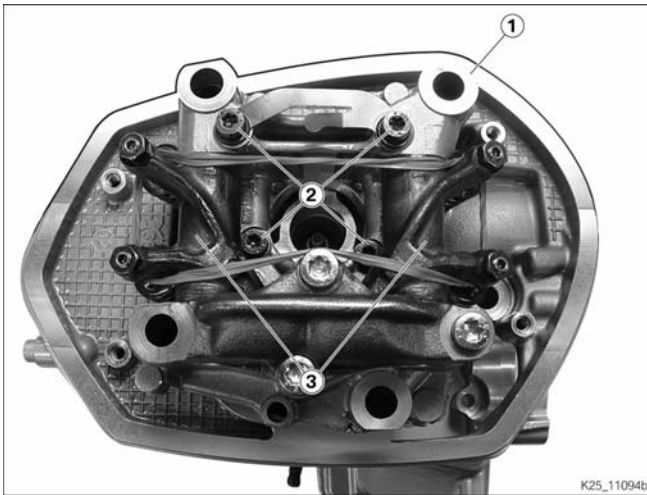
When the engine is being reassembled, it is easier to set

the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

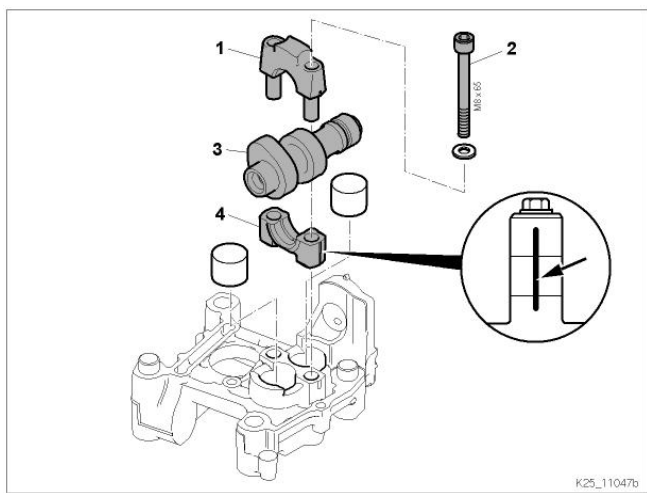
(-) Removing timing-gear carrier

- Use a rubber band to hold rocker arm (3).
- Remove screws (2).
- Release timing-gear carrier (1) by tapping it lightly with a plastic-faced hammer and remove.



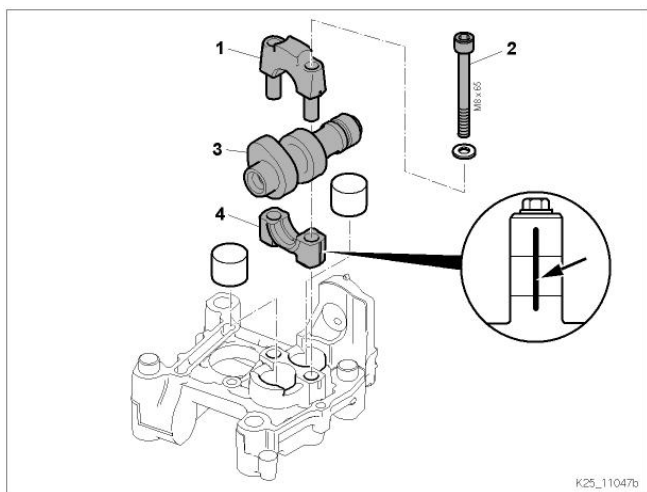
(-) Removing camshaft


- Remove screws (2).
- Remove bearing cap (1).
- Remove camshaft (3).
- Remove step-bearing cap (4).



(-) Installing camshaft

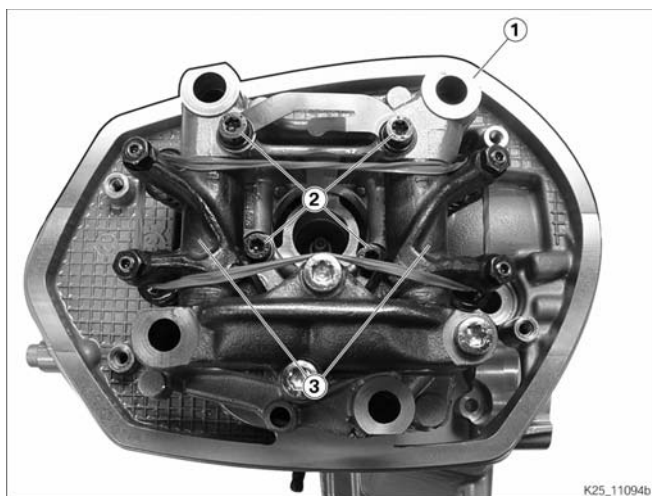
- Position step-bearing cap (4) on the timing-gear carrier, noting the position of the mark (arrow).
- Install oiled camshaft (3).
- Install bearing cap (1), noting the position of the mark (arrow).
- Install screws (2).



 Tightening torques		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 30	19 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	

Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	
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(-) Installing timing-gear carrier



- Install timing-gear carrier (1), making sure that the reamed sleeves of the timing-gear carrier are perfectly aligned with the holes in the cylinder head.
- Install screws (2), noting the different lengths of the screws.

Tightening torques		
Timing-gear carrier to cylinder head left/right, M6 x30	8 Nm	
Timing-gear carrier to cylinder head left/right, M6 x 60	8 Nm	

- Remove the rubber bands securing the rocker arms.

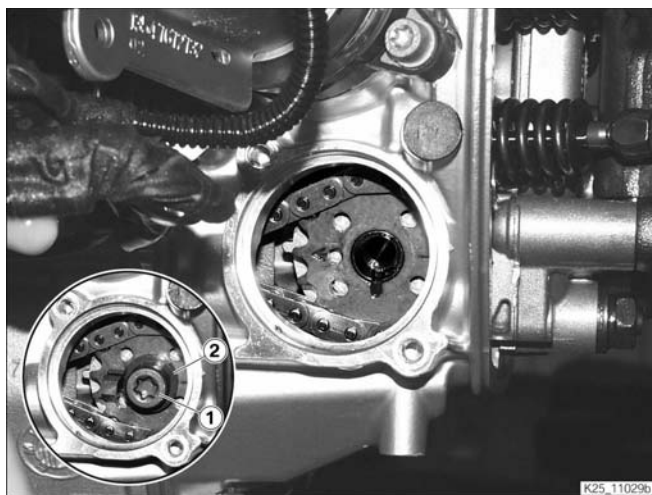
(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.

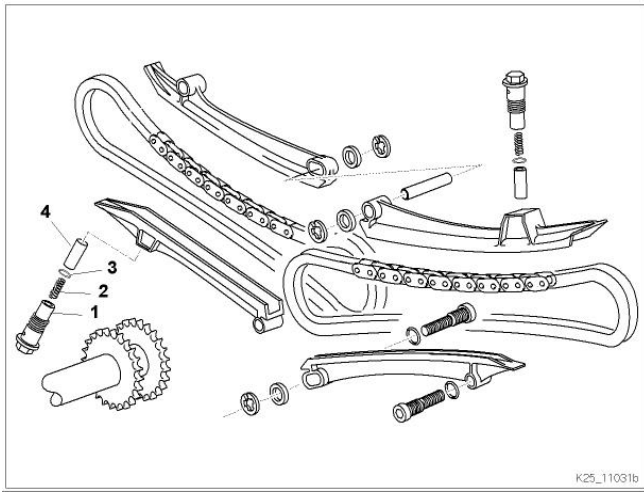


▶ Installing right timing chain tensioner


Precondition

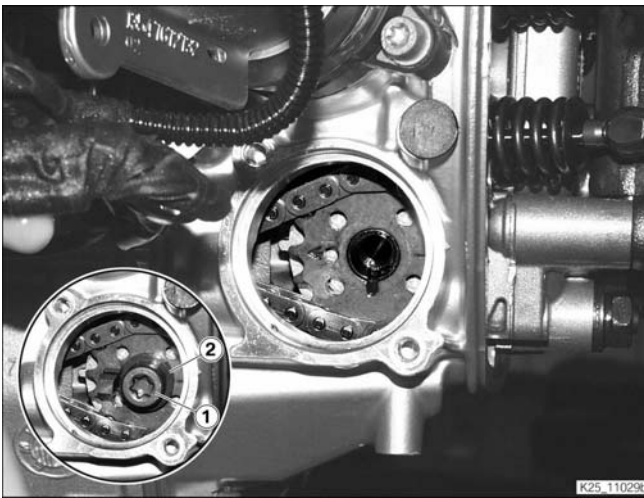
-

Make sure that the camshaft sprocket is correctly positioned on the camshaft.




- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

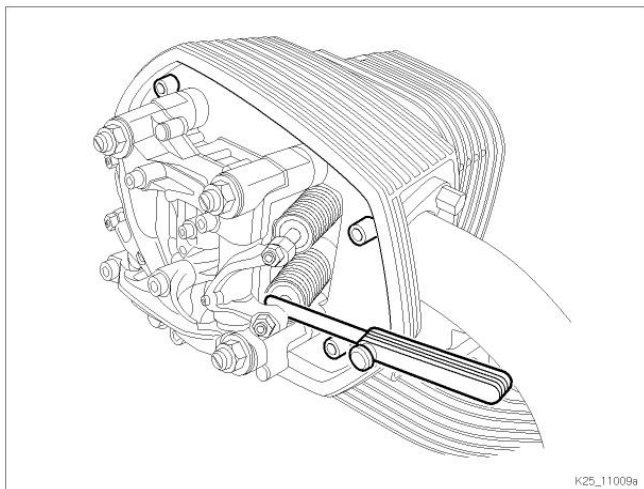
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

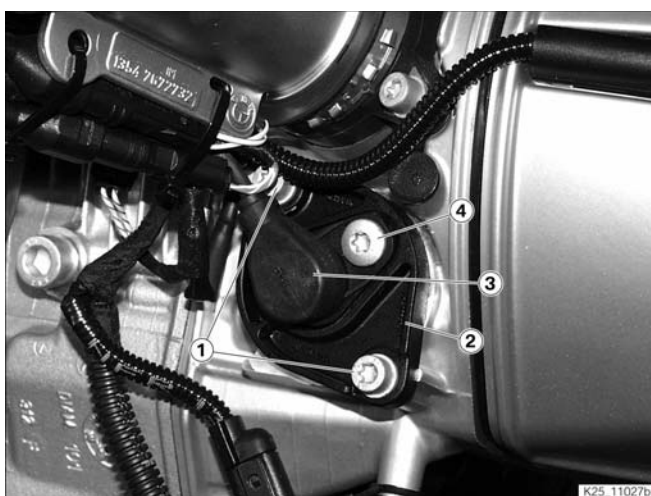
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



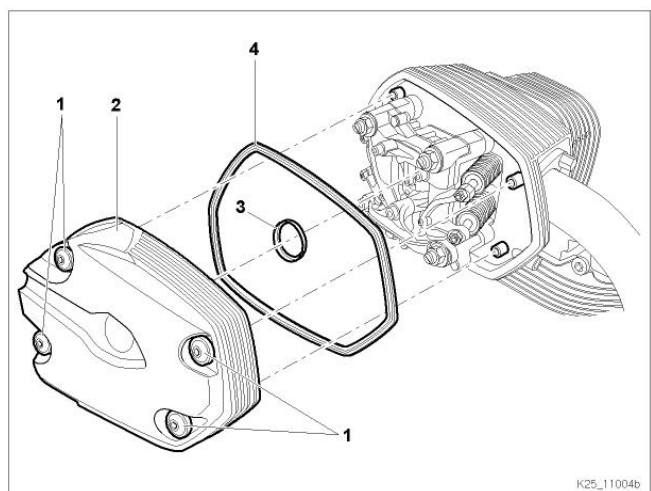
 **Attention**

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.


Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

(-) Installing cylinder head cover

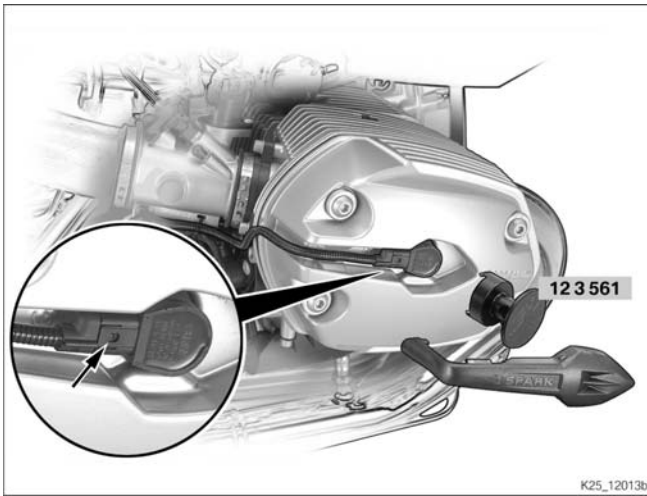


- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.



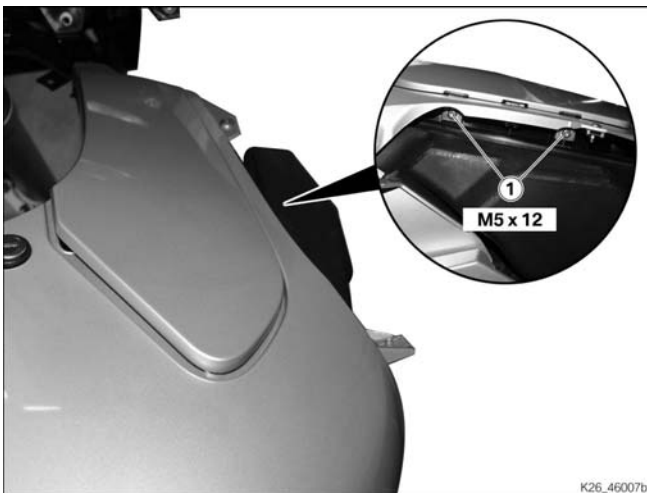
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



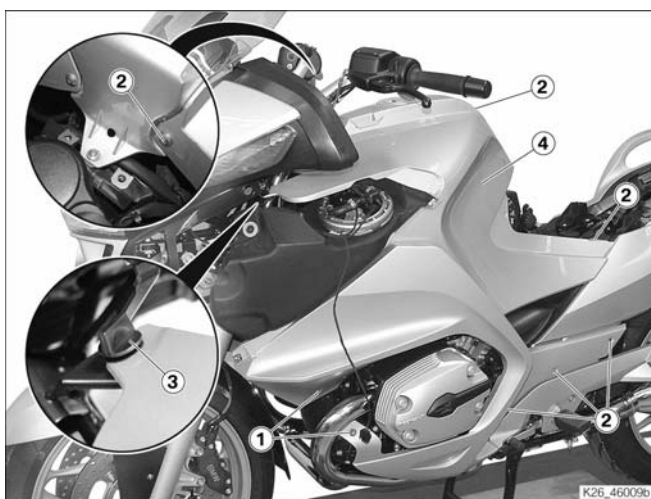
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

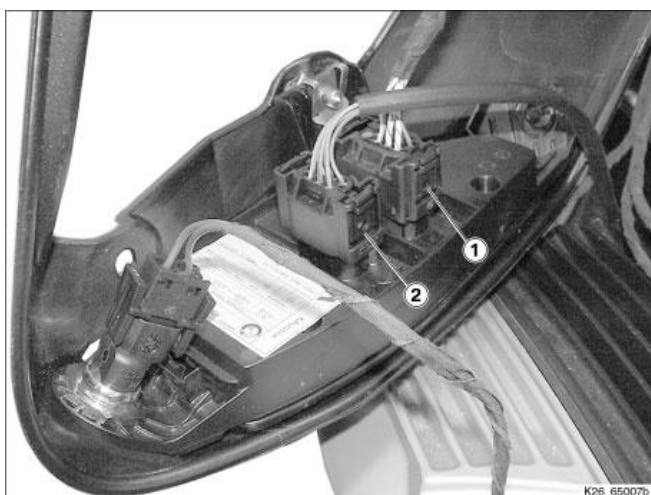
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



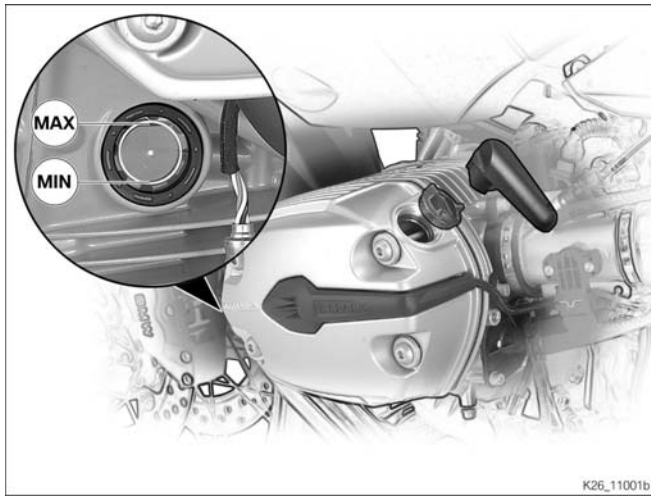
(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



Technical data

Technical data			

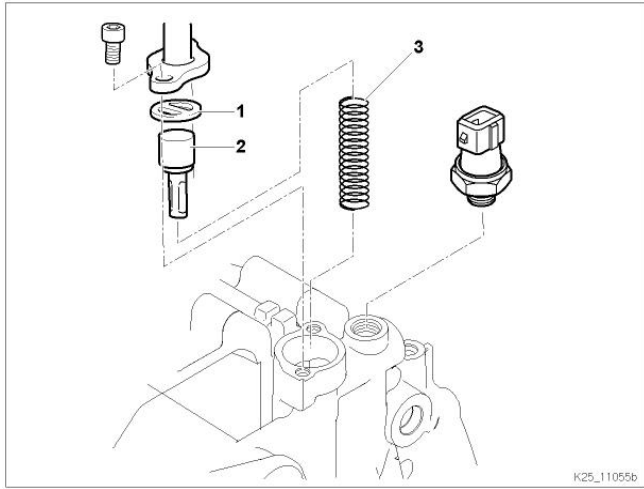


K26_11001b

Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

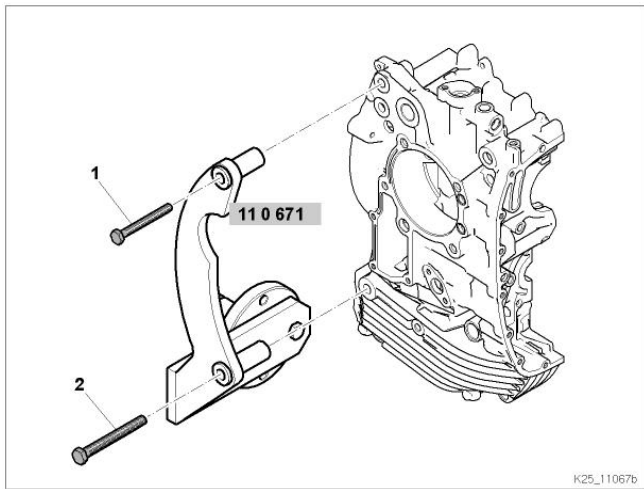
11 31 770 Replacing timing chains, countershaft / camshaft (engine removed)

(-) Removing oil thermostat



- Remove supporting plate (1), control element (2), and spring (3).

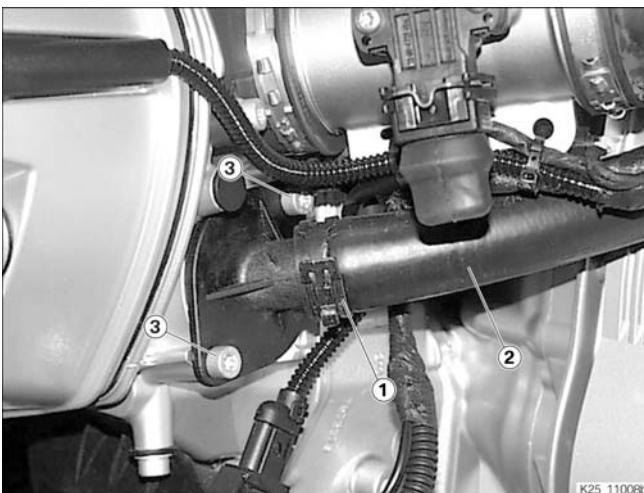
(-) Securing engine holder to right half of engine block



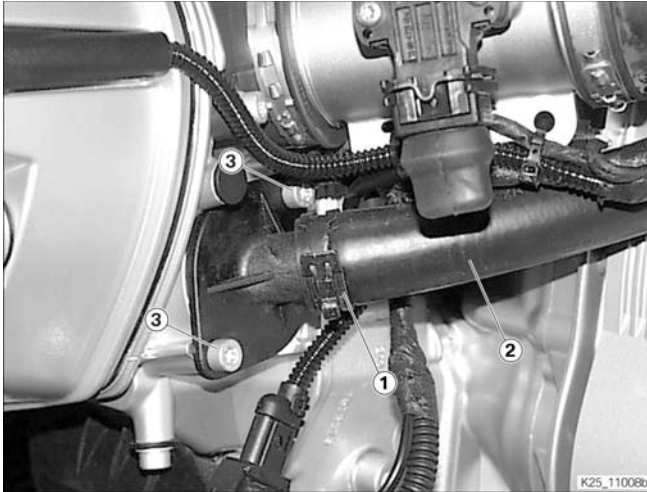
- Position engine holder (No. 11 0 671) at the right half of the engine block.
- Install screws (1) and (2).

(-) Removing left camshaft cover

► Disconnecting hose for crankcase breather

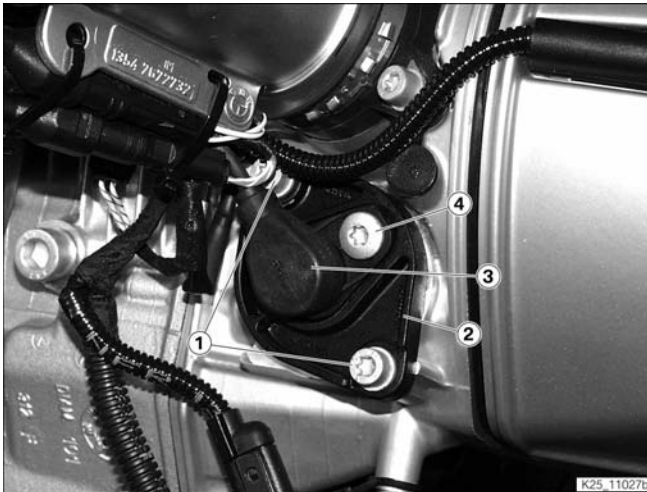


- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



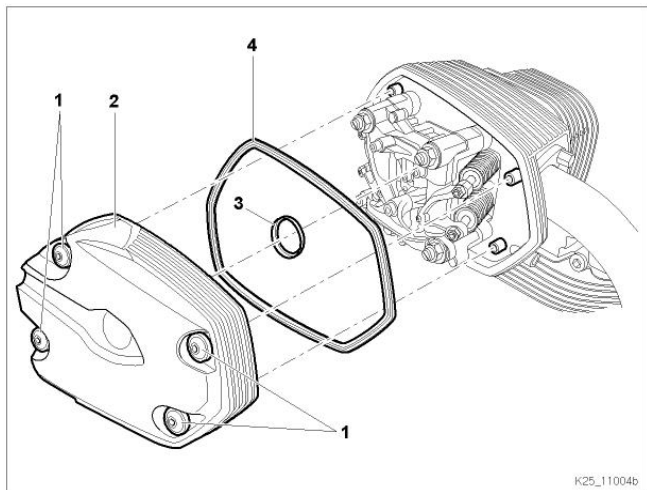
- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.

(-) Removing right camshaft cover



- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.

(-) Removing cylinder head covers




- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head covers (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.

 Technical data			
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	

- Remove gaskets (3) and (4).

(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



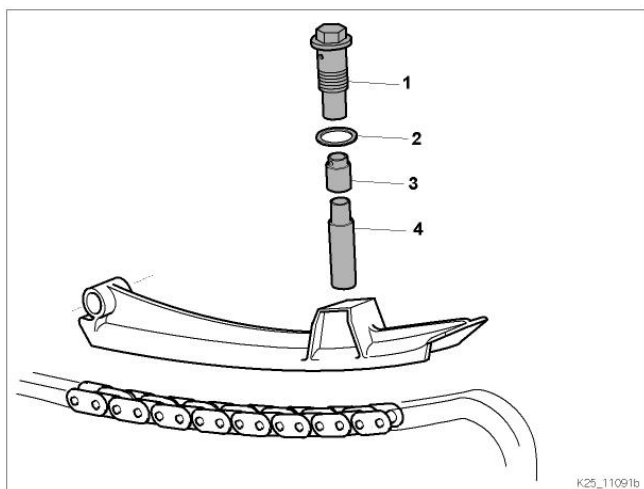
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

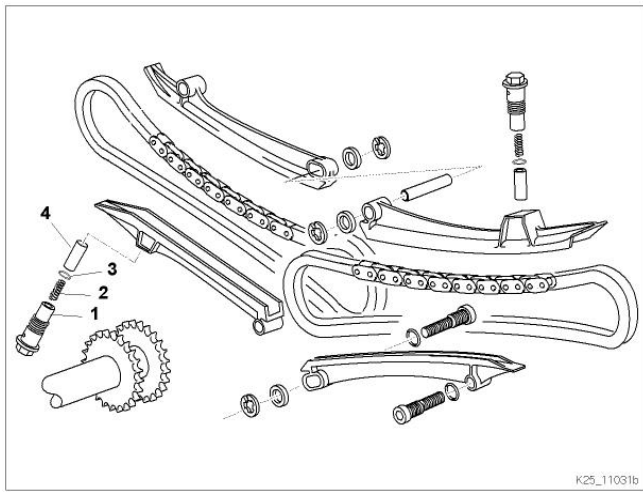
(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



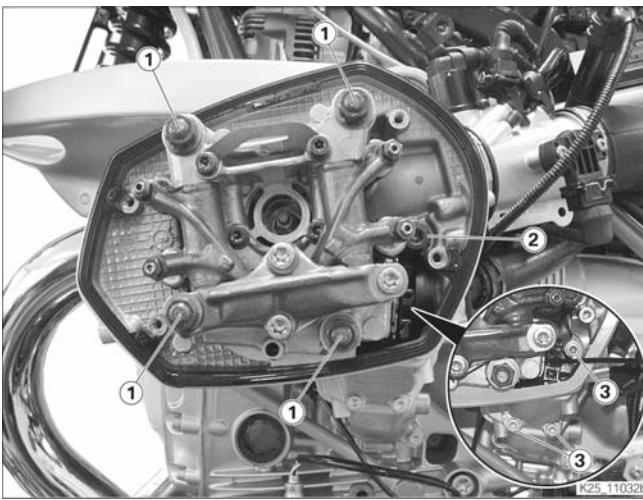
(-) Removing right chain tensioner

- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.



- manner.
- Remove spring (2) and piston (4) from the cylinder.

(-) Removing left cylinder head



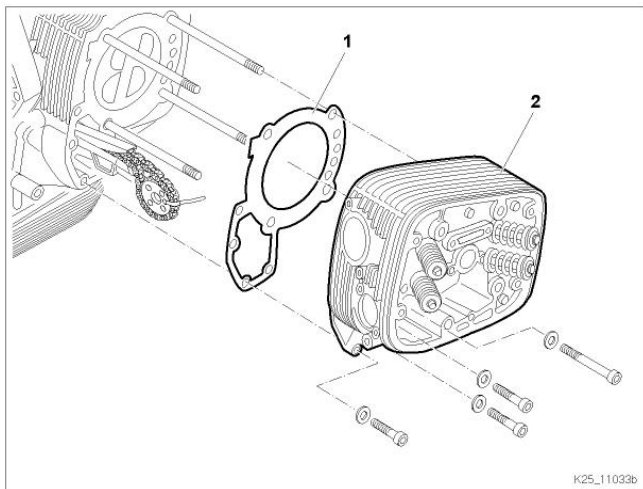
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.

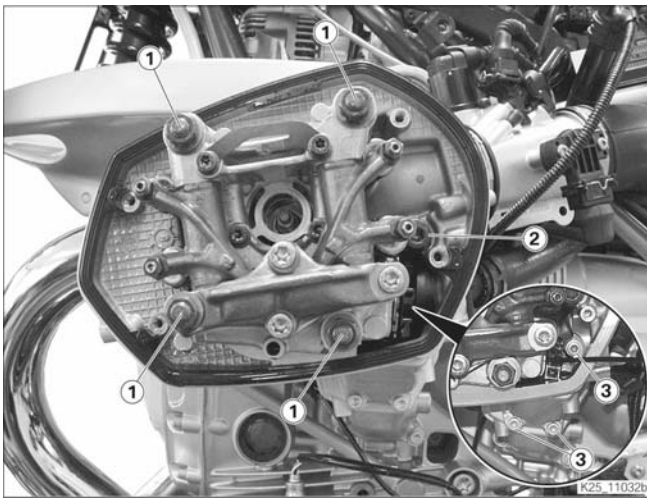
(-) Removing right cylinder head

- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



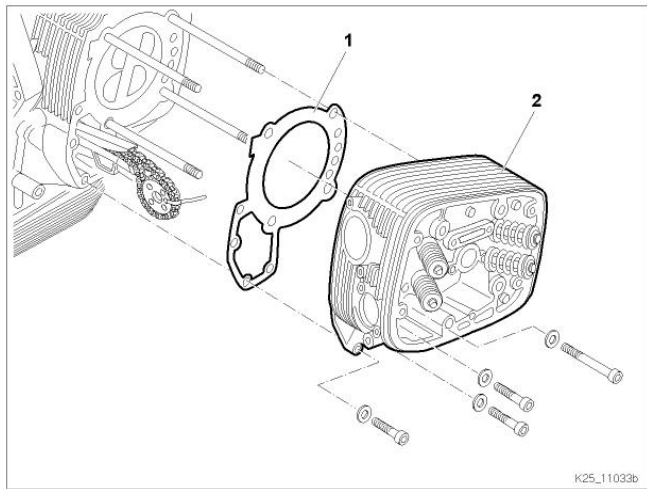
Note

When removing and installing the screws in the chain

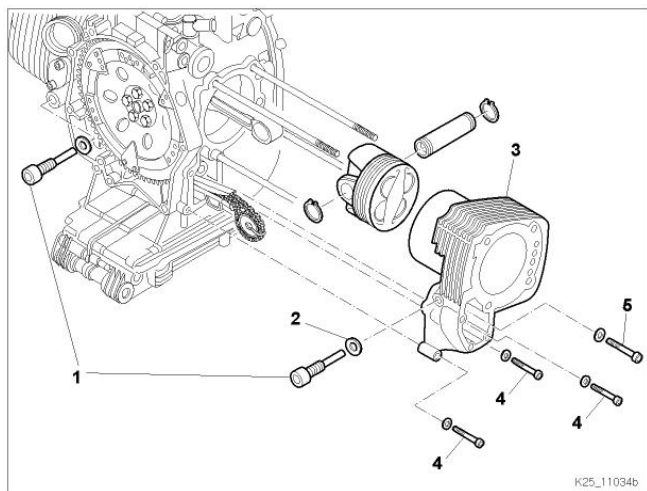


cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing left cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

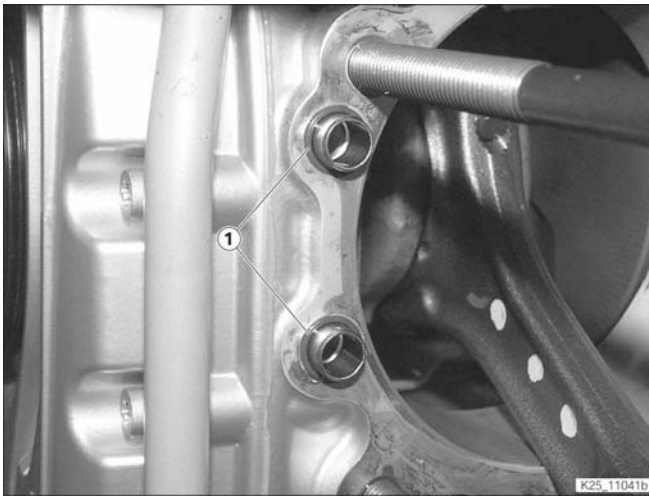
Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

- Pull the cylinder outward to remove.

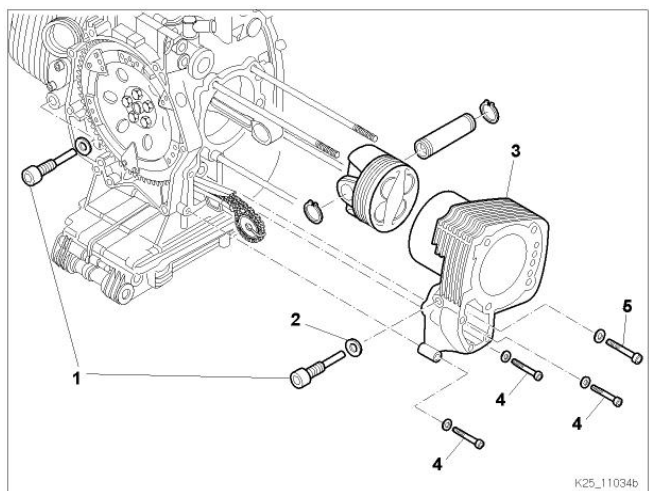


Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.



- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



(-) Removing right cylinder

- Remove pivot screw for timing-chain slide rail (1) and dispose of seal (2) in the approved, environmentally compatible manner.
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Attention

Nature: The piston can be damaged if it is allowed to drop against the crankcase.

Avoidance: Use your hand to guide the piston when removing the cylinder, and take care when laying down the assembly.

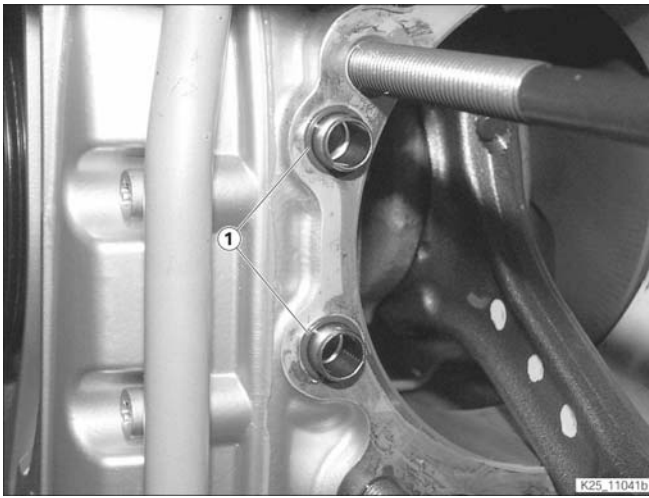
- Pull the cylinder outward to remove.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs or other parts of the crankcase.

- Remove O-rings (1) and dispose of them in the approved, environmentally compatible manner.



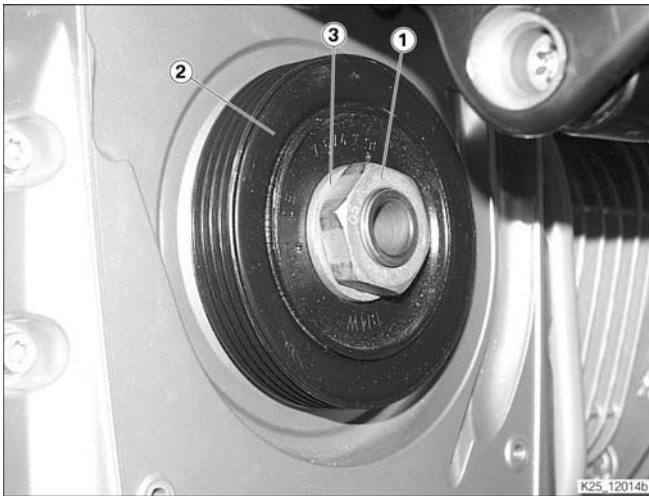
(-) Removing crankshaft belt pulley

Precondition

- Engine locked.



- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.



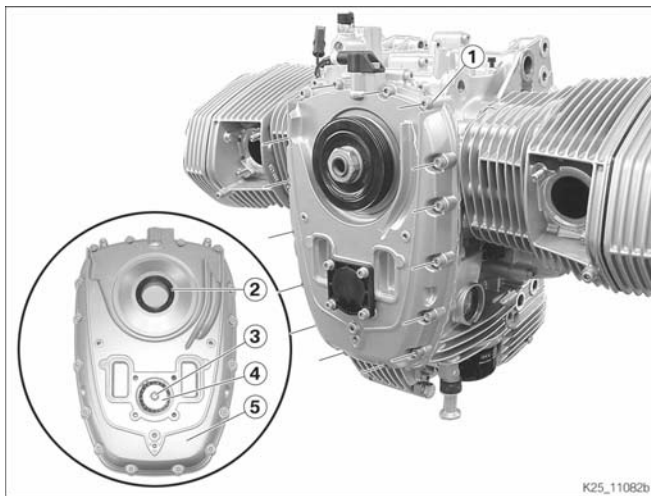
(-) Removing cover for counterbalance shaft

- Remove screws (1) and remove cover.

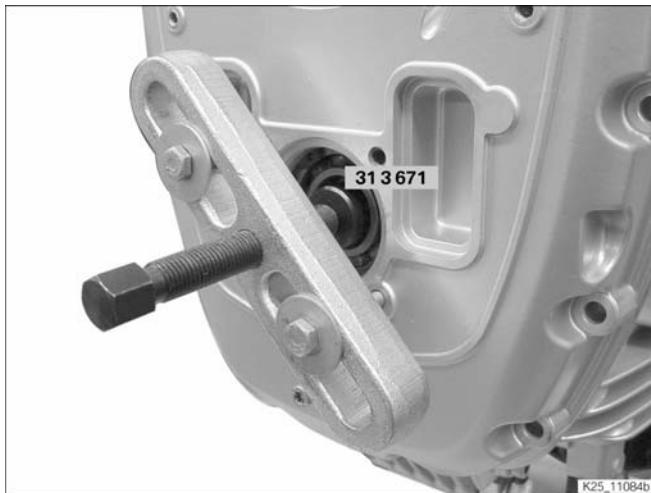


(-) Removing time case cover

- Remove screw (3) and washer (4).



- Remove screws (1).



- Install the puller and thrust piece (No. 31 3 671) .
- Remove the timing case cover, noting the inductive sensor of the crankshaft, which is still fixed in position.



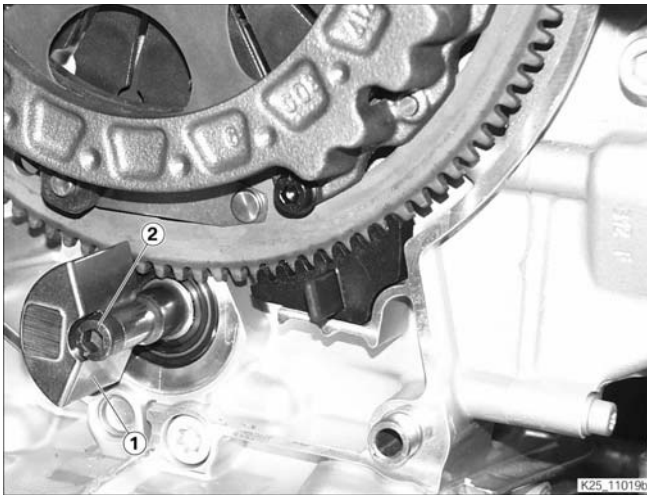
► **Releasing crankshaft inductive sensor from timing case cover**

- Remove screw and remove crankshaft inductive sensor (2) from the timing case cover.





- Remove puller and thrust piece (No. 31 3 671) .

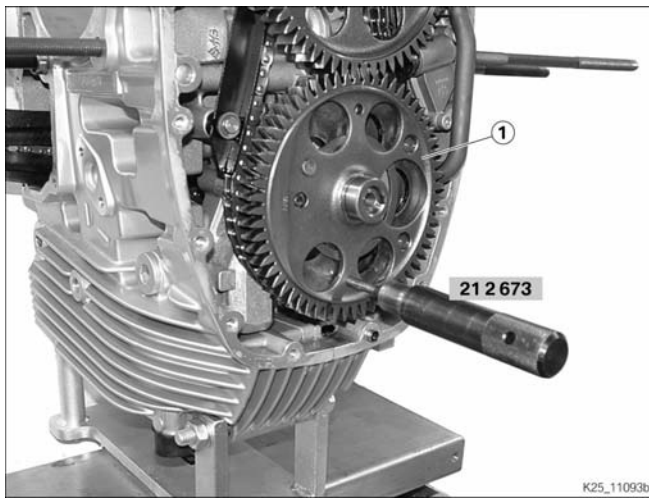


(-) Removing balance weight

- Remove screw (2) from the balance weight.
- Pull balance weight (1) back and off the counterbalance shaft.

(-) Removing tensioning wheel

- Use clutch centring pin (No. 21 2 673) to fix the tensioning wheel in position.
- Remove tensioning wheel (1).



(-) Removing counterbalance shaft

- Pull balancing shaft (1) to the rear to remove.



(-) Removing drive gear on counterbalance shaft

- Tighten nut (1) until hand-tight.



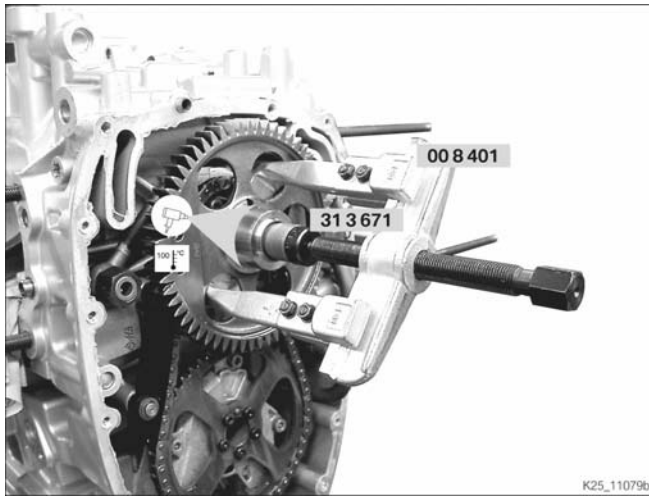
- Install puller (No. 00 8 401) and thrust piece (No. 31 3 671) and pretension.



Attention

Nature:

Once the gear has been heated it can



work loose suddenly and damage components in the vicinity.

Avoidance: Cover components in the vicinity and protect them against damage.

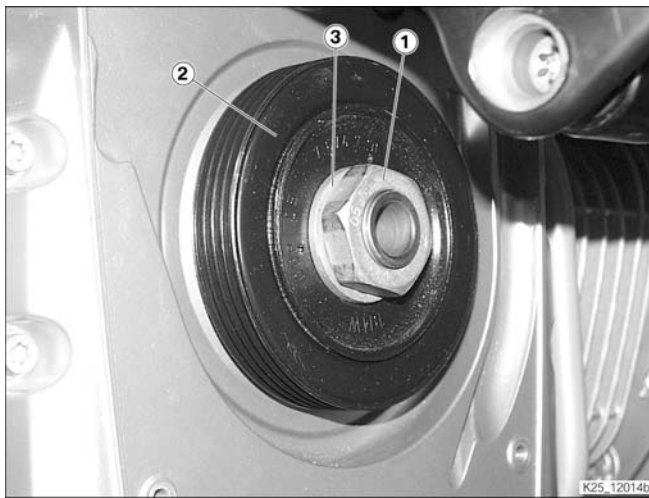
- Heat the drive gear for the balancing shaft at the crankshaft and tap it to release.



Technical data

Release temperature, drive gear for balancing shaft on crankshaft

80 °C



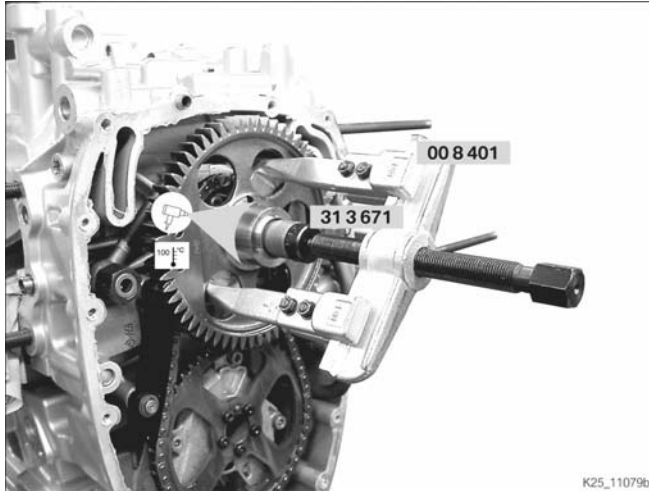
- Remove nut (1).



Warning

Nature: Heated/hot parts can cause burns.

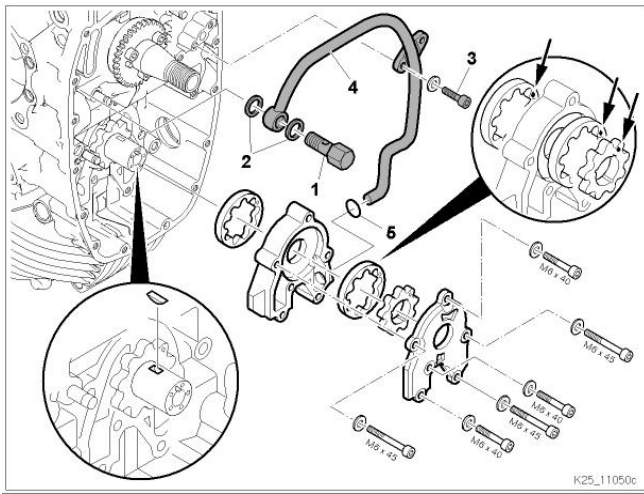
Avoidance: Wear protective gloves when handling heated parts.



- Remove the drive gear for the balancing shaft and remove puller (No. 00 8 401) and thrust piece (No. 31 3 671).

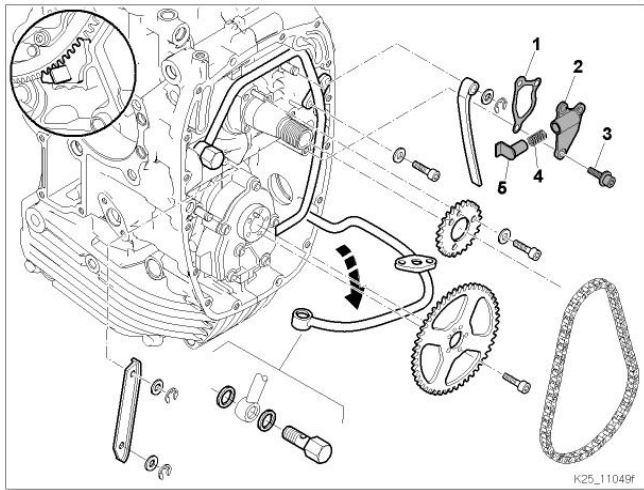
(-) Removing cooling oil line

- Remove banjo bolt (1) with sealing rings (2).
- Remove screws (3).
- Swing cooling oil line (4) forward and remove.
- Remove O-ring (5).



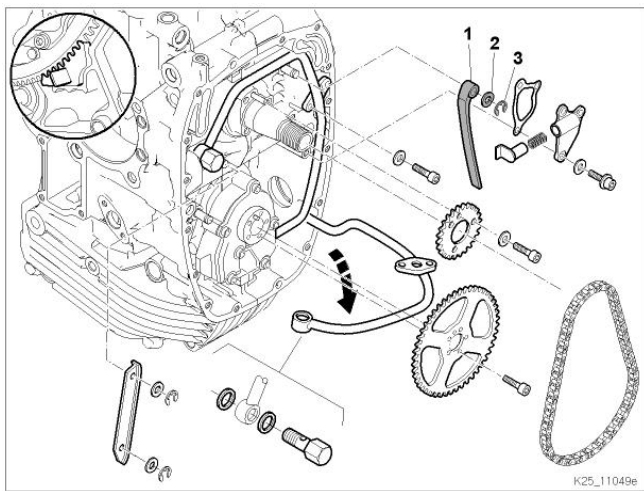
(-) Removing timing chain tensioner, crankshaft/auxiliary shaft

- Remove screws (3).
- Remove housing (2) with spring (4) and piston (5).
- Remove seal (1).



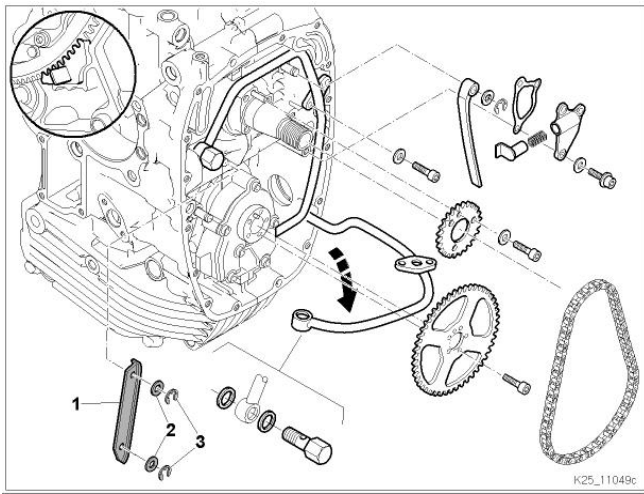
(-) Removing timing chain tensioner rail, crankshaft/auxiliary shaft

- Remove retaining washer (3) and lift off spacer (2).
- Remove timing-chain tensioning rail (1).



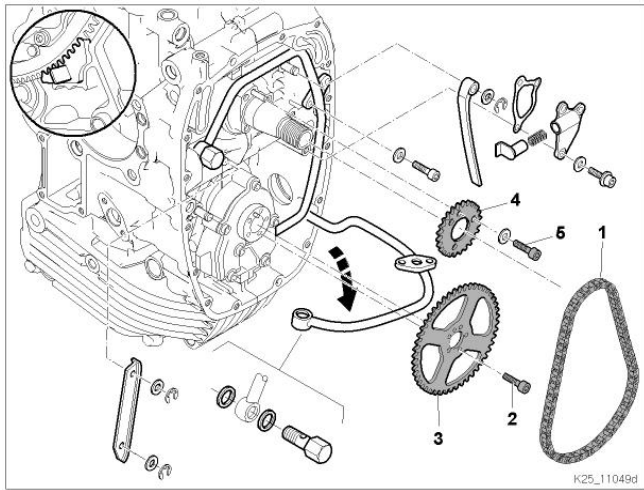
(-) Removing timing chain guide rail, crankshaft/auxiliary shaft

- Remove retaining washers (2) and lift off spacers (3).
- Remove timing-chain guide rail (1).



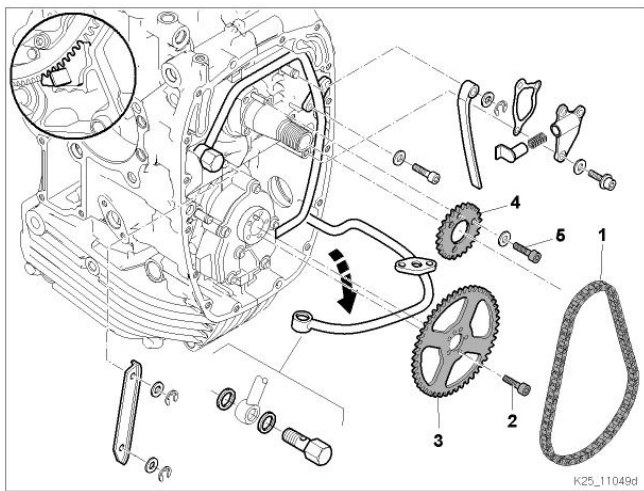
(-) Removing timing chain, crankshaft/auxiliary shaft

- Remove screws (2).
- Remove timing chain (1) with sprocket of countershaft (3).



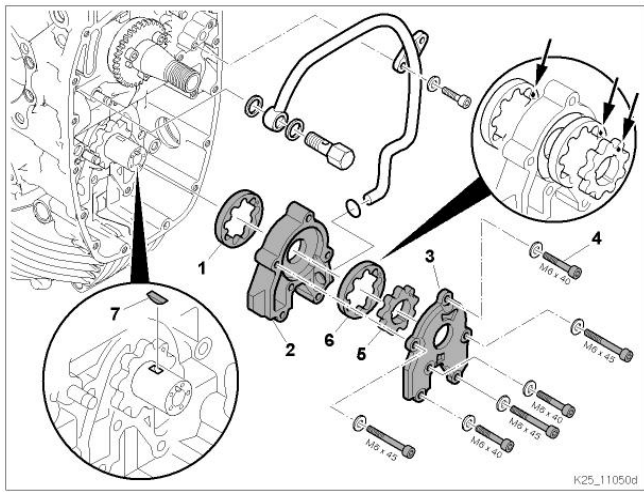
(-) Removing timing-chain pinion from crankshaft

- Remove screws (5).
- Remove timing-chain pinion (4).



(-) Removing oil pump

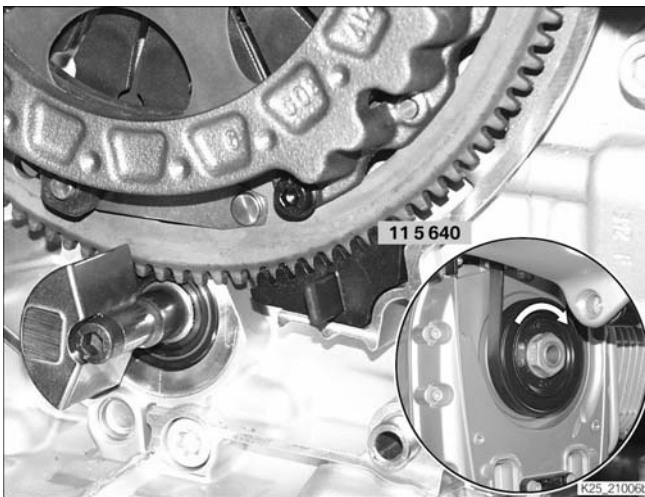
- Remove screws (4).
- Remove oil-pump cover (3).
- Remove outer rotor for cooling oil (6) and inner rotor



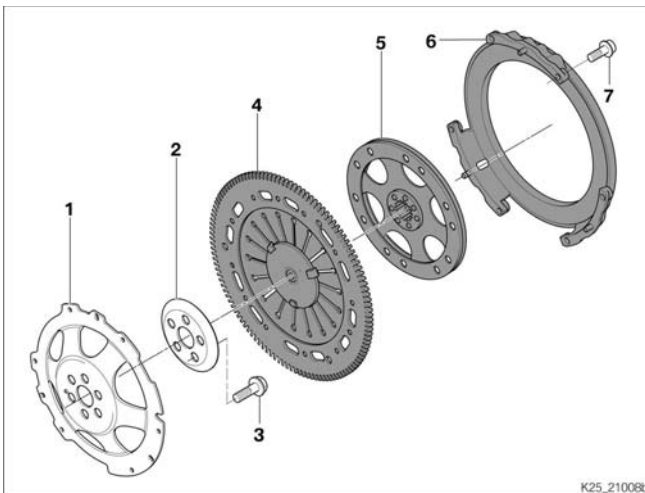
for cooling oil (5).

- Remove oil-pump housing (2) with outer rotor for lube oil (1).

(-) Removing clutch



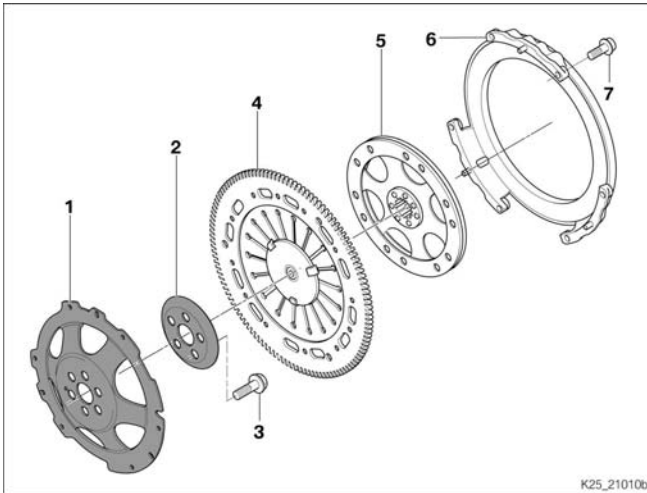
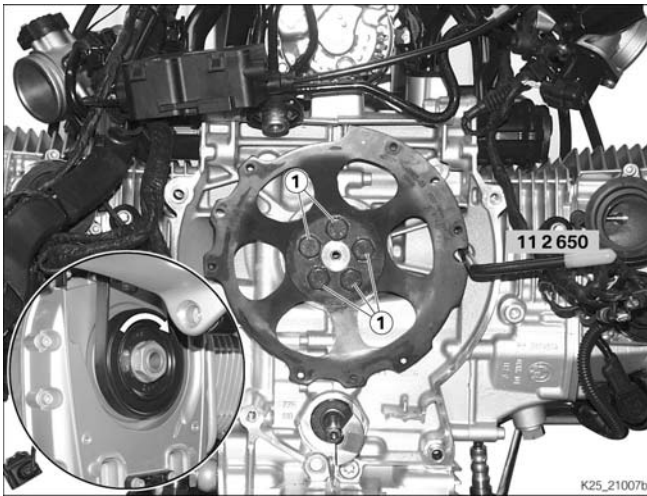
- By means of the belt pulley, turn the engine in the normal direction of rotation until the engine locking device can be inserted.
- Insert engine locking device (No. 11 5 640) .



- Working in diagonally opposite sequence, loosen screws (7) in stages.
- Remove engine locking device (No. 11 5 640) .
- Remove the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6).

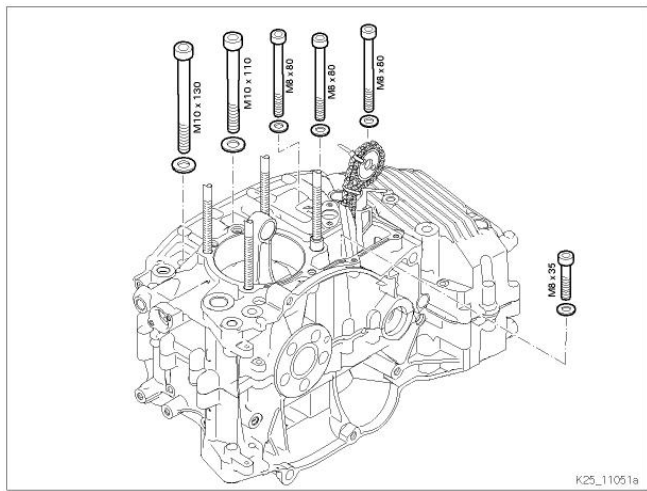
(-) Removing clutch housing

- By means of the belt pulley, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .



- Remove screws (3).
- Remove clutch housing (1) and reinforcing plate (2).
- Remove TDC locating pin (No. 11 2 650) .

(-) Removing left half of engine casing



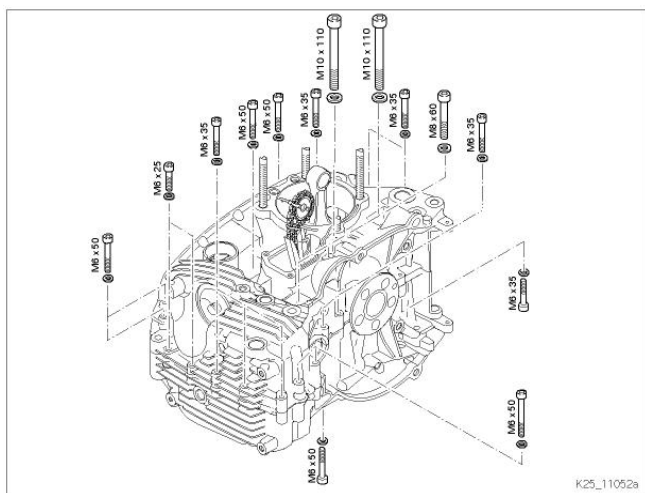
- Turn engine to side position.
- Remove the screws on the right-hand side.

- Turn engine to side position.
- Remove the screws on the left-hand side.



Note

The sealing compound forms a strong bond and in some instances engine components can be difficult to separate. Separate the engine components by tapping them with a rubber mallet, without damaging cooling ribs



or other parts of the crankcase.

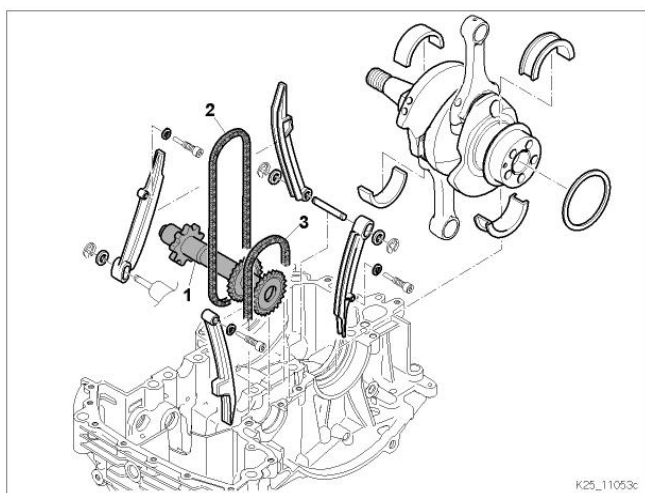
⚠ Attention

Nature: If the engine block is not kept straight during removal and installation, the bearing shells can be damaged.

Avoidance: Do not tilt the engine block when removing and installing.

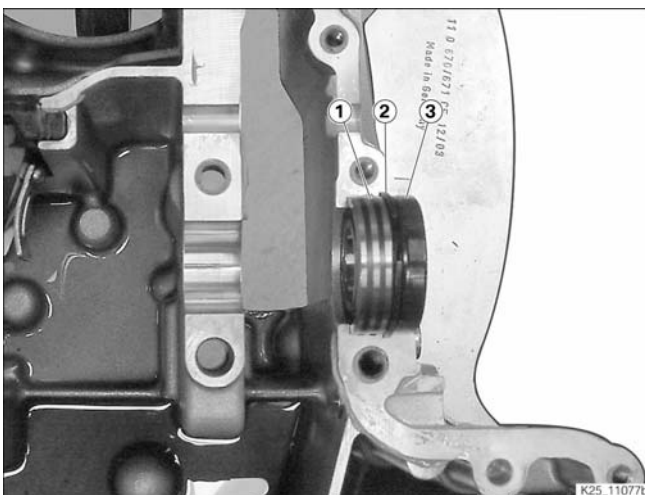
- Remove left half of engine casing.

(-) Removing auxiliary shaft



- Remove auxiliary shaft (1) with both timing chains.
- Remove left timing chain (2) and right timing chain (3).

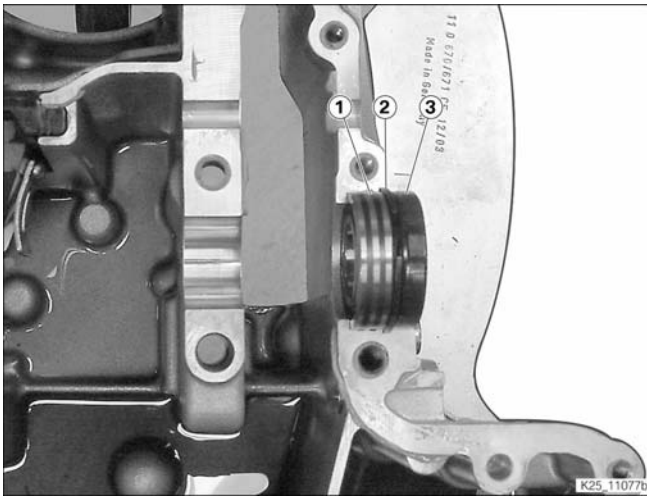
(-) Removing counterbalance shaft on clutch side



- Remove deep groove ball bearing (1).
- Remove circlip (2).

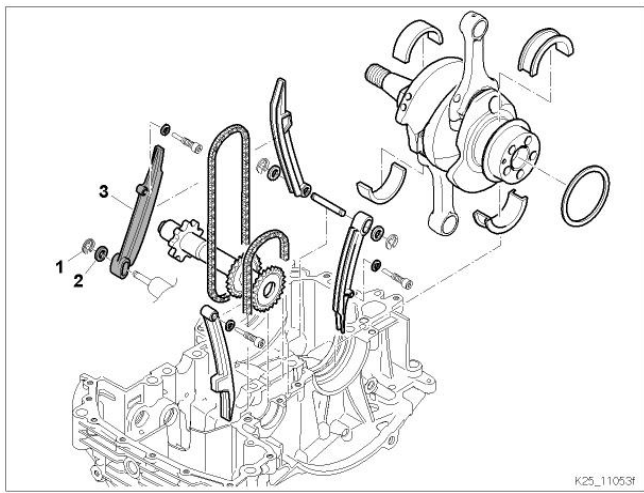
(-) Removing rotary shaft seal, counterbalance shaft

- Remove rotary shaft seal (3).



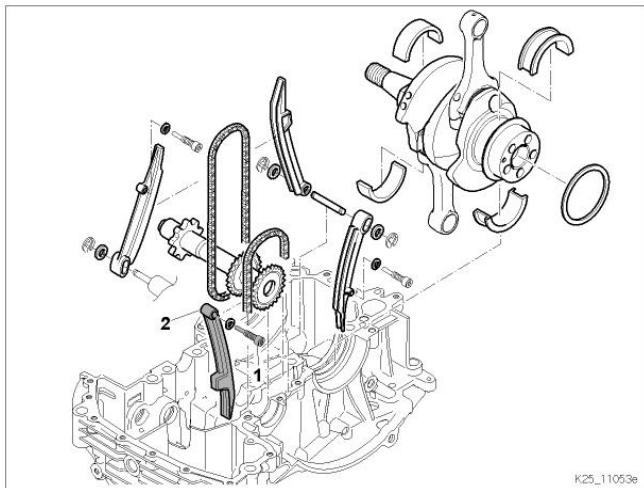
(-) Removing left timing chain slide rail

- Remove retaining washer (1) and spacer (2).
- Remove timing-chain slide rail (3), left.



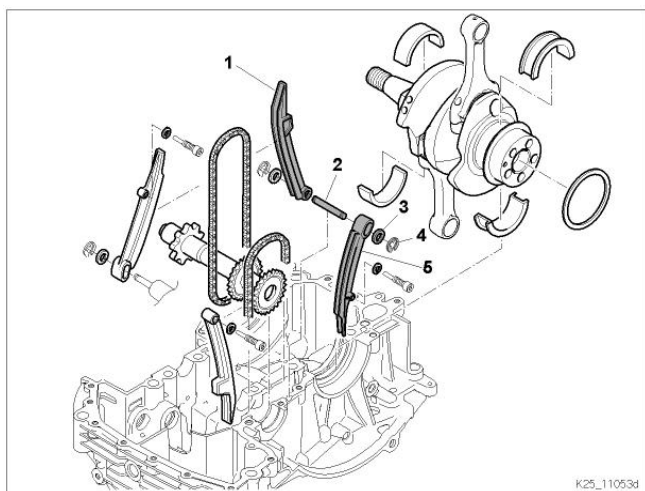
(-) Removing right timing chain tensioning rail

- Remove screw (1).
- Remove right timing chain tensioning rail (2).



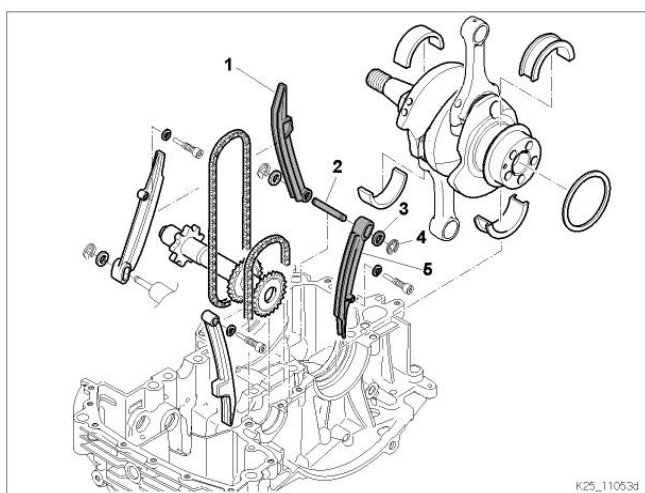
(-) Removing left tensioner rail and right slide rail


- Remove pin (2) with left tensioning rail (1) and right slide rail (5).
- Remove retaining washer (4) and washer (3).
- Remove left tensioning rail (1) and right slide rail (5).



(-) Installing left tensioner rail and right slide rail

- Slip left tensioning rail (1) and right slide rail (5) onto pin (2), making sure that the installed positions are correct.
- Install washer (3) and retaining washer (4).
- Apply sealant to the clean and grease-free bearing face of bearing pin (2).

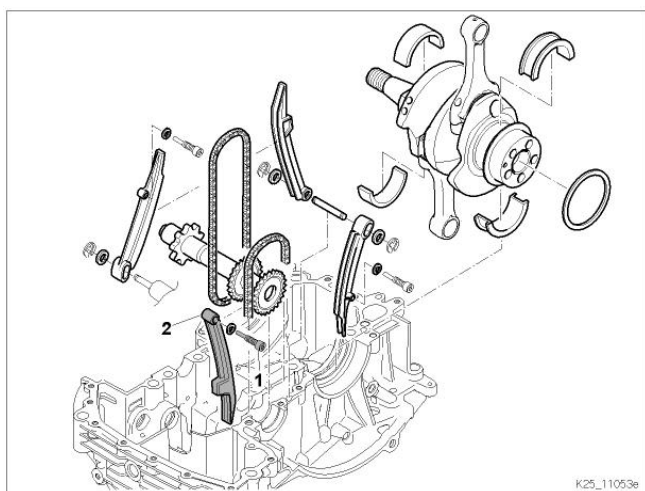



 <p>Consumables/lubricants</p>		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Install pin (2) with left tensioning rail (1) and right slide rail (5).

(-) Installing right timing chain tensioner rail

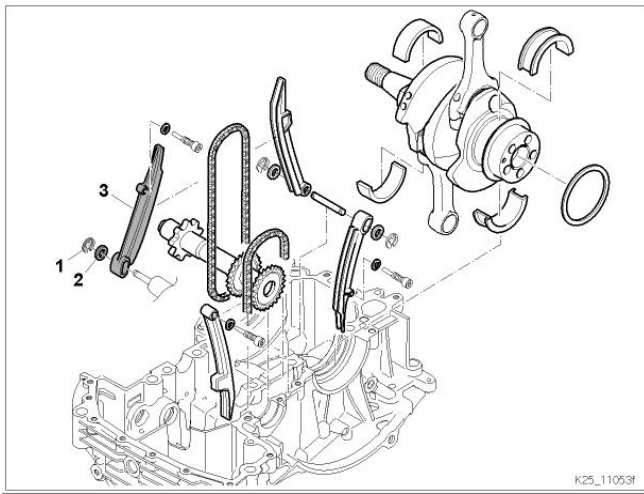
- Fit right timing chain tensioning rail (2) in position.
- Install screw (1).



 <p>Tightening torques</p>		
Mounting screw for timing chain tensioner, crankcase, M10	18 Nm	

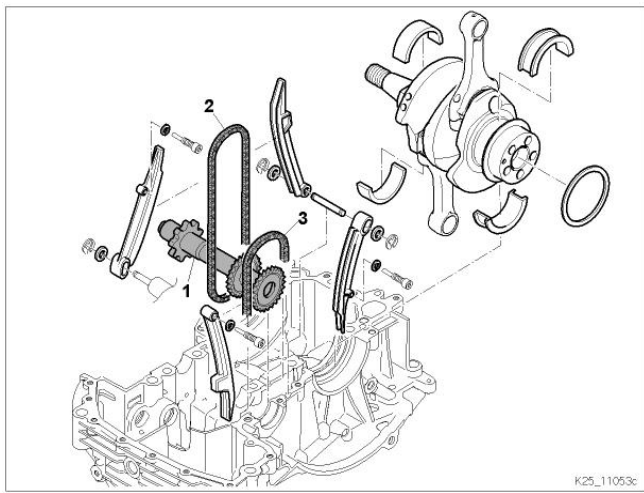
(-) Installing left timing chain slide rail

- Install left timing-chain slide rail (3).
- Install spacer (2) and retaining washer (1).



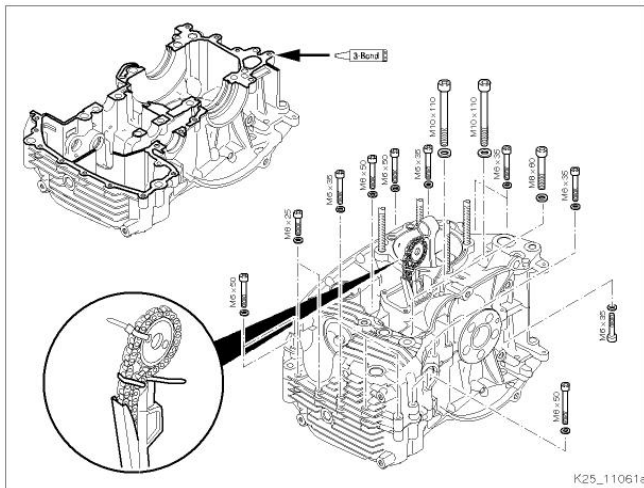
(-) Installing auxiliary shaft


- Check bearing surfaces for damage.
- Oil bearing surfaces.
- Fit left timing chain (2) and right timing chain (3) on auxiliary shaft.
- Install auxiliary shaft (1) together with both timing chains in right half of engine casing.



(-) Installing left half of engine casing

- Secure timing chain with rubber band to timing chain tensioning and slide rail.
- Apply lubricant to the clean and grease-free sealing surfaces.



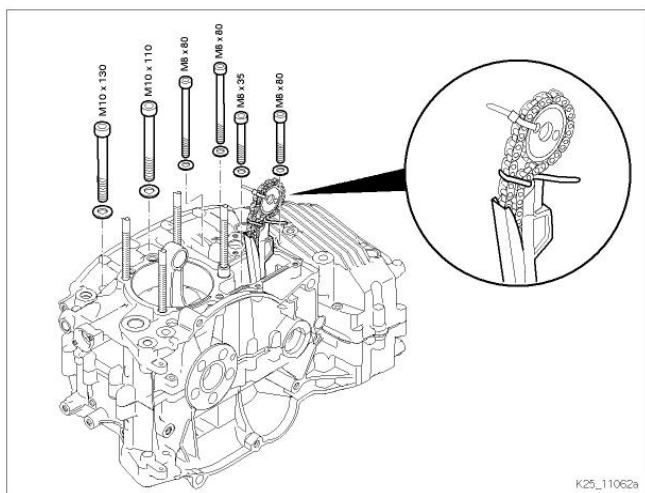
 <p>Consumables/lubricants</p>		
3 - Bond 1209	Surface sealant	07 58 9 062 376


⚠ Attention

Nature: If the engine block is not kept straight during removal and installation, the bearing shells can be damaged.


Avoidance: Do not tilt the engine block when removing and installing.

- Place left half of engine casing in position.
- Install the screws on the left-hand side.




 Tightening torques		
Engine block, M6 x 35	8 Nm	
Engine block, M6 x 50	8 Nm	
Engine block, M6 x 25	8 Nm	
Engine block, M8 x 60, Bolted with sealing ring, A8 x 13 Al	19 Nm	
Engine block, M8 x 35	19 Nm	
Engine block, M10 x 110/130	Initial torque, 25 Nm	
	Final torque, 90 °	

- Turn engine to side position.
- Install the screws on the right-hand side.

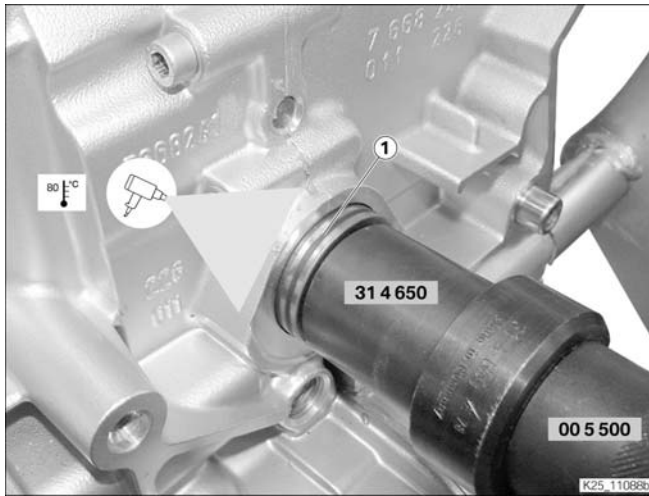
 Tightening torques		
Engine block, M6 x 35	8 Nm	
Engine block, M6 x 50	8 Nm	
Engine block, M6 x 25	8 Nm	
Engine block, M8 x 60, Bolted with sealing ring, A8 x 13 Al	19 Nm	
Engine block, M8 x 35	19 Nm	
Engine block, M10 x 110/130	Initial torque, 25 Nm	
	Final torque, 90 °	

(-) Installing counterbalance shaft on clutch side

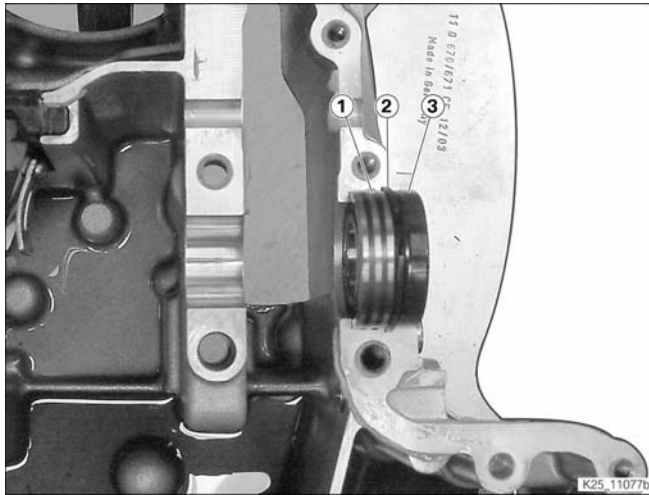
- Heat up engine casing in area of deep groove ball bearing.

 Technical data			
Release/mating temperature		80 °C	

- Fit deep groove ball bearing (1) with handle (No. 00 5 500) and drift (No. 23 4 660) .



- Install circlip (2).



(-) Installing counterbalance shaft

- Install balancing shaft (1) from behind.



(-) Installing rotary shaft seal, counterbalance shaft



Attention

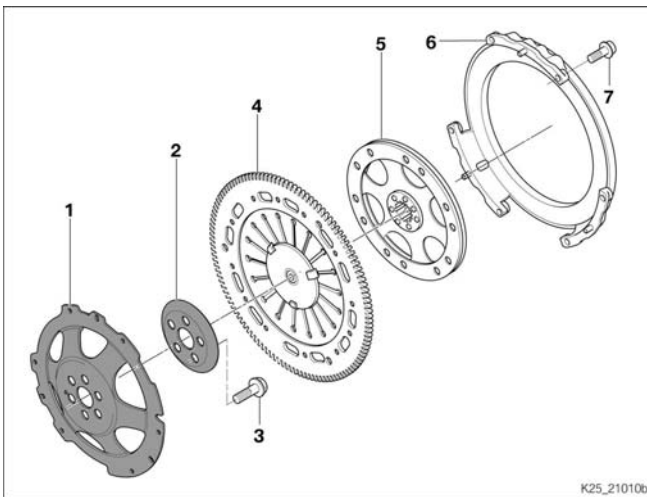
Nature: Incorrect installation of the shaft sealing ring can result in damage to the sealing ring.



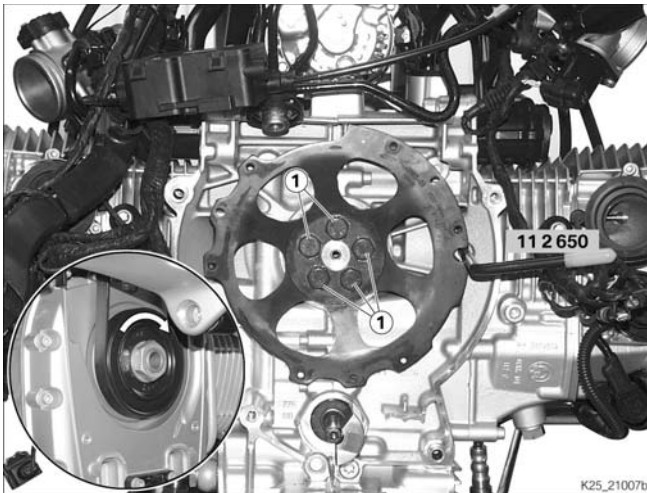
Avoidance: Do not preshape the sealing lip of the shaft sealing ring by hand.
Install the shaft sealing ring dry.

- Using handle (No. 00 5 500) and drift (No. 23 1 770) , drive the rotary shaft seal into the crankcase.


(-) Installing clutch housing



- Install clutch housing (1) with the locating lug engaged in the locating bore of the crankshaft.
- Install reinforcing plate (2) and install screws (3) to hold it in position.



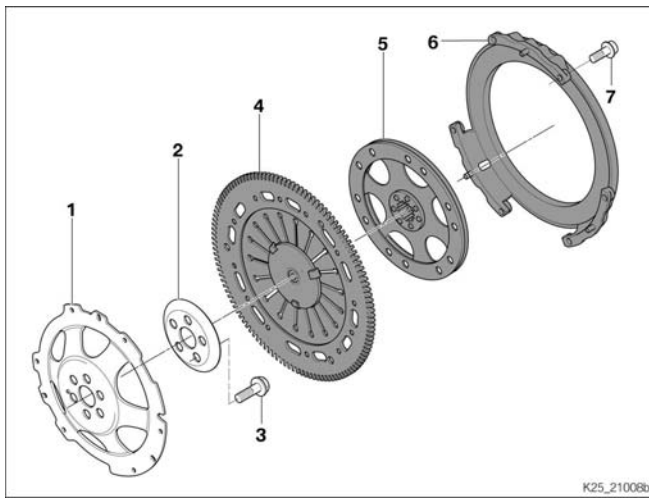
- By means of the clutch housing, turn the engine in the normal direction of rotation until the TDC locating pin can be inserted to lock the clutch housing.
- Insert TDC locating pin (No. 11 2 650) .
- Install new screws (1) and tighten in correct tightening sequence.

 Tightening torques	
Never re-use the original screws, M11 x 1.5 12.9	Threads and underside of head lightly oiled
	Initial torque, 40 Nm
	Final torque, 40 °

- Remove TDC locating pin (No. 11 2 650) .

(-) Installing clutch

- Install the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6) in clutch




housing (1).



Note

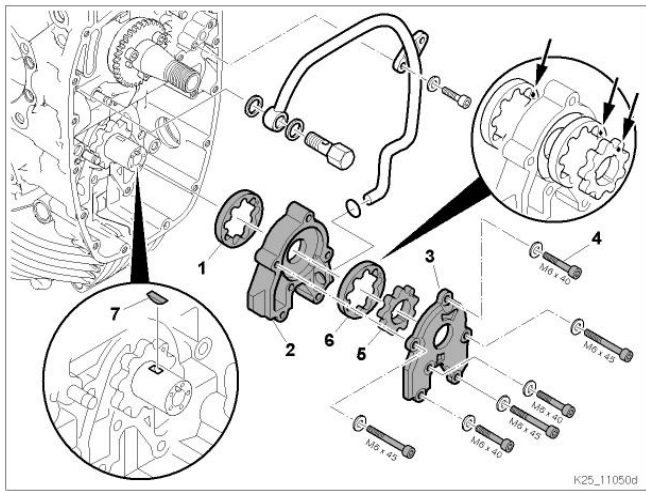
The clutch components are all precision-balanced. It is not necessary to check for identification marks when assembling.

- Insert screws (7).
- Use centering pin for clutch (No. 21 2 673) to centre the clutch plate.
- Insert engine locking device (No. 11 5 640) .
- Install screws (7) and tighten in correct tightening sequence.


 Tightening torques		
Never re-use the original screws, M6 x 20, in diagonally opposite sequence and stage by stage	12 Nm	

- Remove engine locking device (No. 11 5 640) and centering pin for clutch (No. 21 2 673) .

(-) Installing oil pump

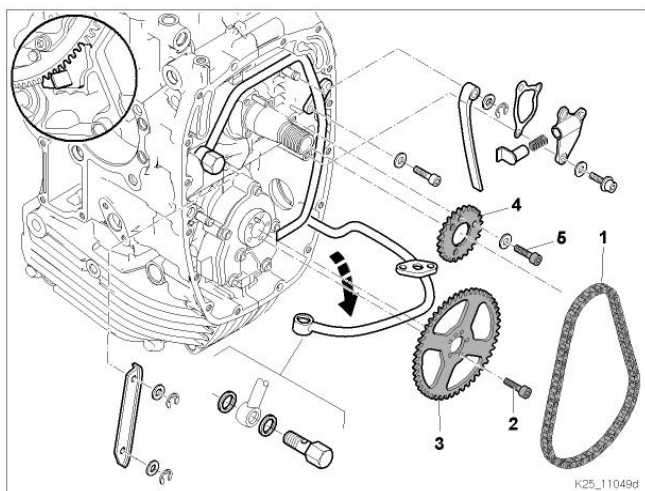


- Ensure Woodruff key (7) is seated correctly.
- Install outer rotor for lube oil (1) in the oil pump housing with the mark (arrow) facing forward. Take care not to mix up the outer rotors.
- Hold oil pump housing (2) in position.
- Install outer rotor for cooling oil (6) with the mark (arrow) facing forward.
- Install inner rotor for cooling oil (5). Make sure that the groove in the inner rotor is in line with Woodruff key (7) of the countershaft and that the mark (arrow) is pointing forward.
- Install new screws (4), noting the different lengths of the screws.

 Tightening torques		
Never re-use the original screws, M6 x 40	Initial torque, 4 Nm	
	Final torque, 90 °	
Never re-use the original screws, M6 x 45	Initial torque, 4 Nm	
	Final torque, 90 °	


(-) Installing timing-chain pinion on crankshaft

- Install timing chain pinion (4), making sure that the



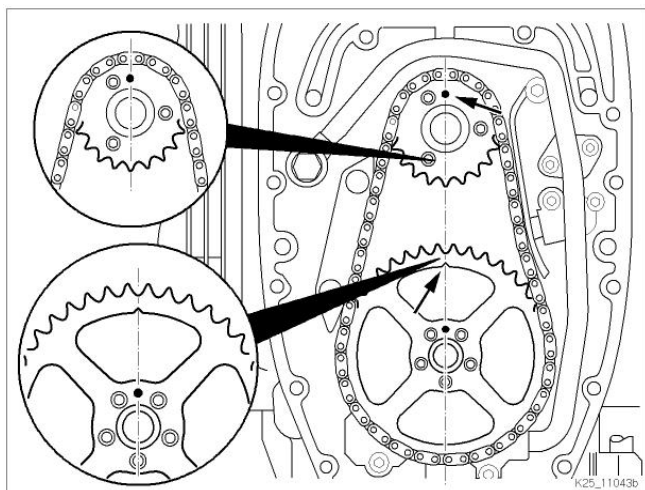
locating pin for the crankshaft engages the hole in the timing chain pinion.

- Install screws (5).

 Tightening torques		
Chain sprocket to crankshaft, M6 x 16	8 Nm	

(-) Adjusting crankshaft and auxiliary shaft to ignition TDC

- Make sure that the crankshaft and countershaft are in the **"firing TDC, right cylinder"** position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



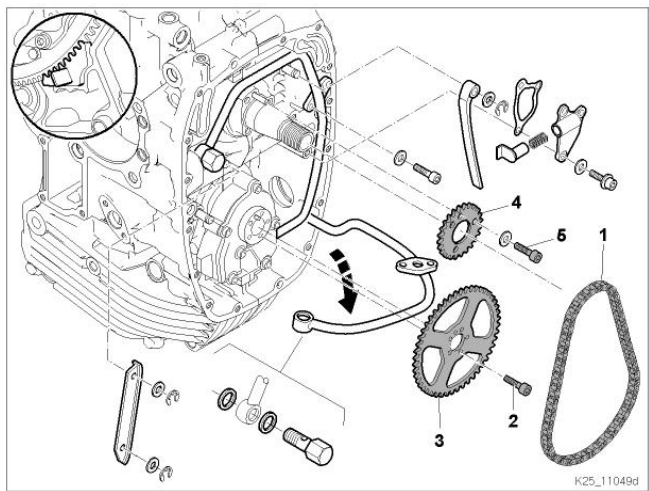
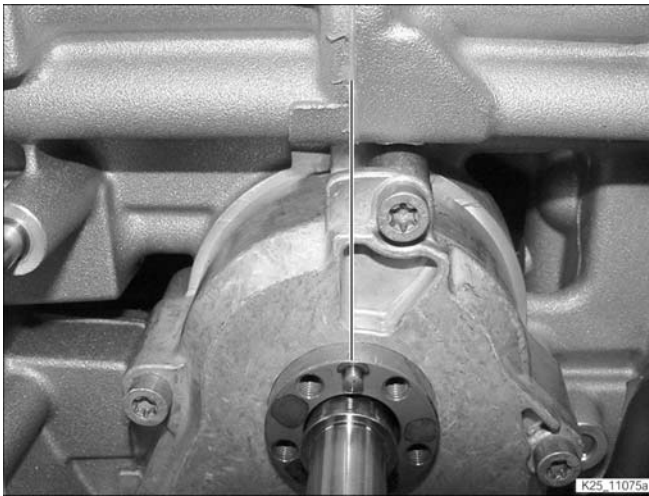
(-) Installing timing chain, crankshaft/auxiliary shaft

Precondition

- The countershaft is at firing TDC for right-hand cylinder, the locating pin of the countershaft is at the top, at the split line between the two halves of the crankcase.



- If necessary, turn the countershaft to firing TDC for the right-hand cylinder, so that the locating pin of the countershaft is at the top, at the split line between the two halves of the crankcase.




! Attention

Nature: Installing the timing chain in the wrong position will result in poor engine performance or cause parts to collide because the valve timing is off

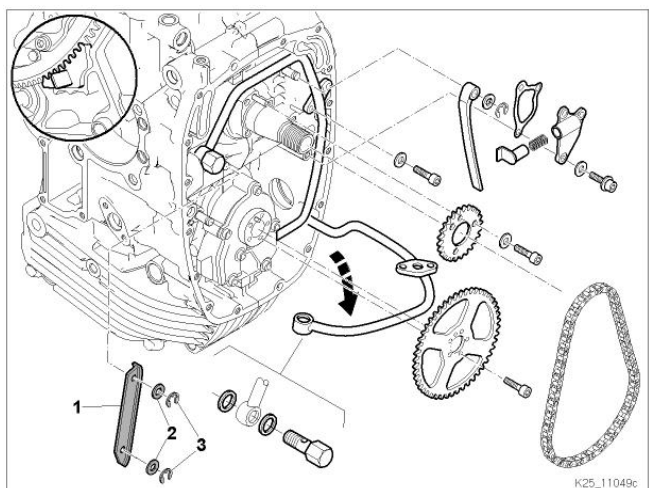
Avoidance: When turning the crankshaft, make sure that the timing chain does not come away from the crankshaft pinion (keep the timing chain taut).

- Install timing chain (1) with countershaft sprocket (3), making sure that the locating pin for the countershaft engages the hole in the countershaft sprocket.
- Install new screws (2).

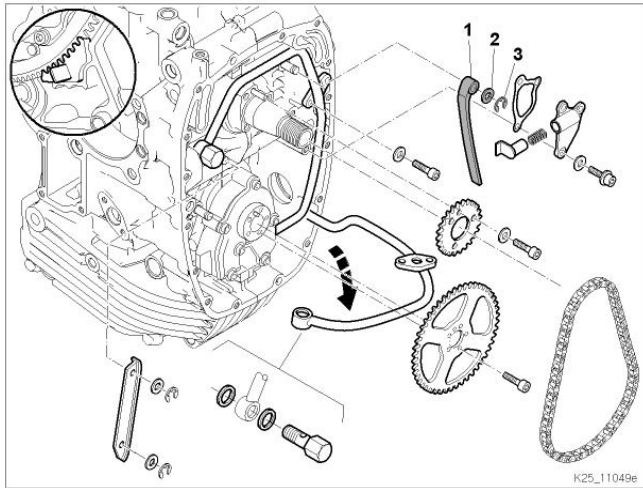
 Tightening torques	
Sprocket to auxiliary shaft, M5 x 16, Replace screws	8 Nm

(-) Installing timing chain guide rail, crankshaft/auxiliary shaft

- Install timing-chain guide rail (1).
- Install spacers (2) and retaining washers (3).



(-) Installing timing chain tensioner rail,

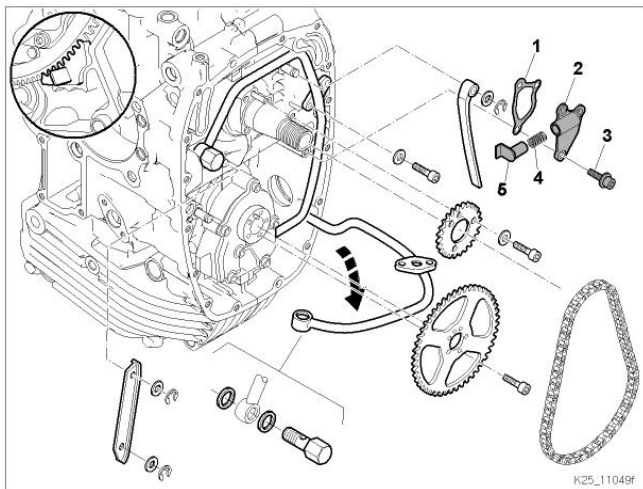



crankshaft/auxiliary shaft

- install timing-chain tensioning rail (1).
- Install spacer (2) and retaining washer (3).

(-) Installing timing chain tensioner, crankshaft/auxiliary shaft

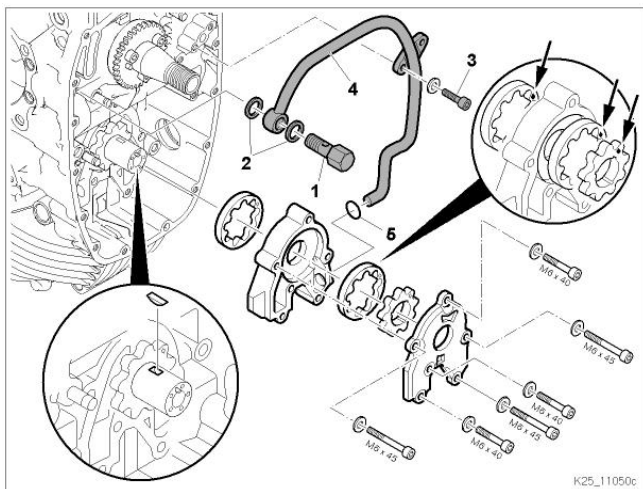
- Check gasket (1) for damage; replace if necessary.
- Install seal (1).
- Place housing (2) in position together with spring (4) and piston (5), making sure that the piston is angled toward the rear.
- Install screws (3).




 Tightening torques		
Housing for chain tensioner to crankcase, M6 x 25	8 Nm	


(-) Installing cooling oil line

- Install new O-ring (5).
- Install cooling oil line (4) and pivot it up.
- Install screws (3).



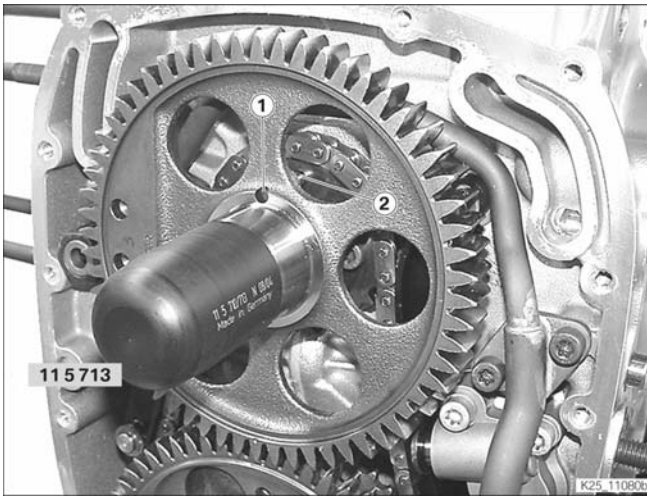
 Tightening torques		
Cooling oil line (inside engine) to crankcase, left, M6 x 16	8 Nm	

- Install banjo bolt (1) with new sealing rings (2).

 Tightening torques		
Banjo bolt, M14 x 4.5	25 Nm	

(-) Installing counterbalance shaft drive gear

- Clean inner taper of counterbalance drive gear and outer taper of crankshaft, **both must be free of oil**



and grease.

- Install the drive gear for the balancing shaft, making sure that straight pin (2) of the crankshaft engages hole (1) in the drive gear.
- Install a suitable tool for holding the drive gear and preventing it from turning.

► **Installing crankshaft belt pulley**


Precondition

- Engine locked.



- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.



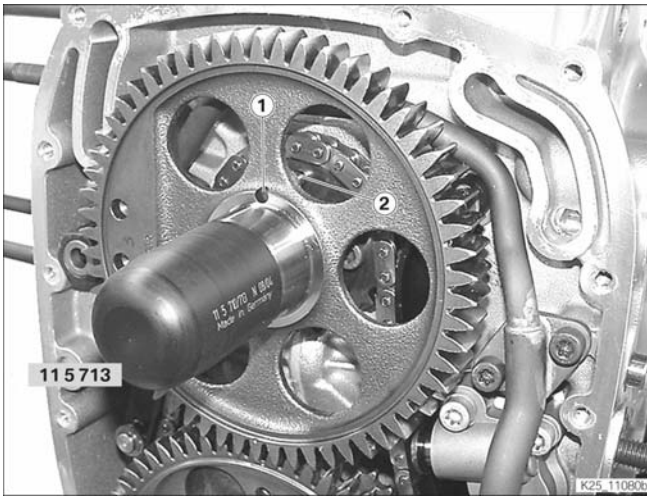
 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	



- Remove TDC locating pin (No. 11 2 650) .



- Remove the tool for holding the drive gear and preventing it from turning.



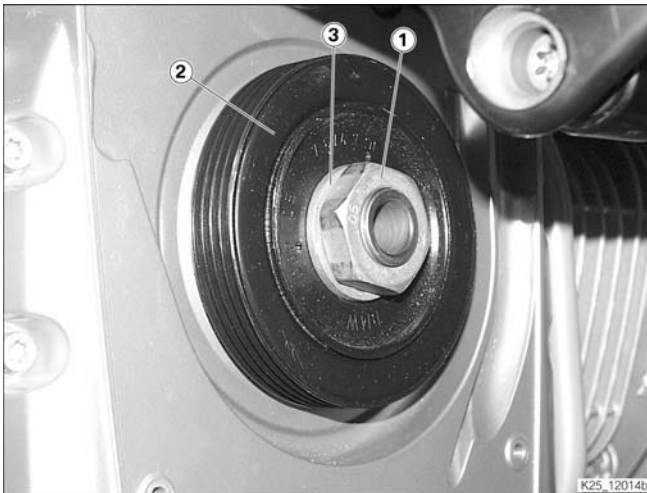
► **Removing crankshaft belt pulley**

Precondition

- Engine locked.

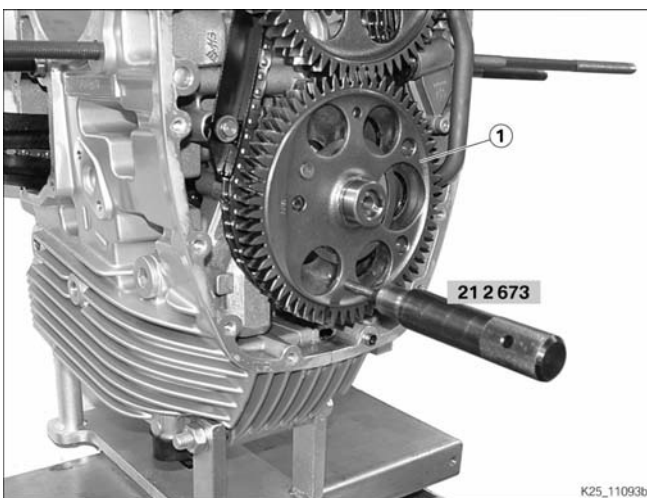


- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.

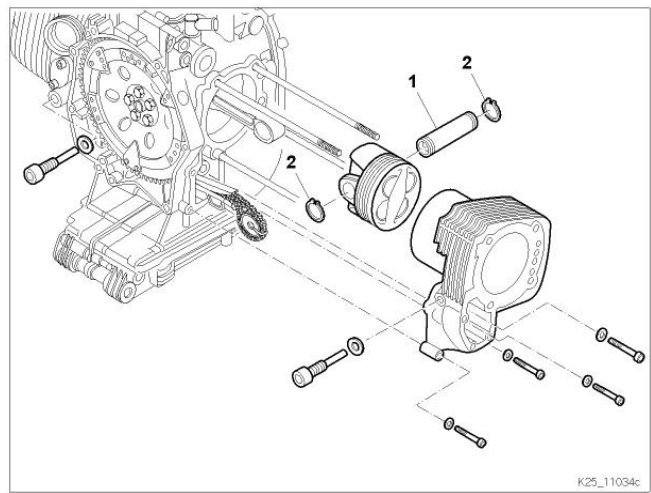
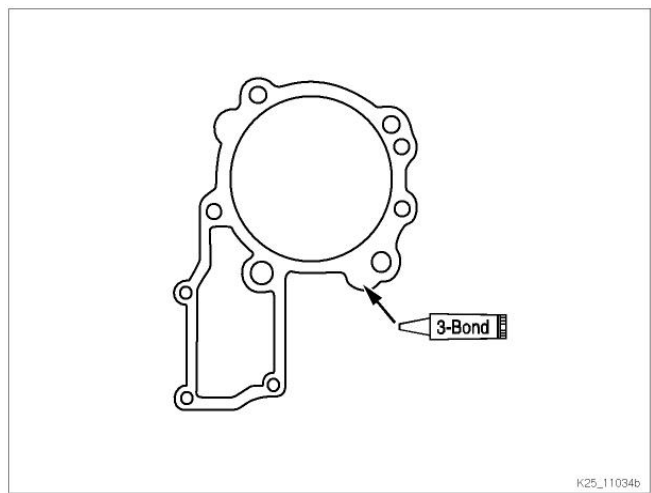
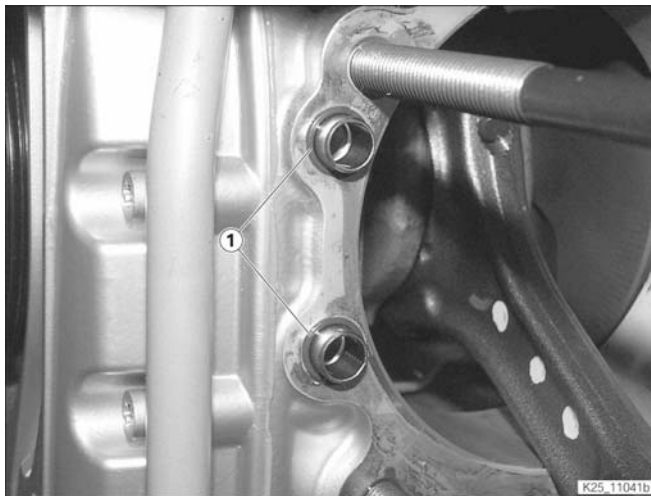


(-) Installing tensioning wheel

- Install tensioning gear (1), if necessary noting the feather key in the balancing shaft.
- Remove clutch centring pin (No. 21 2 673) .




(-) Installing right cylinder




Precondition

- Crankshaft is locked at TDC.
- ▶ **_____**
- Slip new O-rings (1) over the reamed sleeves and into the crankcase.

- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.

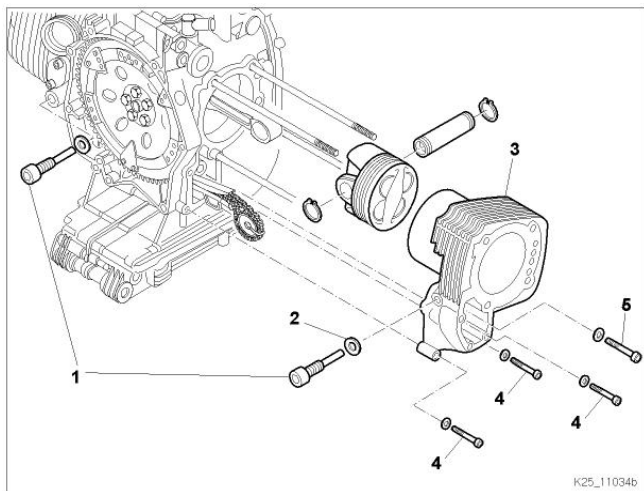
 Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain



cavity, take care not to drop parts into the engine.

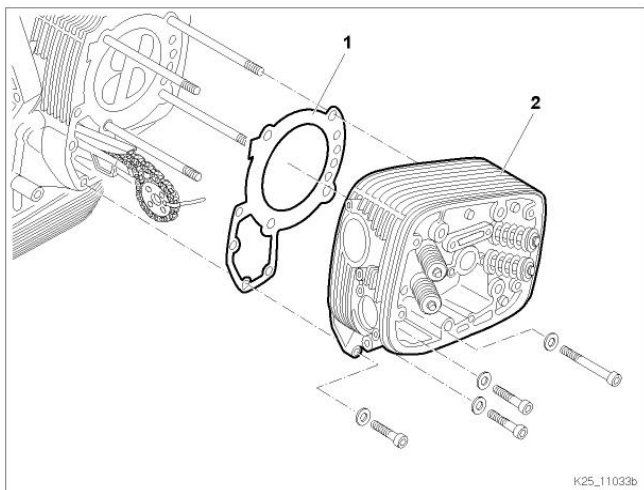
Tightening torques		
right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).

Tightening torques		
Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	

(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



⚠ Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

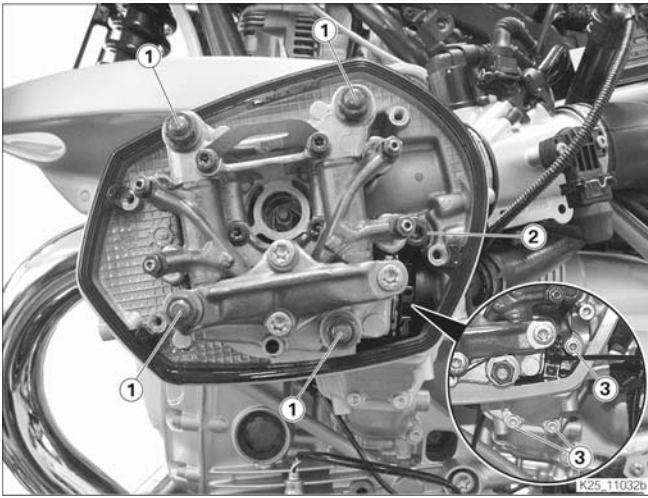
- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

⚠ Attention


Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mils at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.



Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

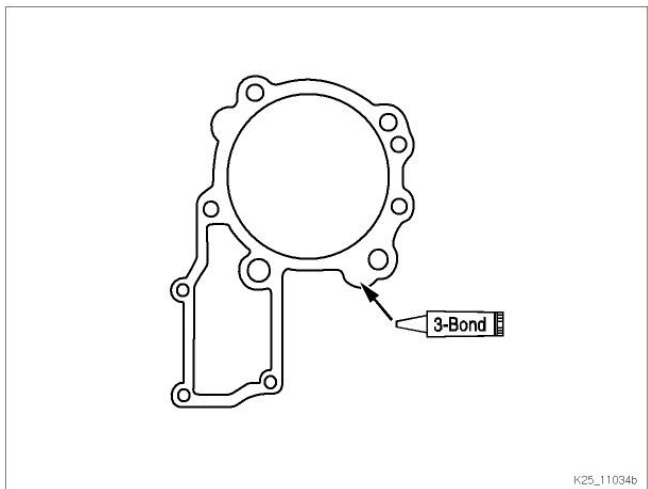
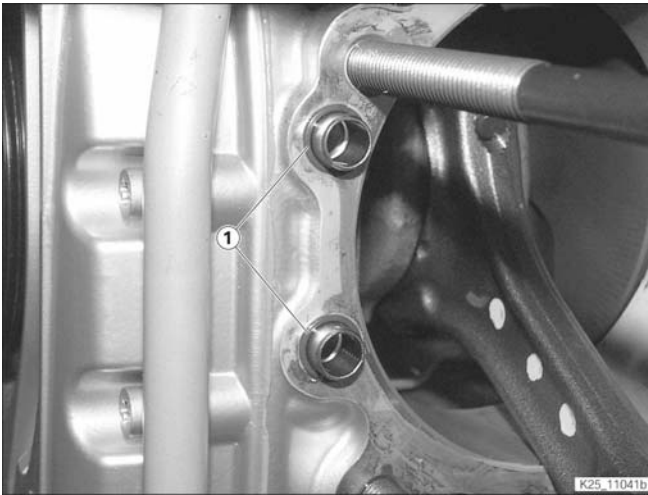
(-) Installing left cylinder

Precondition


- Crankshaft is locked at TDC.

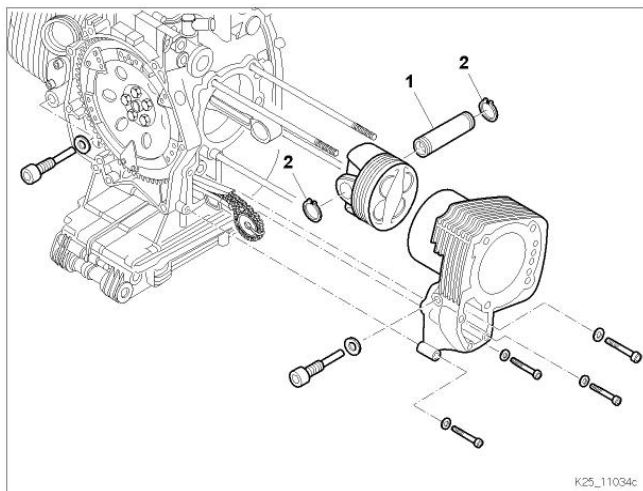


- Slip new O-rings (1) over the reamed sleeves and into the crankcase.



- Make sure the underside of the cylinder (arrow) is clean and degreased, and uniformly apply sealant to the face.

 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376



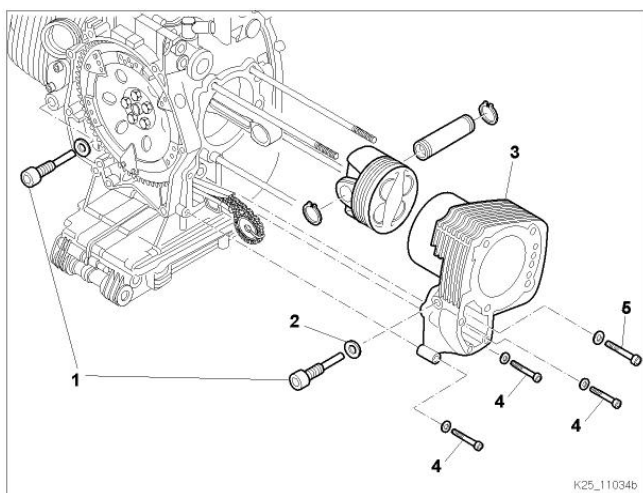
- Slip cylinder with piston on, and simultaneously guide the timing chain, tensioning and guide rail through the timing-chain cavity.
- Slip the cylinder with piston into the position at which the small-end connecting rod bore is aligned with the bore for the piston pin.
- Oil piston pin (1) and install.



Consumables/lubricants

Engine oil, 20W-50	Engine oil	81 22 9 407 685
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- Install circlips (2) and make sure they are correctly seated.
- Slip cylinder (3) fully into position and secure it to the crankcase with screws (4) and (5).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.



Tightening torques

right, M8 x 55	19 Nm	
left, M8 x 30	19 Nm	
left / right, M6 x 35	8 Nm	

- Install pivot screw for timing-chain slide rail (1) with new seal (2).



Tightening torques

Pivot screw, timing-chain sliding rail, cylinder crankcase, M10, installed with sealing washer A12x15.5-AL	18 Nm	
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(-) Installing left cylinder head

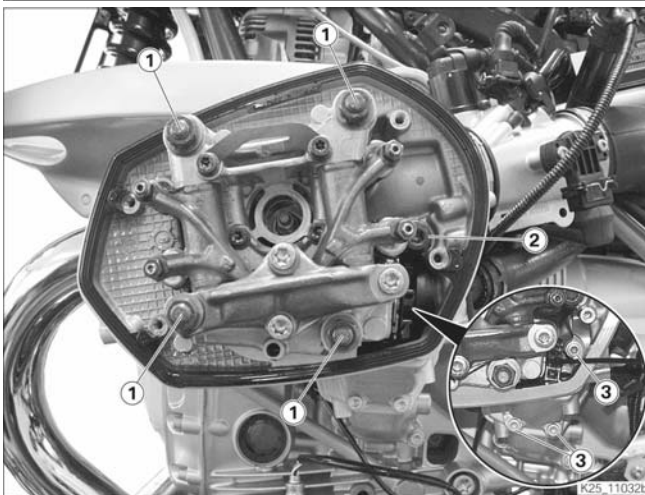
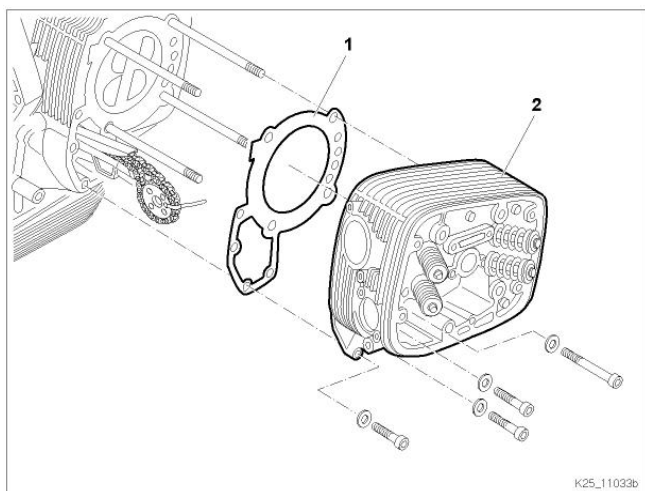
- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed



(firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

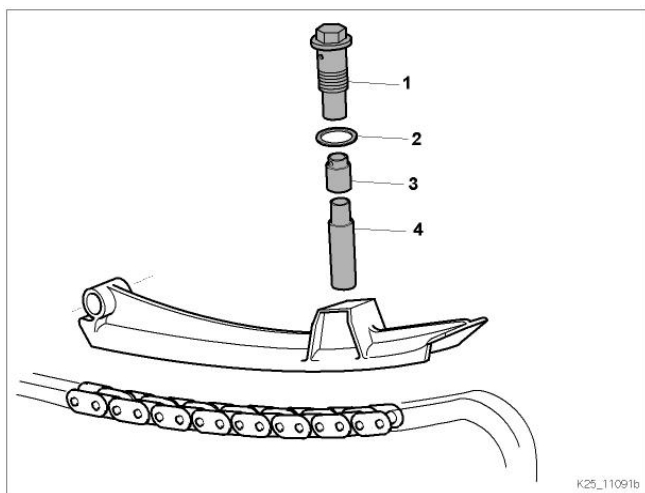
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Installing left timing chain tensioner


- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore up in the chain tensioner.
- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.

>>



The chain tensioner must slide onto the piston without tilting.

- Screw chain tensioner (1) into the cylinder and tighten it.

 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

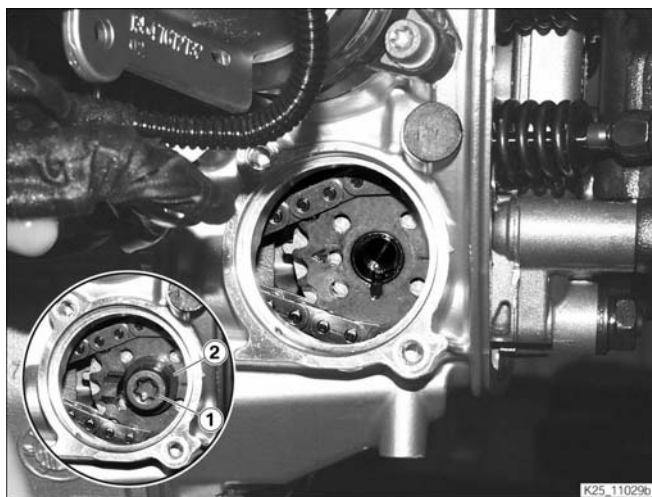


- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and that the screw is tightened hand-tight.



► Installing right timing chain tensioner

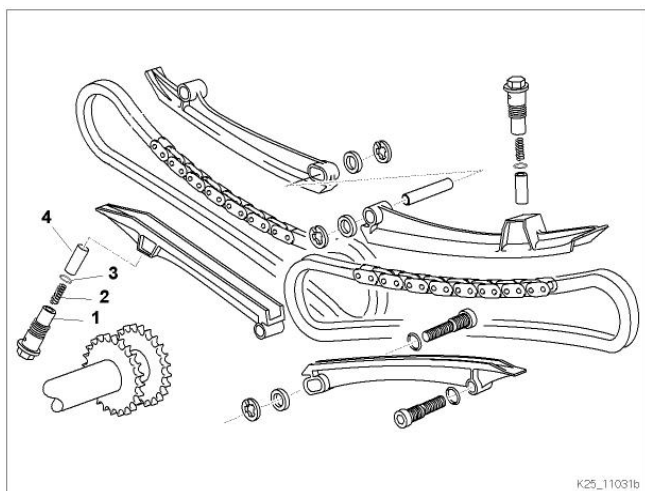
Precondition


- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

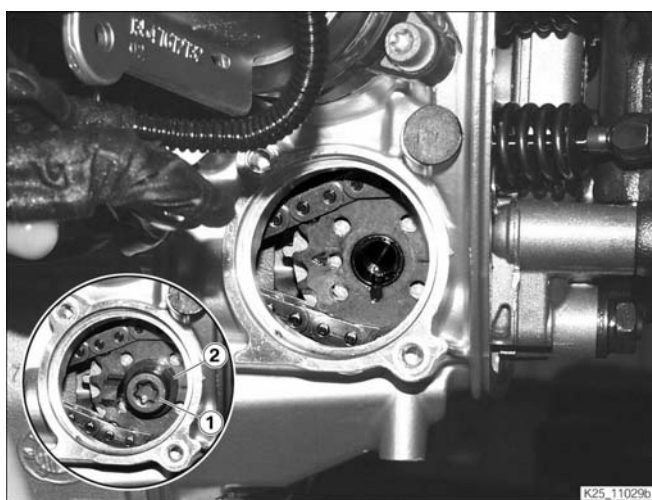


- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.






 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Installing breather plate

Precondition

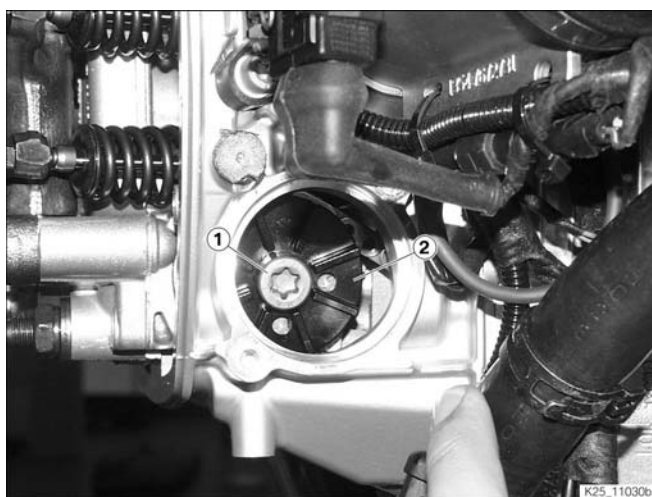
- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.

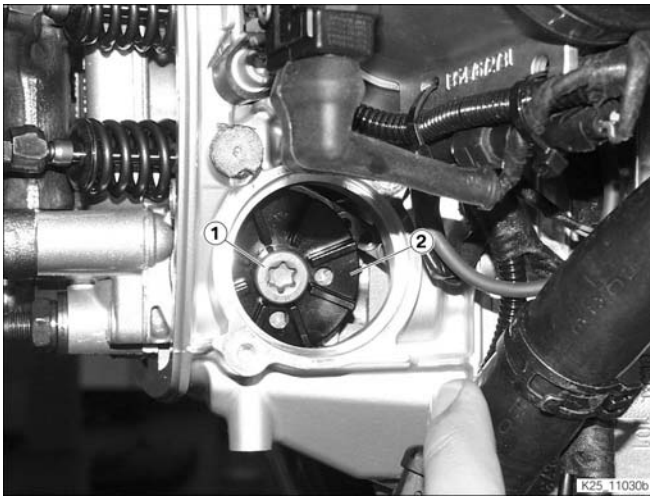


Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Securing left camshaft sprocket




Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).

 Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

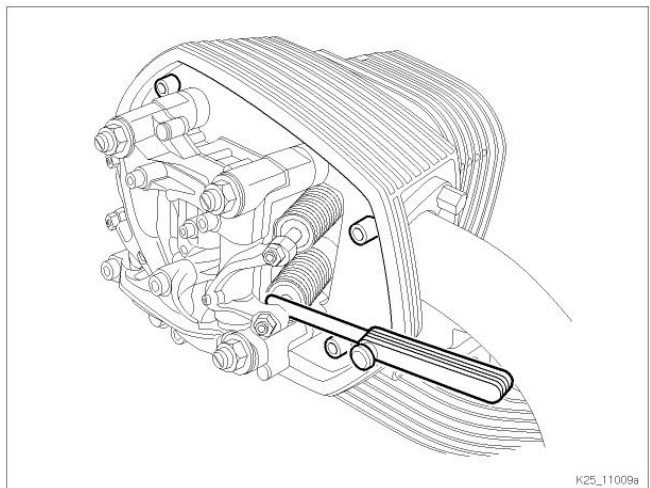
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

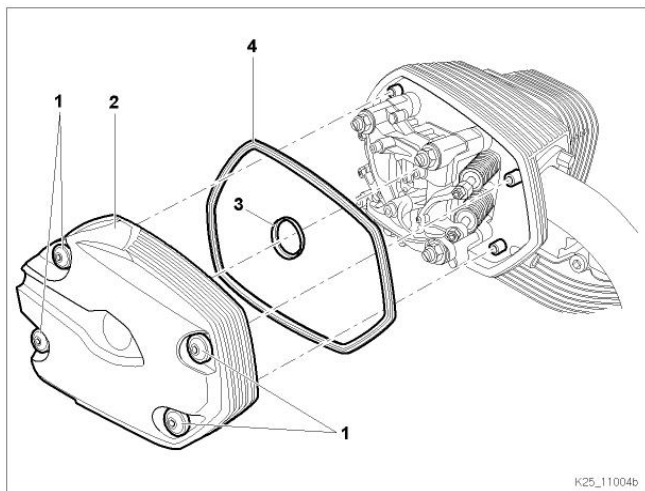
Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	


- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.



- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

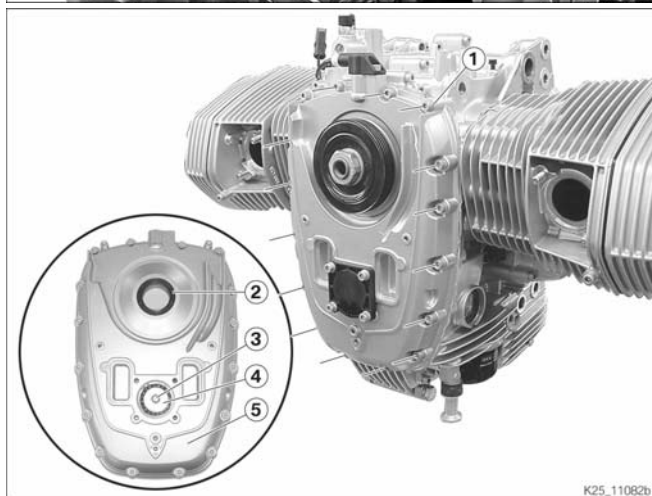
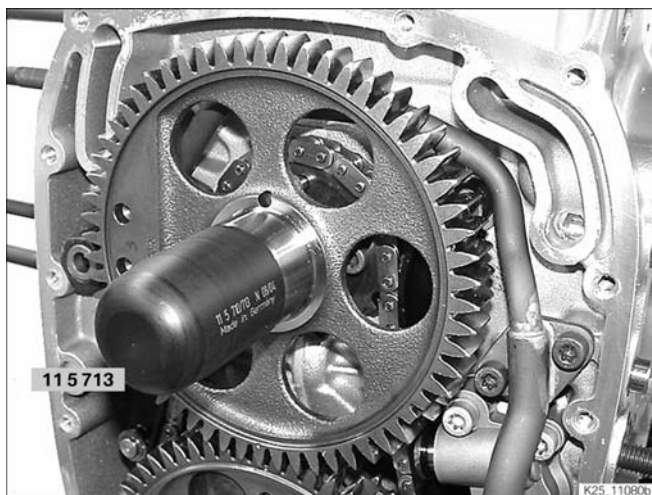
(-) Installing cylinder head covers

- Gaskets must be free from oil and grease, replace if damaged.
- Fit gaskets (3) on cylinder head covers.
- Fit gaskets (4) on cylinder heads.
- Install the cylinder head covers, making sure that both gaskets are correctly seated.
- Install and tighten the screws.


 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing timing case cover

- Install sliding sleeve (No. 11 5 713) .




- Make sure the sealing surface of the timing case cover is clean and free of grease and run a uniform bead of sealant round the face.

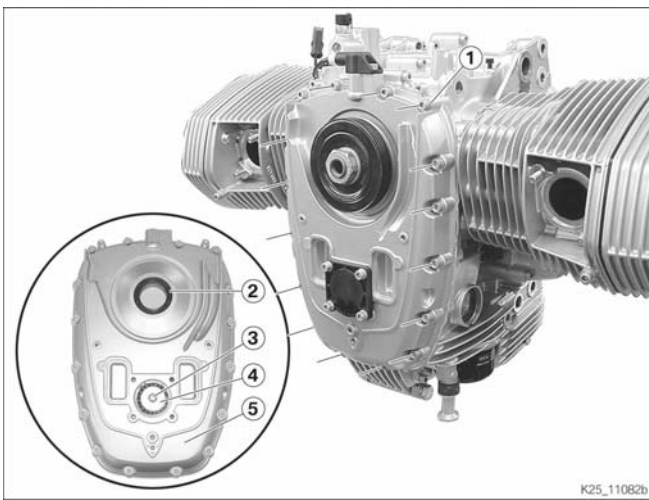
 Consumables/lubricants		
3 - Bond 1209	Surface sealant	07 58 9 062 376

► Securing crankshaft inductive sensor in timing case cover


- Position inductive sensor for crankshaft (2) on the timing case cover and install the screw.




 Tightening torques		
Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	



- Place timing case cover (5) in position.
- Install screws (1).

 Tightening torques		
Timing case cover to crankcase, M6	8 Nm	


- Remove sliding sleeve (No. 11 5 713) .
- Install screw (3) and washer (4).

 Tightening torques		
Gear wheel to balancing shaft, M8 x 50	19 Nm	

(-) Installing counter balance shaft cover

- Check the sealing ring of the cover for the balancing shaft for damage; replace if necessary.
- Hold the cover in position and install screws (1).



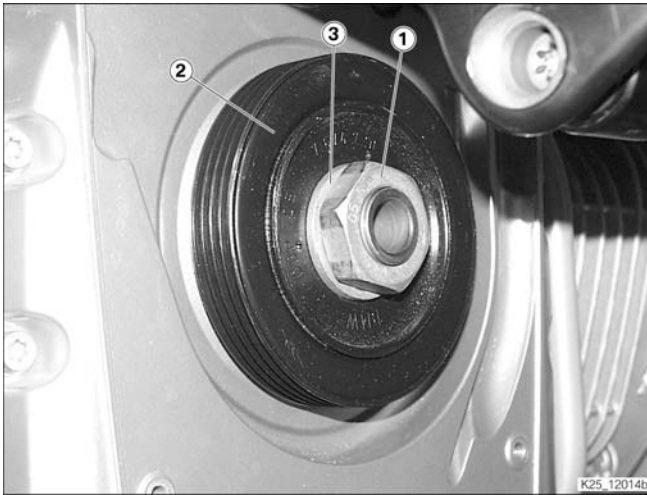
 Tightening torques		
Bearing cap, front auxiliary shaft on timing case cover, M6 x 20	8 Nm	

(-) Installing crankshaft belt pulley


Precondition

-

Engine locked.

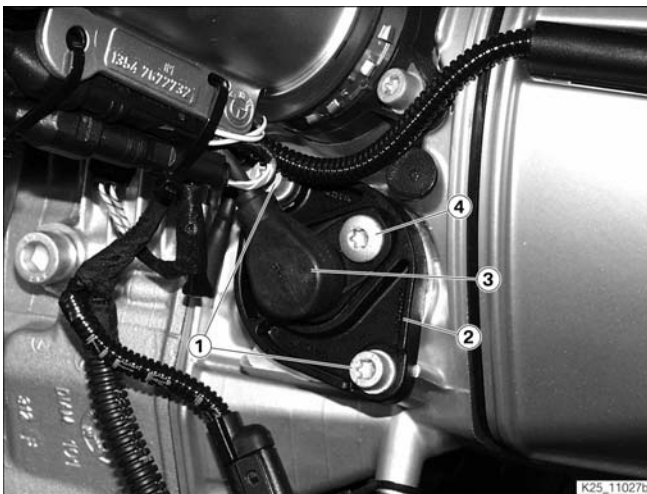


- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	



- Remove TDC locating pin (No. 11 2 650) .



(-) Installing right camshaft cover

Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

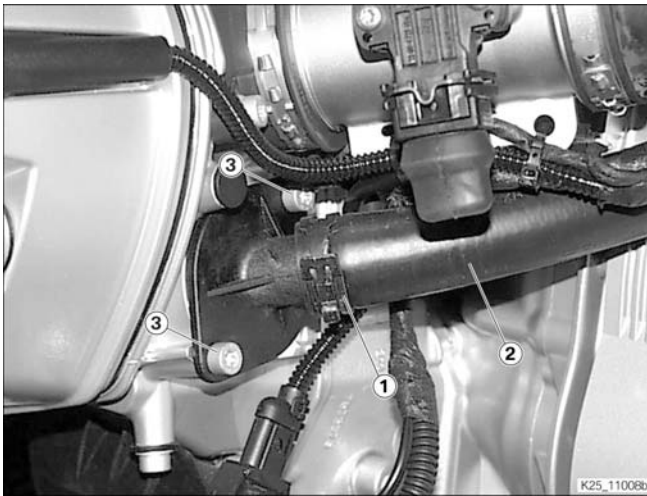
Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

(-) Installing left camshaft cover

Attention

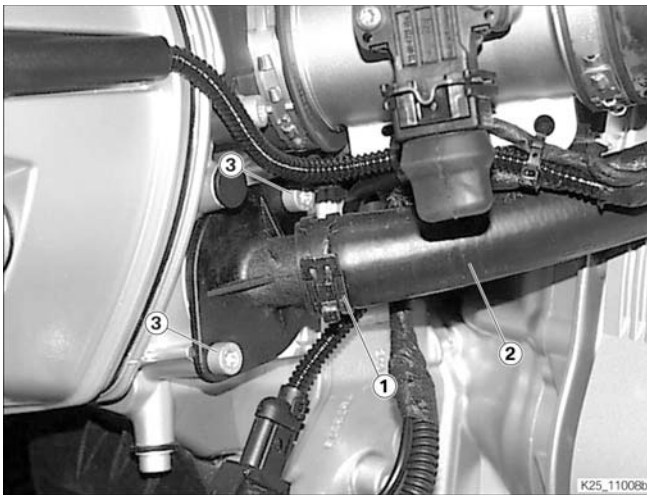
Nature: Sharp edges of the housing can damage the O-ring in the course of assembly



work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).



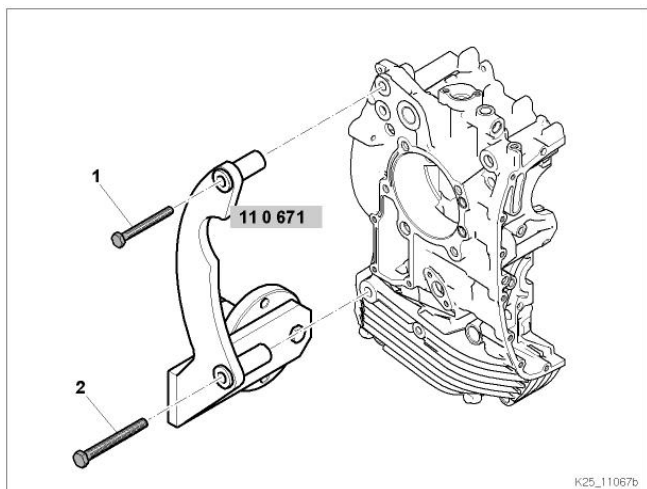
► **Connecting hose for crankcase breather**

- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



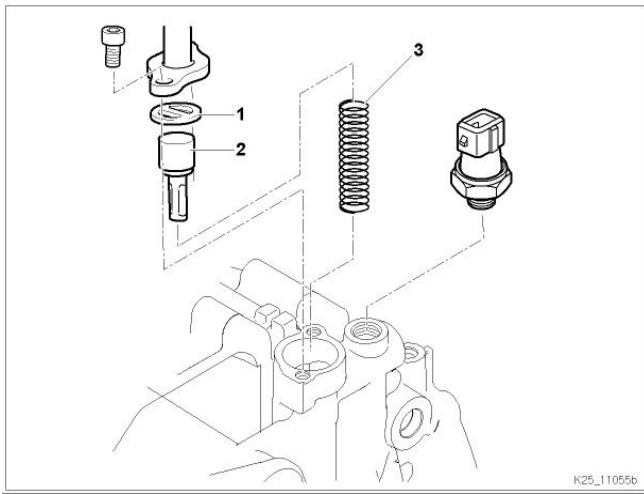
(-) Removing engine holder from right half of engine block

- Remove screws (1) and (2).
- Remove engine holder (No. 11 0 671) .



(-) Installing oil thermostat

- Install spring (3), control element (2), and supporting plate (1).



 **11 33 220 Replacing rocker arms with rocker-arm shafts, left**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

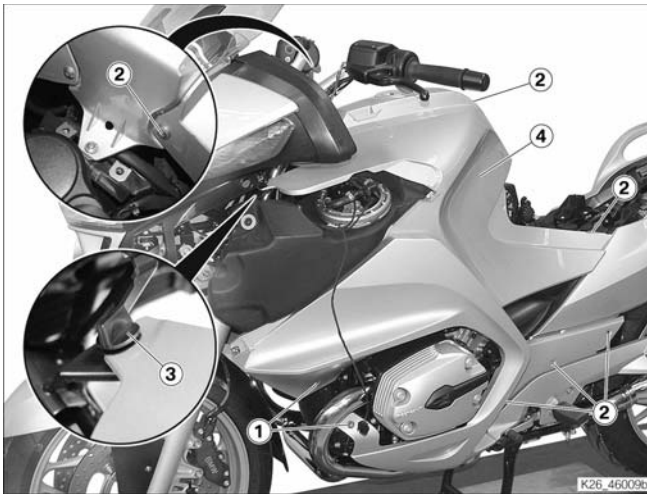


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

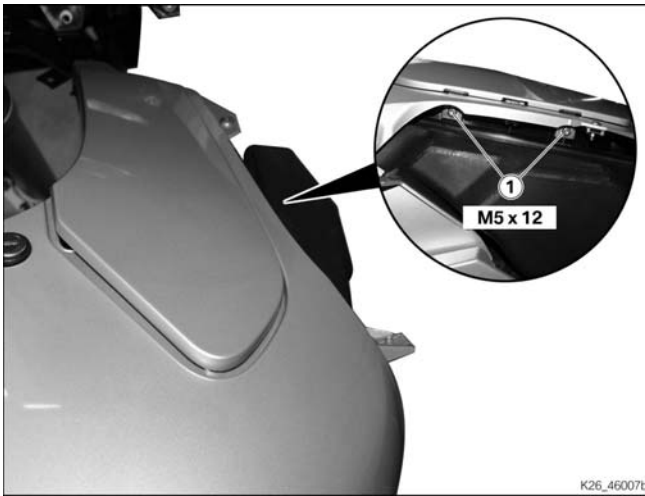
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing direct ignition coil

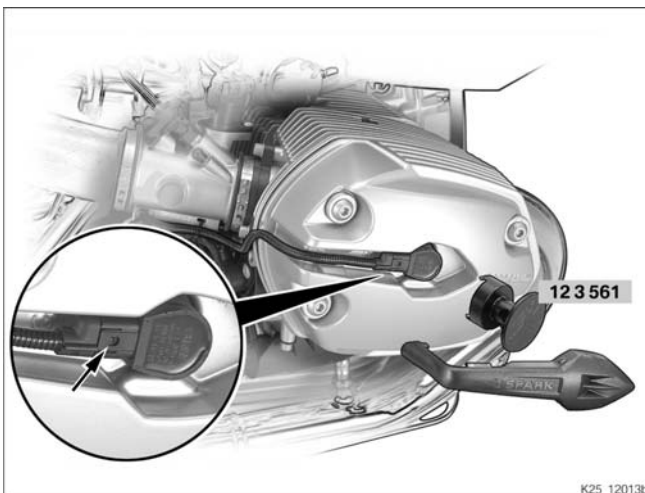
Precondition

- Ignition is switched OFF
- ▶
- Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

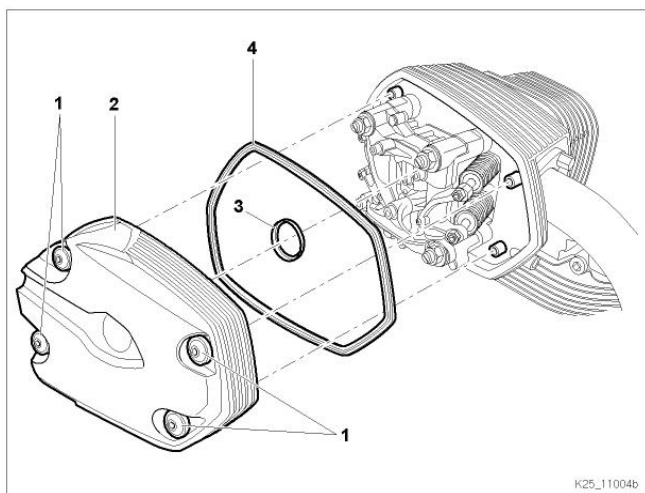
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

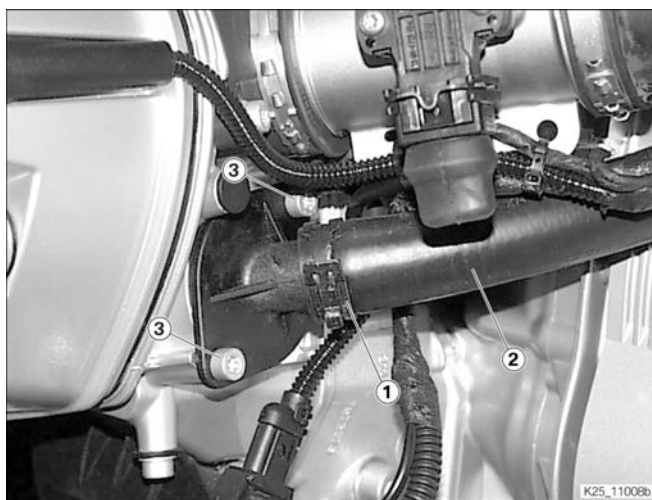
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

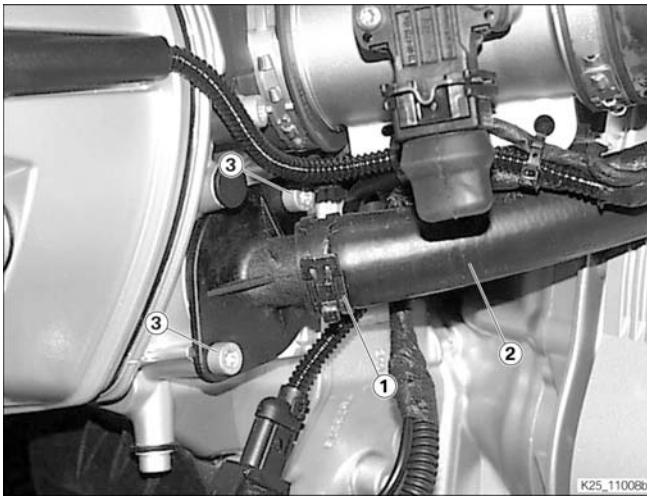
(-) Removing left camshaft cover

► **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



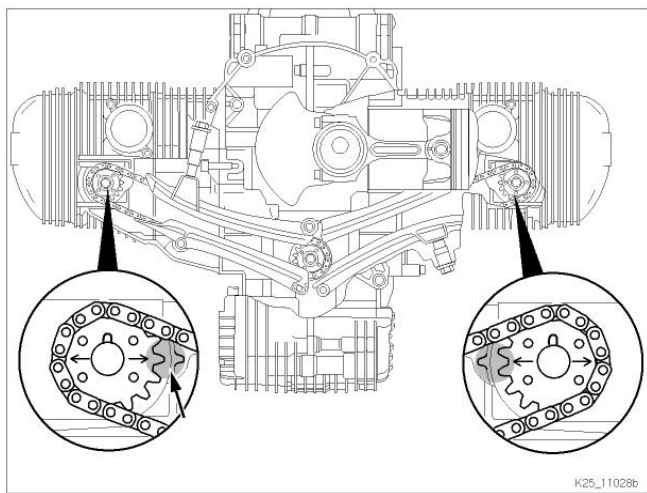
(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.



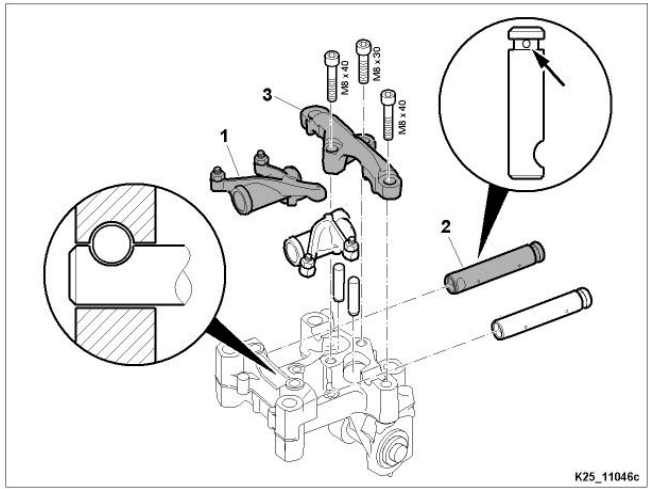
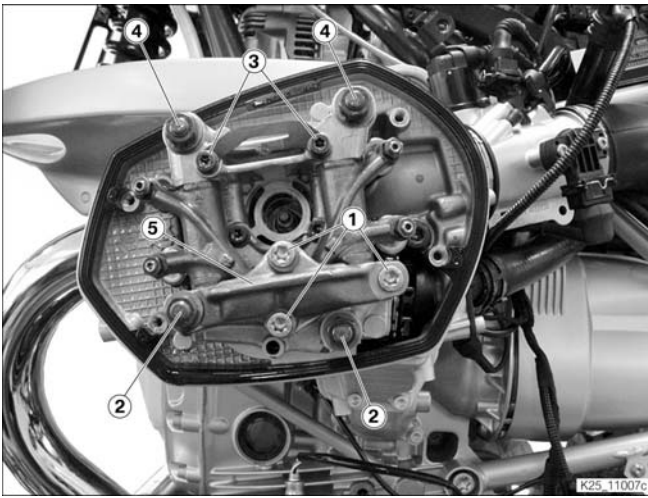
- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



(-) Replacing both rocker arms with shafts

- Remove screws (1).
- Remove cylinder-head screws (2) with washers.
- Remove bearing cap (5).
- Remove screws (3) with contact springs.
- Release cylinder head nuts (4).




- Slip a pin of the correct size into bore (arrow) of the rocker-arm shaft and use it as a lever to work the shaft back and forth and ease it off the bearing.
- Remove rocker arm (1).
- Repeat this procedure with the second rocker arm.
- Oil the rocker-arm bore and install new rocker arm (1).
- Install new oiled rocker-arm shaft (2), making sure that the recess of the rocker-arm shaft is in line with the locating bore.
- Set the oiled ball socket of the rocker arm on the pushrod and secure the rocker arm with a rubber band.
- Repeat this procedure with the second rocker arm.
- Install bearing cap (3).
- Slightly tighten the screws.


► **Adjusting endplay of rocker arms**

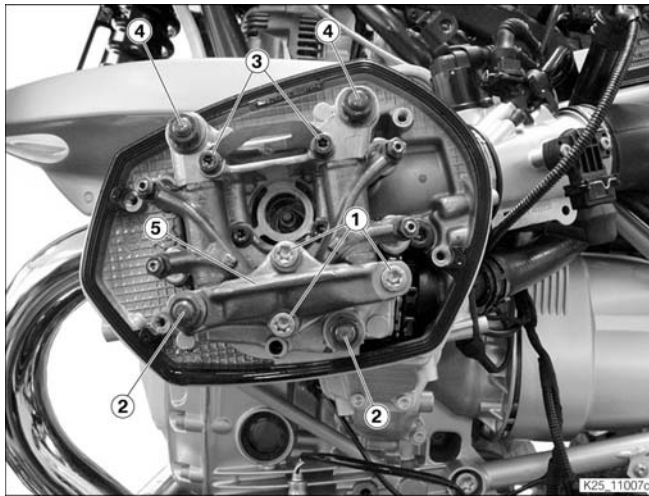
- Adjust the endplay of the rocker arms by moving the bearing cap to **minimum play**.



 Technical data			
Endplay, rocker arm		0.05 - 0.4 mm	


- Tighten screws (1).

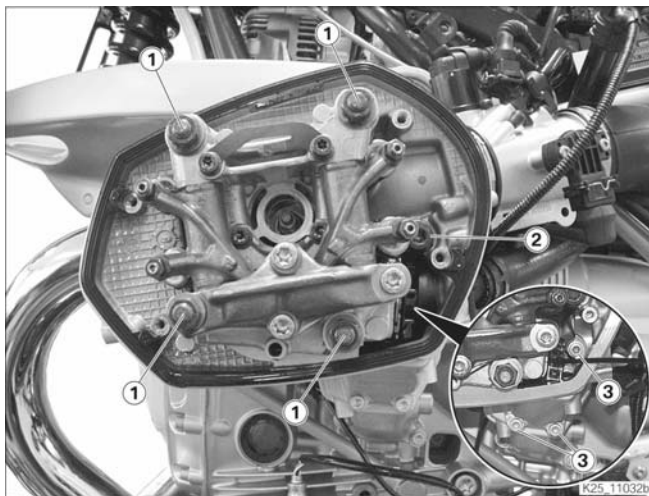
 Tightening torques		
Timing-gear carrier,	19 Nm	



camshaft bearing, bearing cap left/right, M8 x 30		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	

- Install screws (3) with contact springs.

 Tightening torques		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 30	19 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	




 **Attention**

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

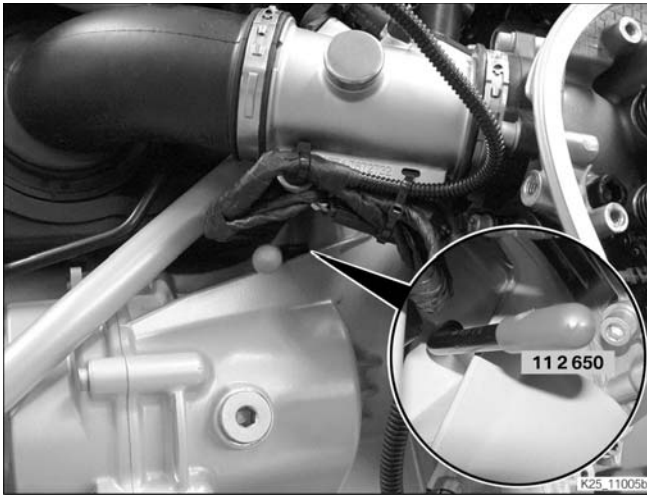
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	

Screw, M6 x 30	9 Nm	
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(-) Removing TDC locating pin

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance

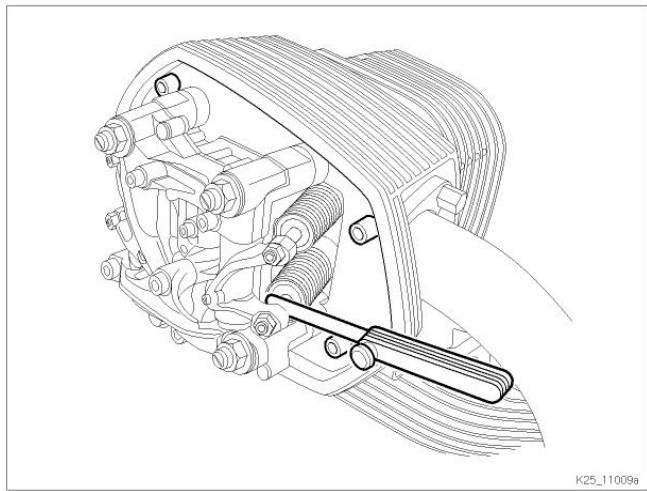
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

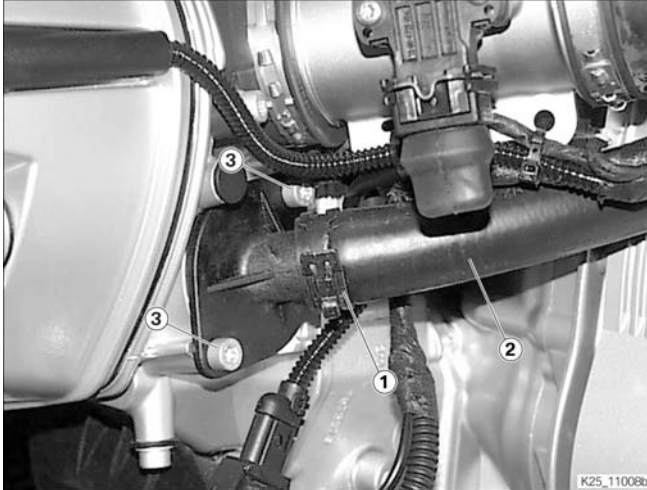
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing left camshaft cover



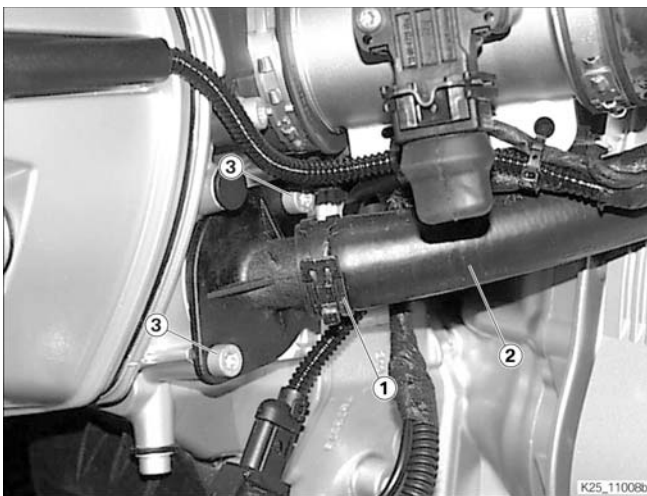
⚠ Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

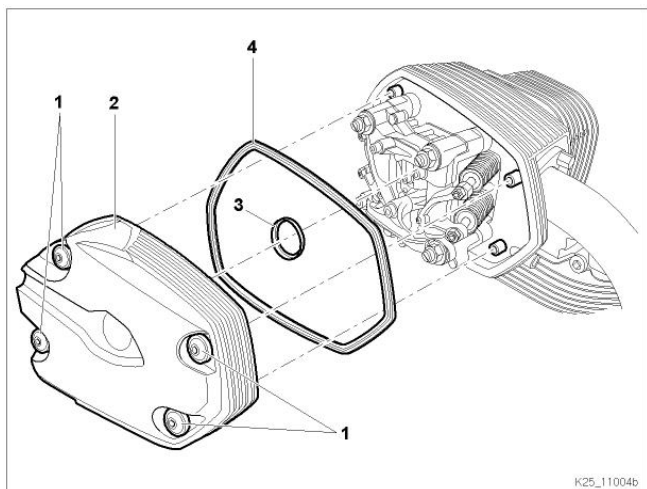
► Connecting hose for crankcase breather



- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.

» The hose is located on the camshaft cover.

◄ (-) Installing cylinder head cover

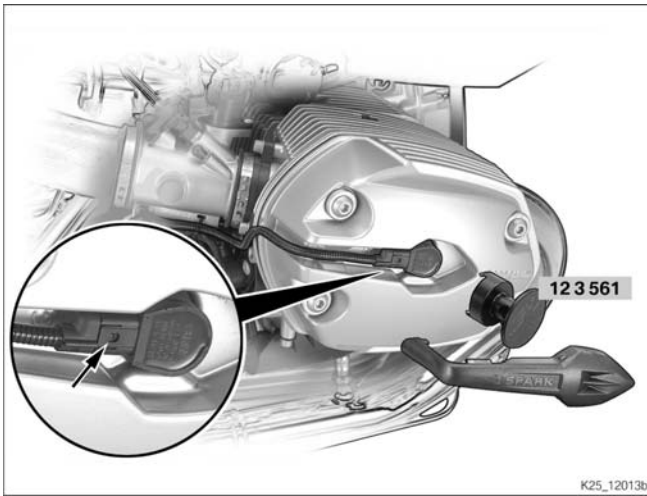


- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

🔧 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil



is correctly seated.

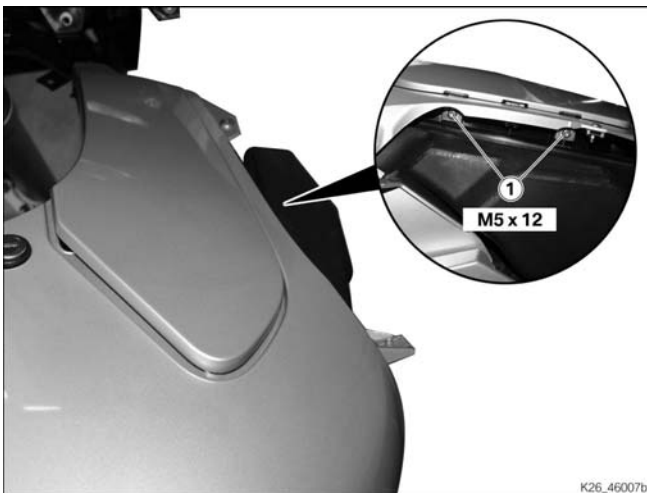
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

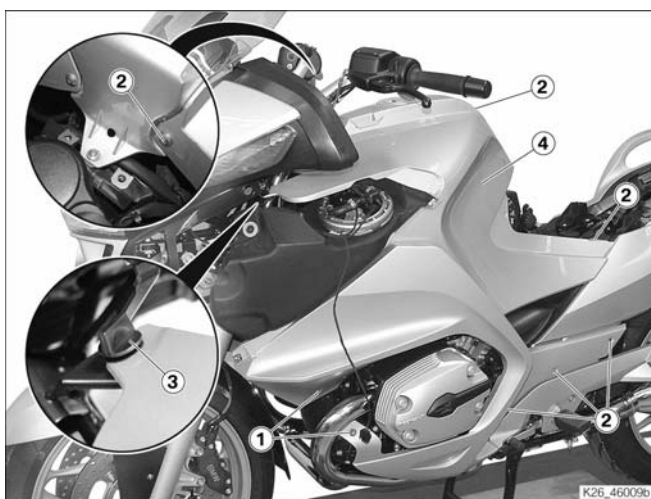
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

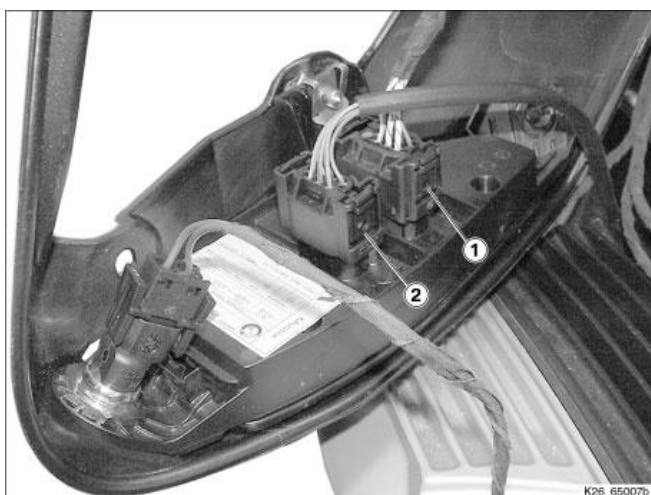
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



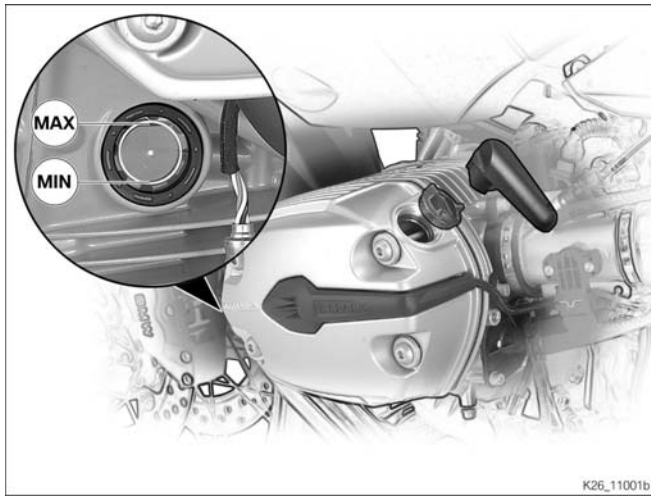
(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



Technical data

Technical data			



K26_11001b

Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 33 222 Replacing rocker arms with rocker-arm shafts, right**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



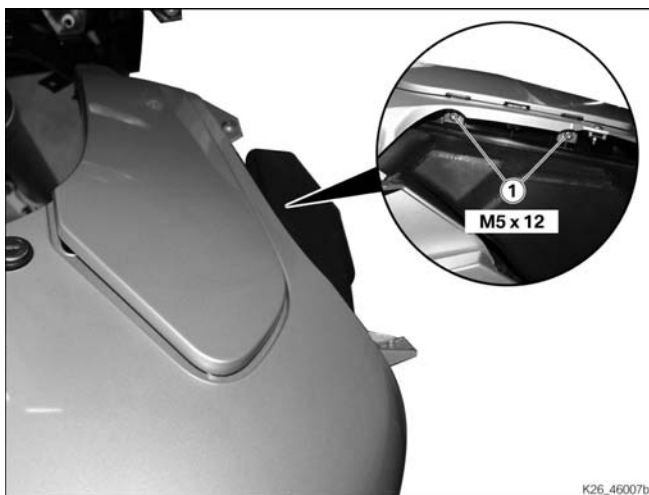
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

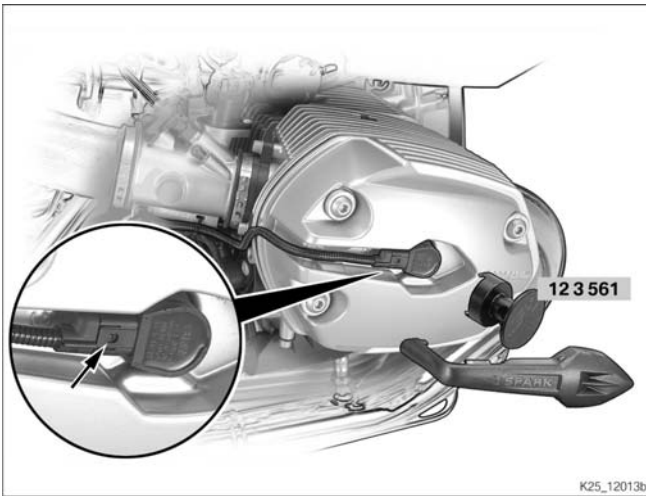


- Remove the primary spark plug cover.

⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

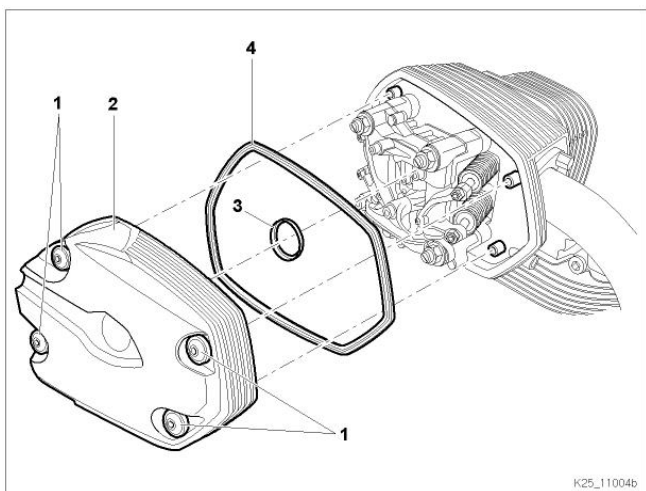
(-) Removing cylinder head cover


- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



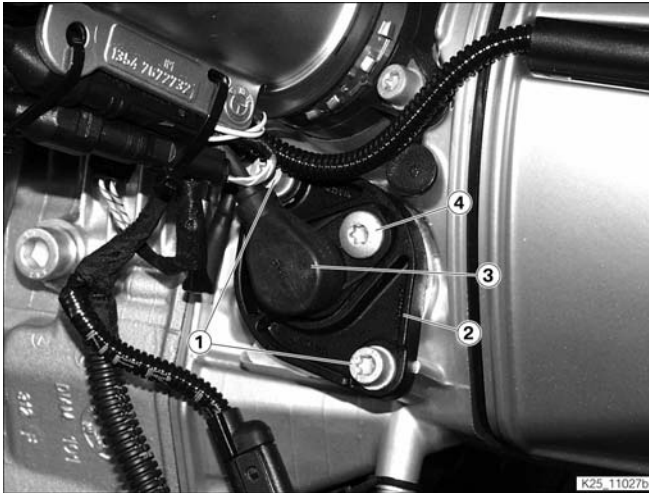
 Technical data			
Permissible projecting threaded length of the	free threaded length	max. 16.5 mm	

bottom left tiebolt on the inlet side			
---	--	--	--

- Remove gaskets (3) and (4).

(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).

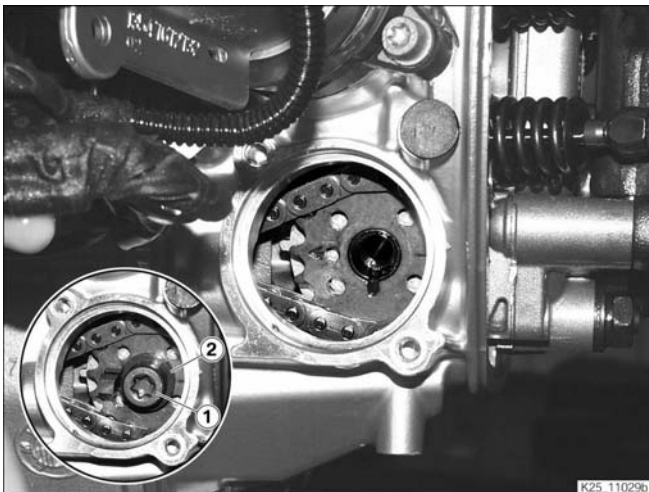


Note

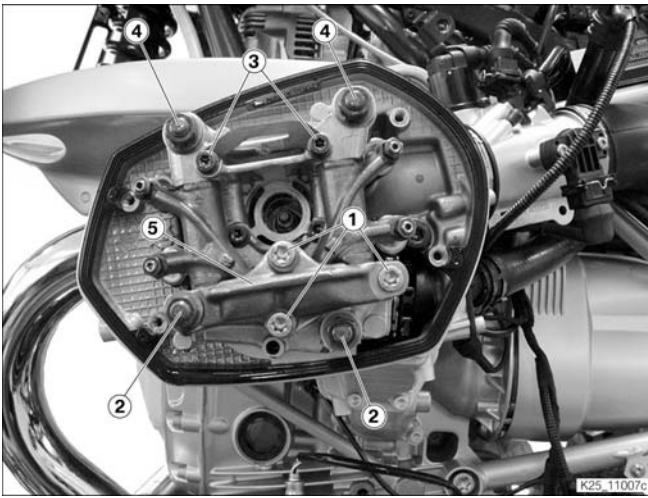
The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

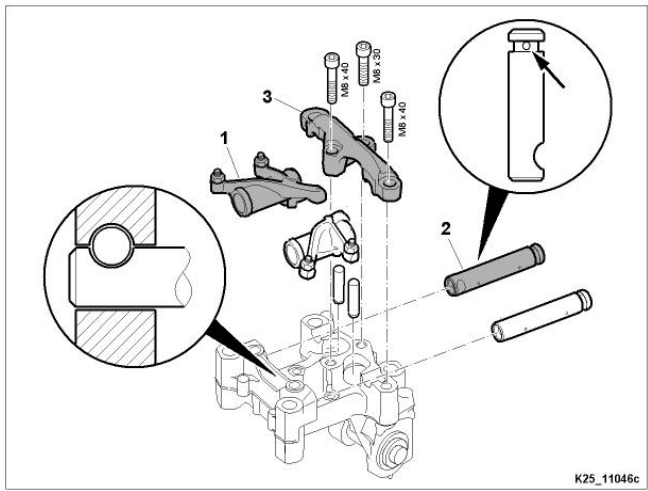
- Insert locating pin (No. 11 2 650) to lock the engine in position.



(-) Replacing both rocker arms with shafts



- Remove screws (1).
- Remove cylinder-head screws (2) with washers.
- Remove bearing cap (5).
- Remove screws (3) with contact springs.
- Release cylinder head nuts (4).




- Slip a pin of the correct size into bore (arrow) of the rocker-arm shaft and use it as a lever to work the shaft back and forth and ease it off the bearing.
- Remove rocker arm (1).
- Repeat this procedure with the second rocker arm.
- Oil the rocker-arm bore and install new rocker arm (1).
- Install new oiled rocker-arm shaft (2), making sure that the recess of the rocker-arm shaft is in line with the locating bore.
- Set the oiled ball socket of the rocker arm on the pushrod and secure the rocker arm with a rubber band.
- Repeat this procedure with the second rocker arm.
- Install bearing cap (3).
- Slightly tighten the screws.


► **Adjusting endplay of rocker arms**

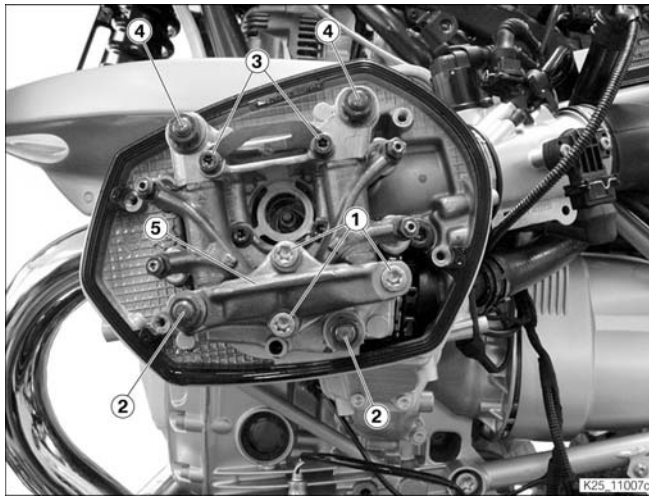
- Adjust the endplay of the rocker arms by moving the bearing cap to **minimum play**.



 Technical data			
Endplay, rocker arm		0.05 - 0.4 mm	


- Tighten screws (1).

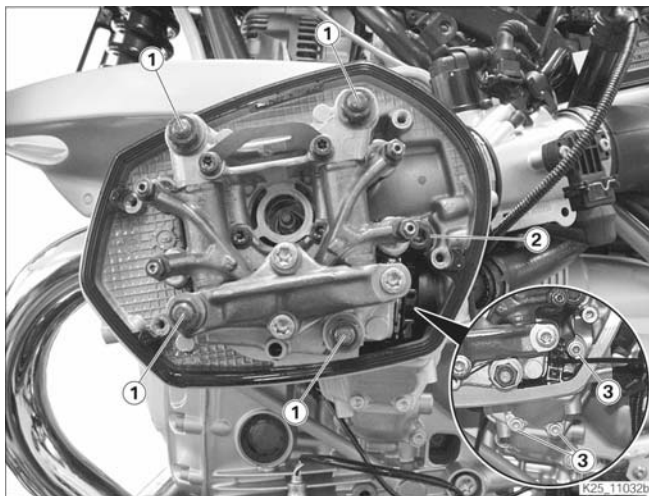
 Tightening torques		
Timing-gear carrier,	19 Nm	



camshaft bearing, bearing cap left/right, M8 x 30		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	

- Install screws (3) with contact springs.

 Tightening torques		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 30	19 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	




 **Attention**

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

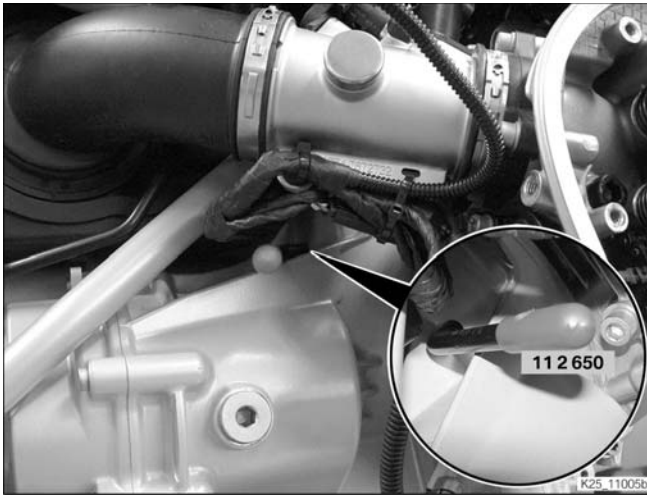
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	

Screw, M6 x 30	9 Nm	
----------------	------	--

(-) Removing TDC locating pin

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance

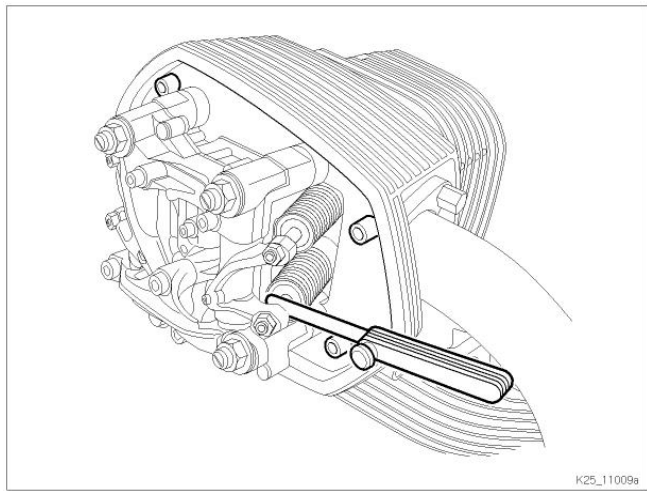
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

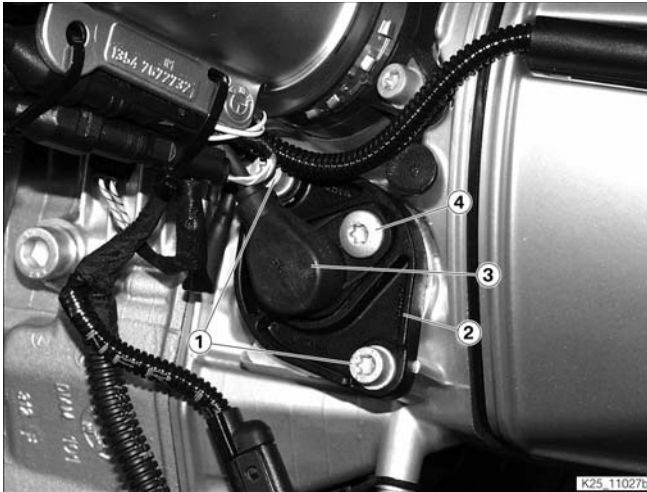
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



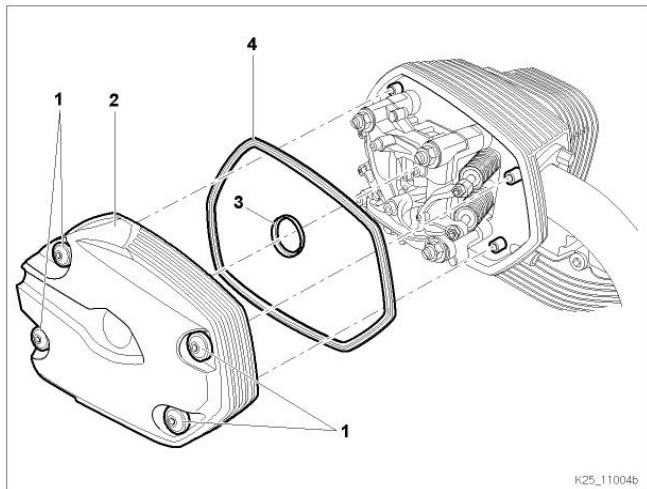
⚠ Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

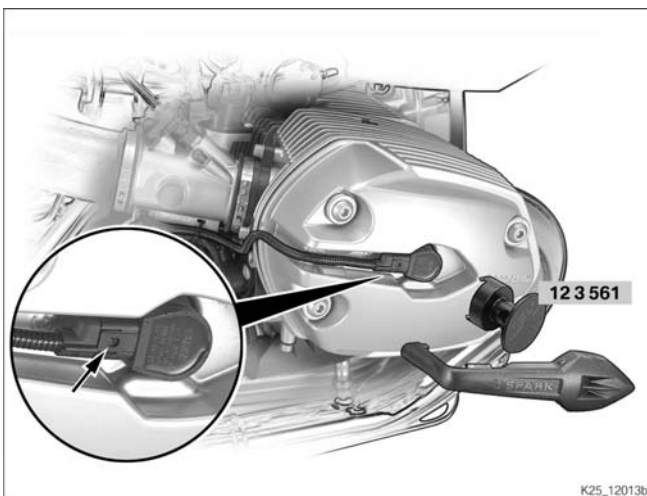
(-) Installing cylinder head cover



- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

🔧 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing direct ignition coil



- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

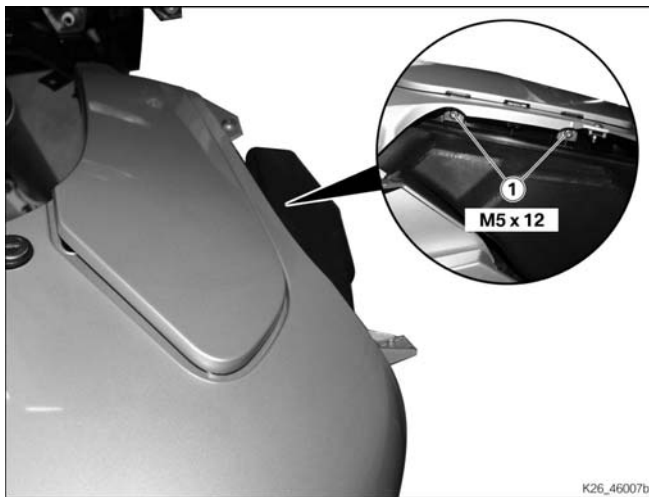
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating


- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 33 280 Replacing all rocker arms with rocker-arm shafts**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

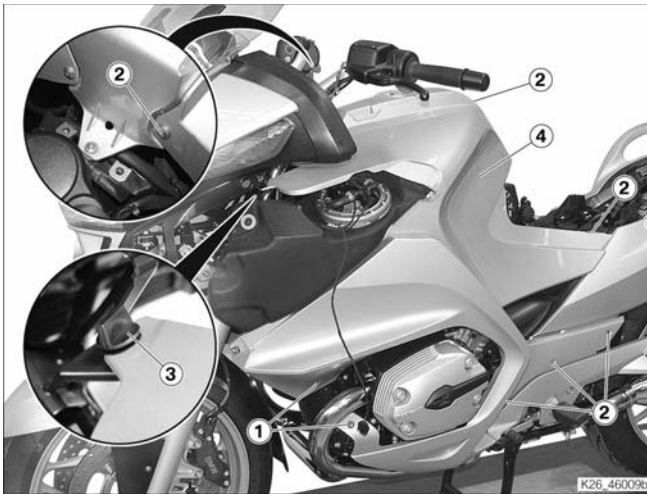


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

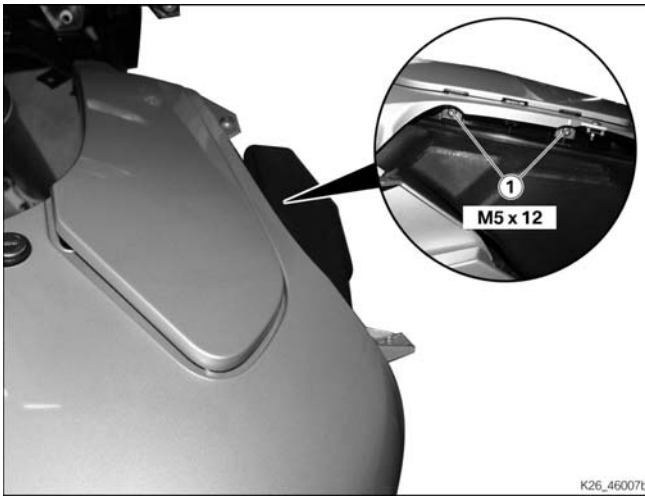
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing direct ignition coil

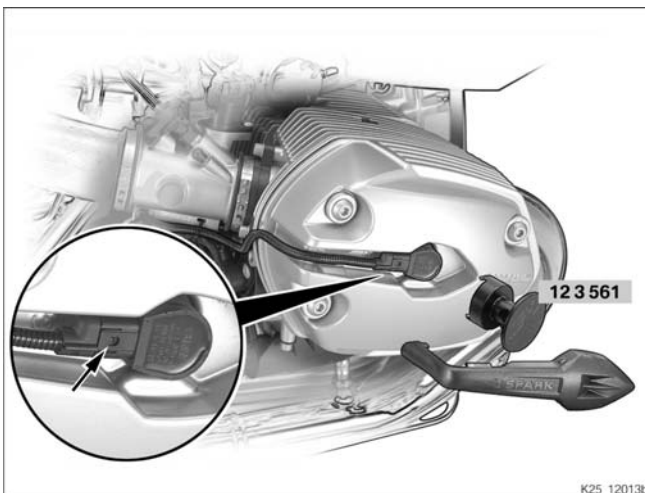
Precondition

- Ignition is switched OFF
- ▶
- Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

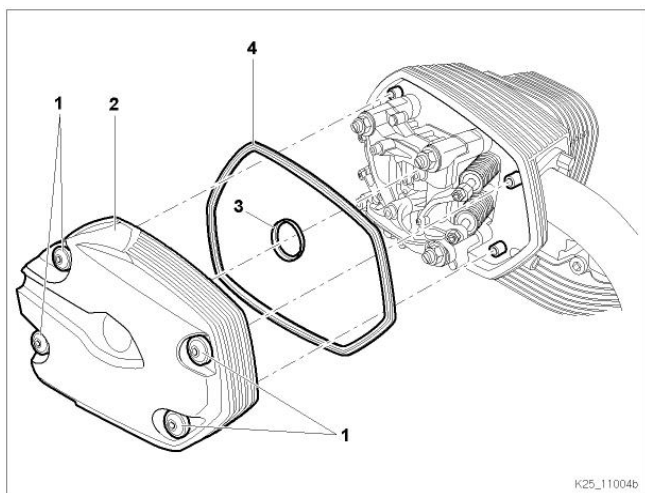
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.



- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

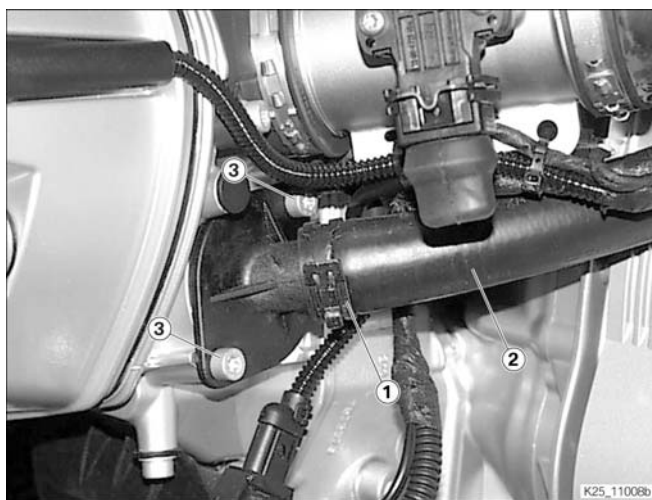
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

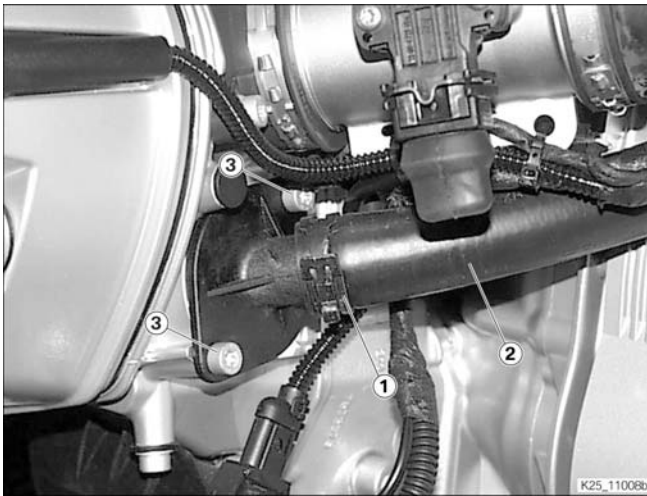
(-) Removing left camshaft cover

► **Disconnecting hose for crankcase breather**

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.



- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



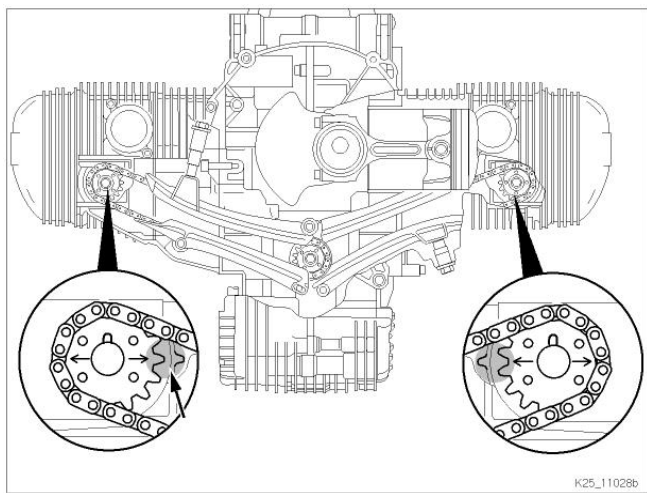
(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.



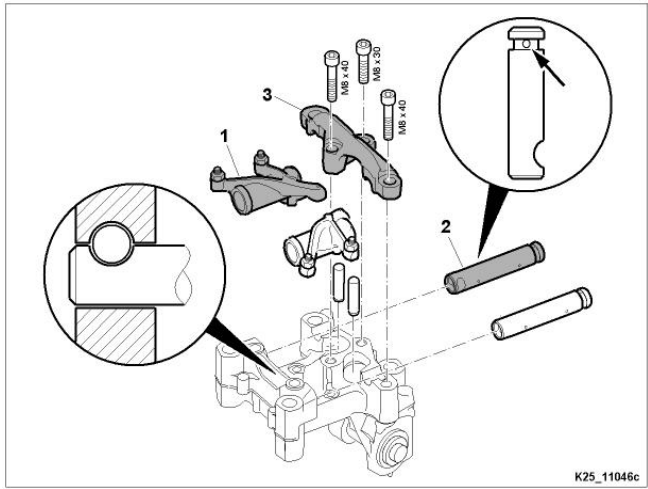
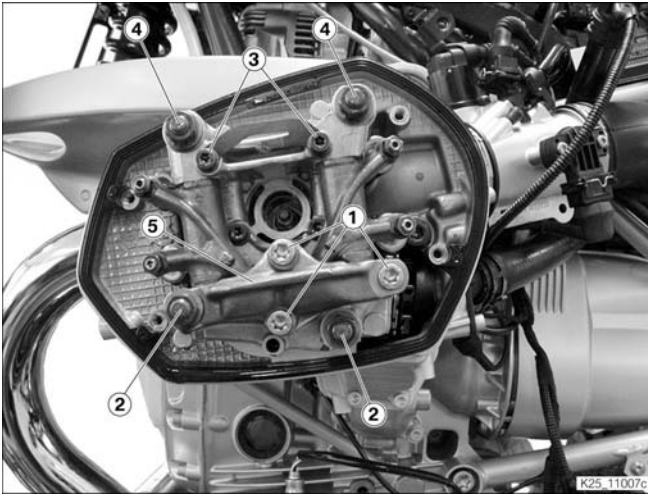
- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



(-) Replacing both rocker arms with shafts

- Remove screws (1).
- Remove cylinder-head screws (2) with washers.
- Remove bearing cap (5).
- Remove screws (3) with contact springs.
- Release cylinder head nuts (4).




- Slip a pin of the correct size into bore (arrow) of the rocker-arm shaft and use it as a lever to work the shaft back and forth and ease it off the bearing.
- Remove rocker arm (1).
- Repeat this procedure with the second rocker arm.
- Oil the rocker-arm bore and install new rocker arm (1).
- Install new oiled rocker-arm shaft (2), making sure that the recess of the rocker-arm shaft is in line with the locating bore.
- Set the oiled ball socket of the rocker arm on the pushrod and secure the rocker arm with a rubber band.
- Repeat this procedure with the second rocker arm.
- Install bearing cap (3).
- Slightly tighten the screws.


► **Adjusting endplay of rocker arms**

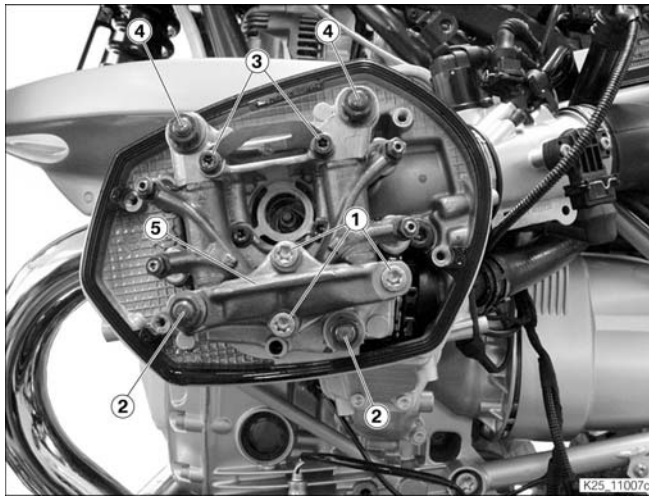
- Adjust the endplay of the rocker arms by moving the bearing cap to **minimum play**.



 Technical data			
Endplay, rocker arm		0.05 - 0.4 mm	


- ◄ • Tighten screws (1).

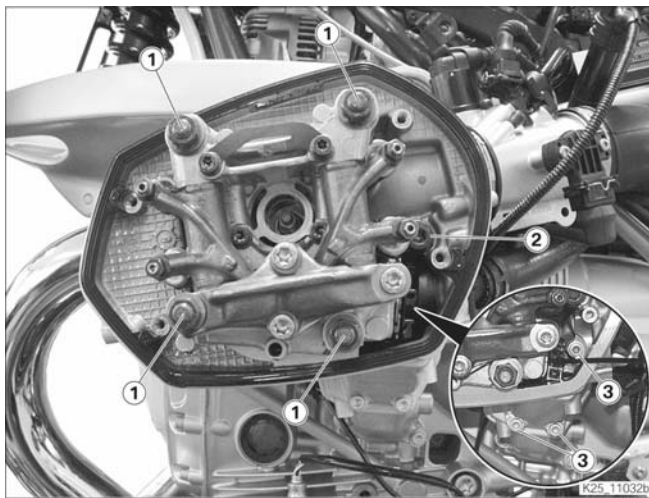
 Tightening torques		
Timing-gear carrier,	19 Nm	



camshaft bearing, bearing cap left/right, M8 x 30		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	

- Install screws (3) with contact springs.

 Tightening torques		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 30	19 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	




 **Attention**

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	

Screw, M6 x 30	9 Nm	
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(-) Removing TDC locating pin

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance

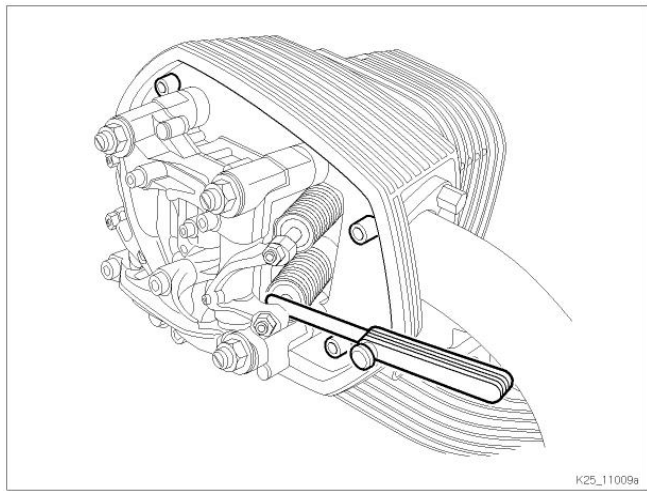
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

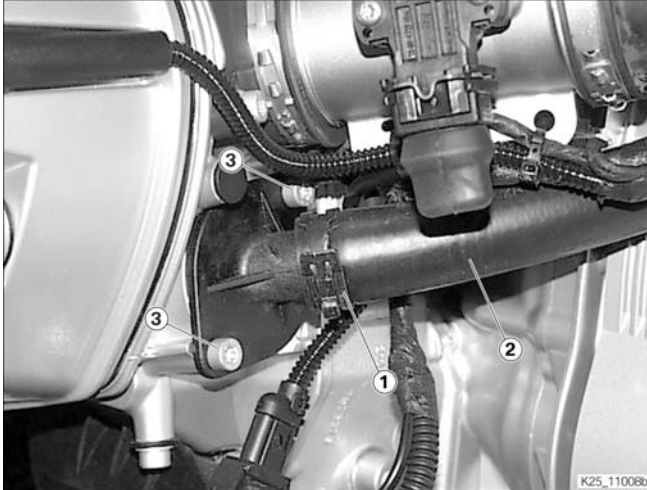
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing left camshaft cover



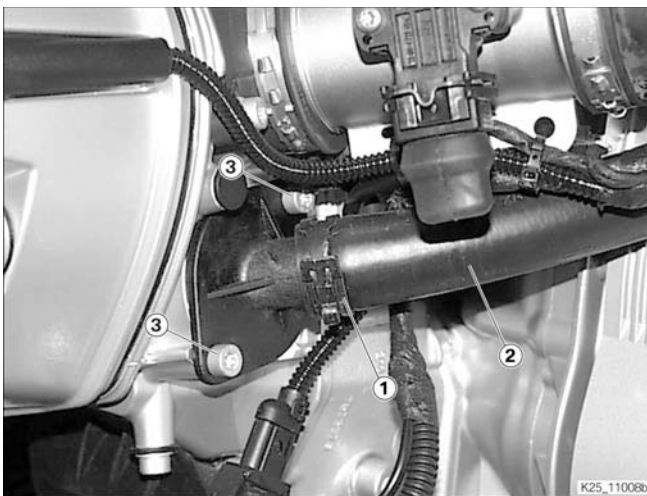
⚠ Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

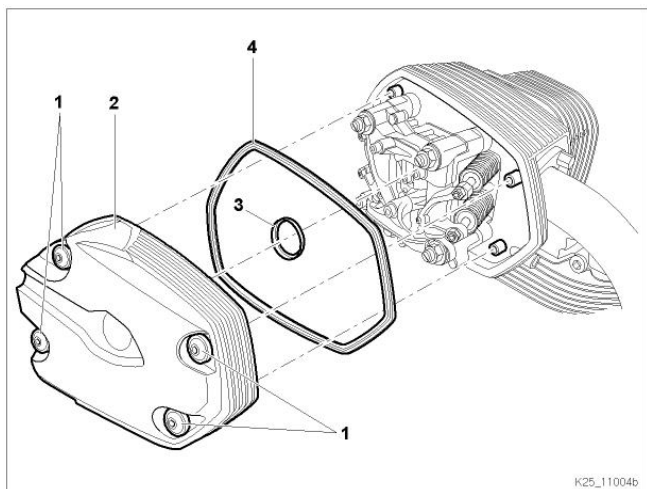
► Connecting hose for crankcase breather



- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.

» The hose is located on the camshaft cover.

◄ (-) Installing cylinder head cover

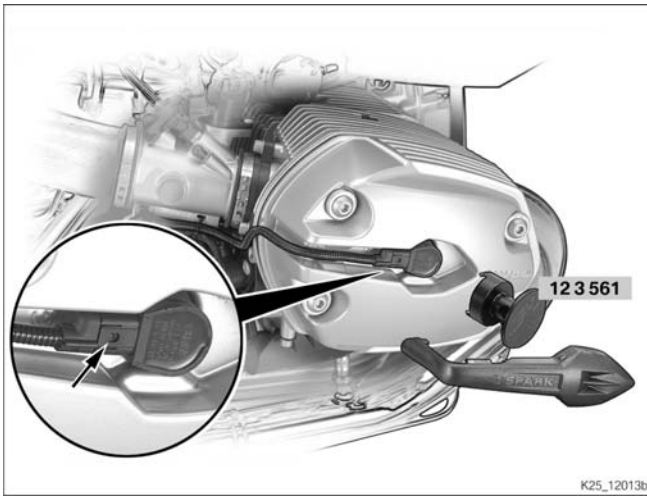


- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

🔧 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil




is correctly seated.

- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Removing direct ignition coil

Precondition

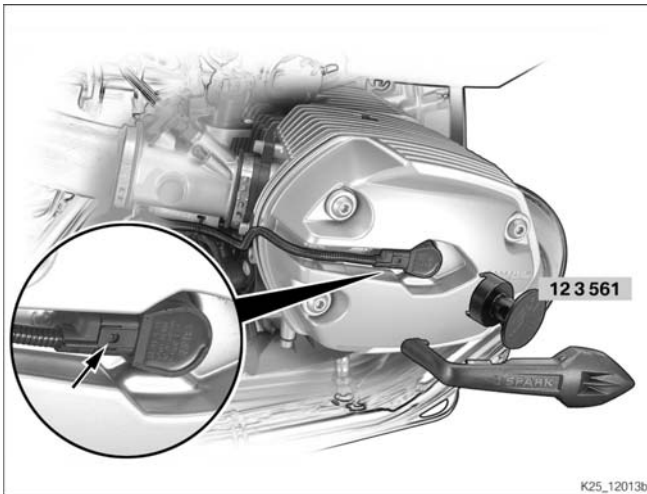
- Ignition is switched OFF

- ▶  Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



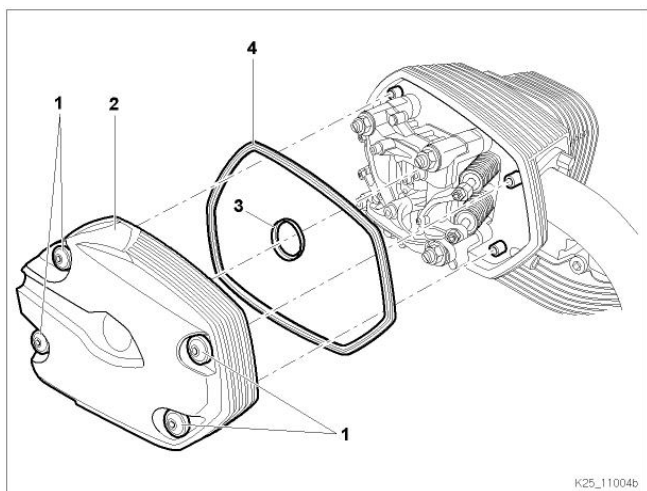
- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.


(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).

Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



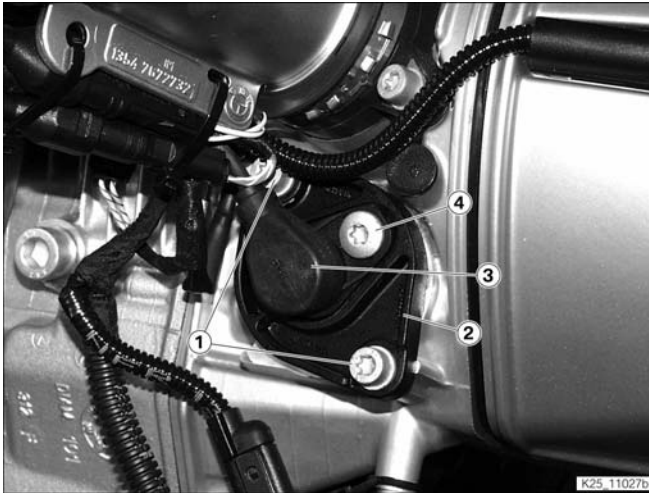
 Technical data			
Permissible projecting threaded length of the	free threaded length	max. 16.5 mm	

bottom left tiebolt on the inlet side			
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- Remove gaskets (3) and (4).

(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).

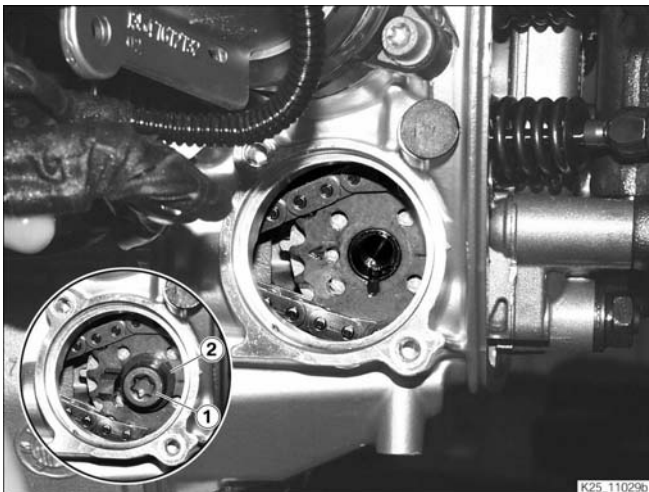


Note

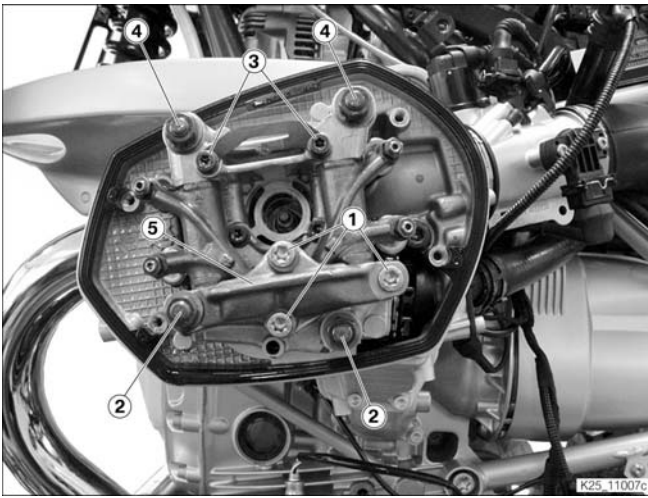
The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

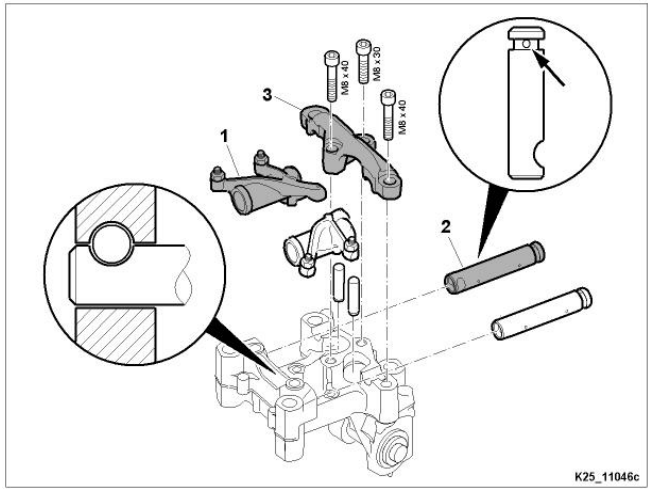
- Insert locating pin (No. 11 2 650) to lock the engine in position.



(-) Replacing both rocker arms with shafts



- Remove screws (1).
- Remove cylinder-head screws (2) with washers.
- Remove bearing cap (5).
- Remove screws (3) with contact springs.
- Release cylinder head nuts (4).




- Slip a pin of the correct size into bore (arrow) of the rocker-arm shaft and use it as a lever to work the shaft back and forth and ease it off the bearing.
- Remove rocker arm (1).
- Repeat this procedure with the second rocker arm.
- Oil the rocker-arm bore and install new rocker arm (1).
- Install new oiled rocker-arm shaft (2), making sure that the recess of the rocker-arm shaft is in line with the locating bore.
- Set the oiled ball socket of the rocker arm on the pushrod and secure the rocker arm with a rubber band.
- Repeat this procedure with the second rocker arm.
- Install bearing cap (3).
- Slightly tighten the screws.


► **Adjusting endplay of rocker arms**

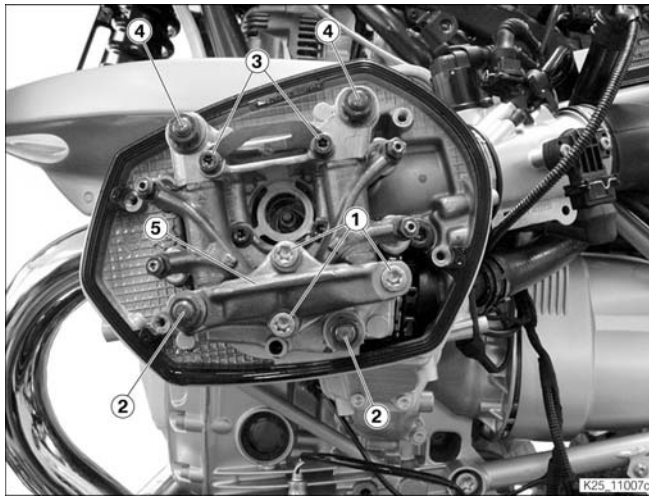
- Adjust the endplay of the rocker arms by moving the bearing cap to **minimum play**.



 Technical data			
Endplay, rocker arm		0.05 - 0.4 mm	


- Tighten screws (1).

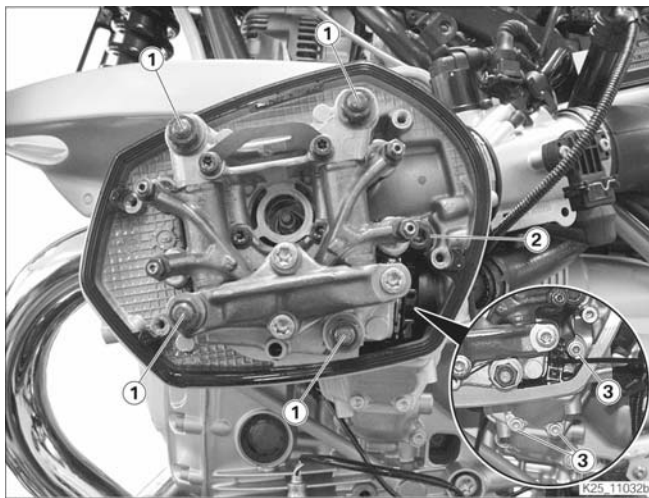
 Tightening torques		
Timing-gear carrier,	19 Nm	



camshaft bearing, bearing cap left/right, M8 x 30		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	

- Install screws (3) with contact springs.

 Tightening torques		
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 30	19 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 40	18 Nm	
Timing-gear carrier, camshaft bearing, bearing cap left/right, M8 x 65	15 Nm	




 **Attention**

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

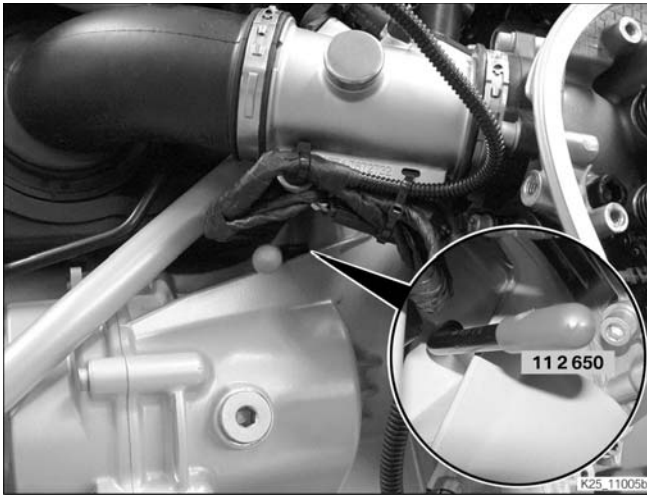
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	

Screw, M6 x 30	9 Nm	
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(-) Removing TDC locating pin

- Remove TDC locating pin (No. 11 2 650) .



(-) Adjusting valve clearance

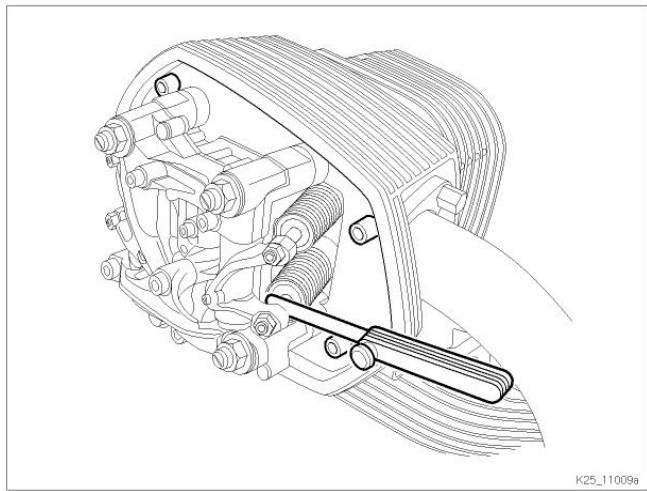
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

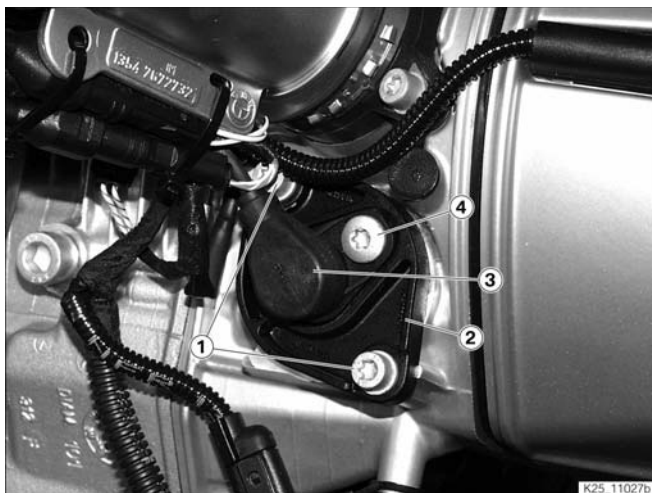
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



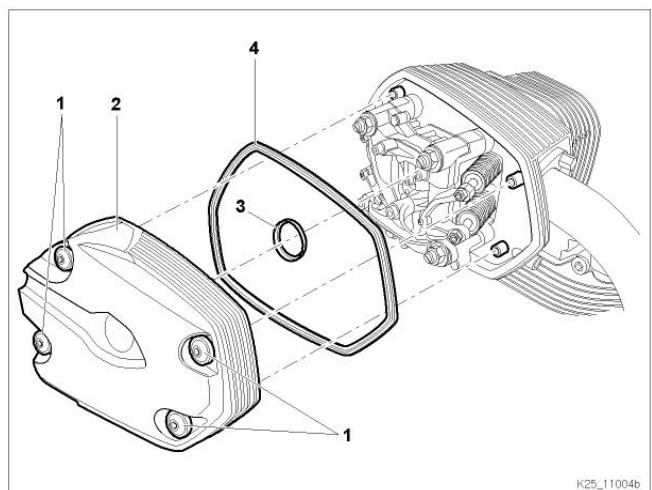
Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.


Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

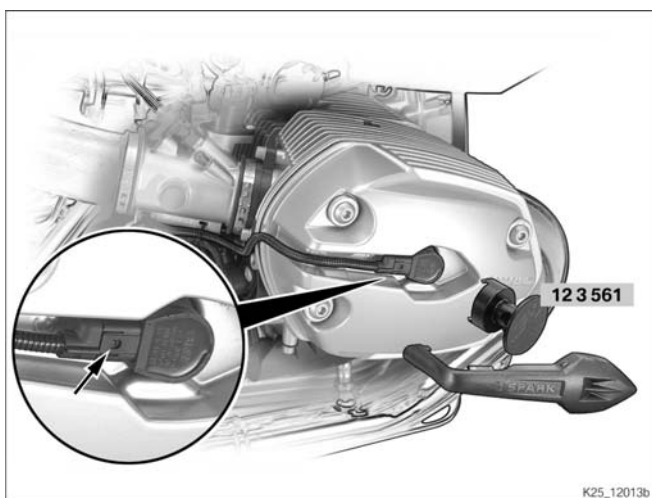
(-) Installing cylinder head cover



- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	

(-) Installing direct ignition coil



- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

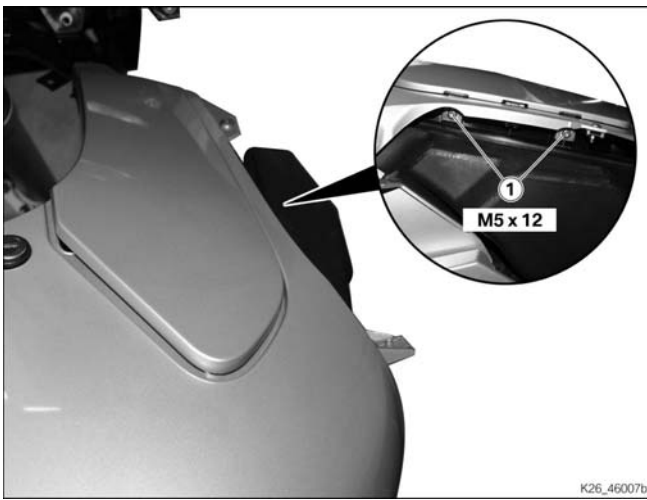
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



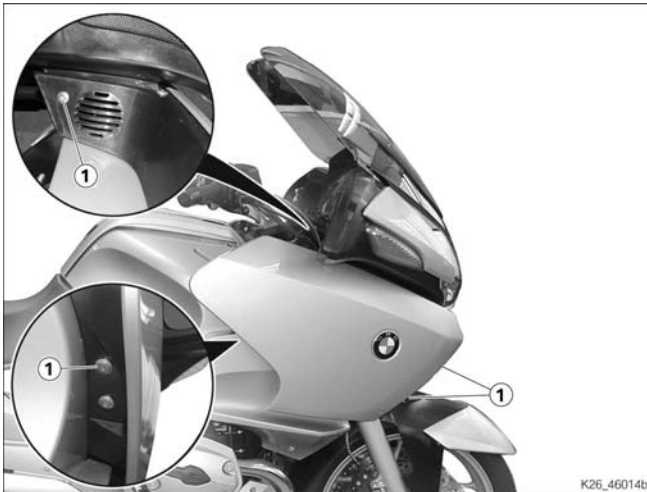
(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



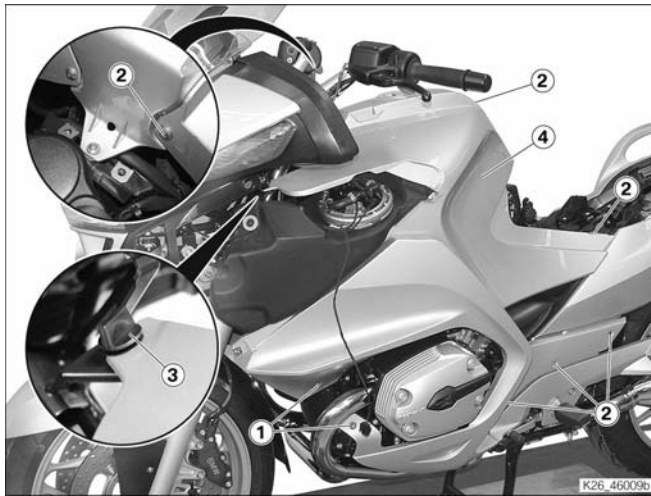
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

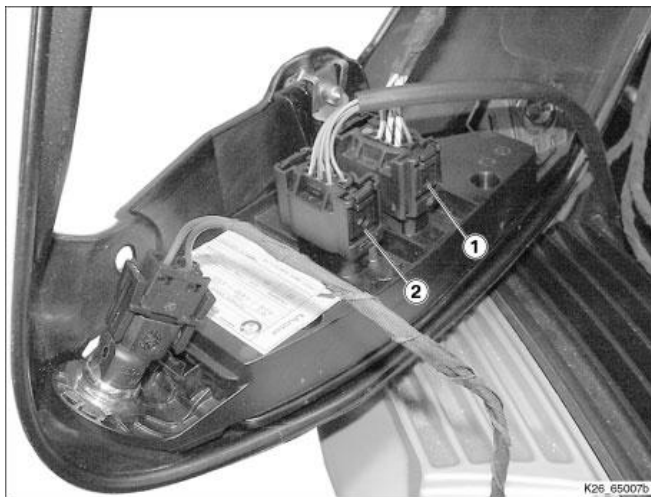
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



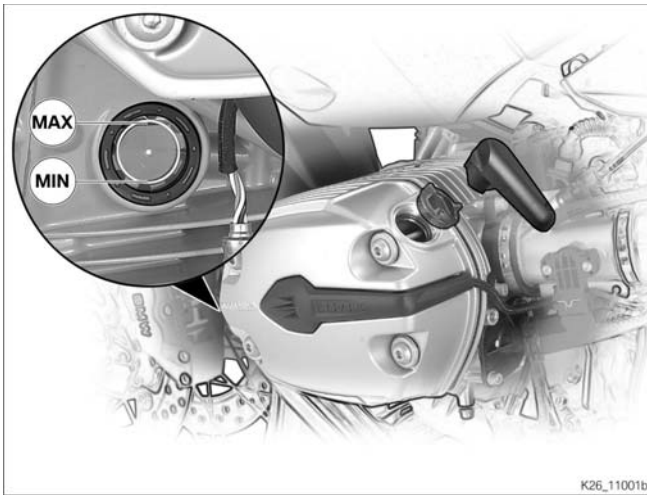
Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 34 004 Adjusting valve clearance**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



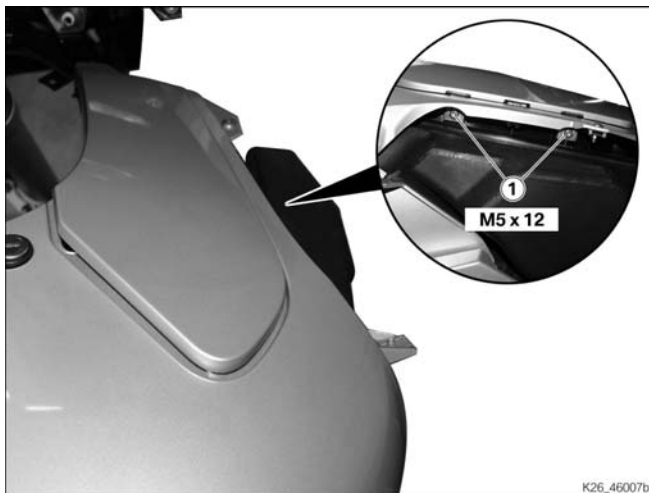
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing trim panels

- Undo front screw (1) from both bottom sections of the fairing.



(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF

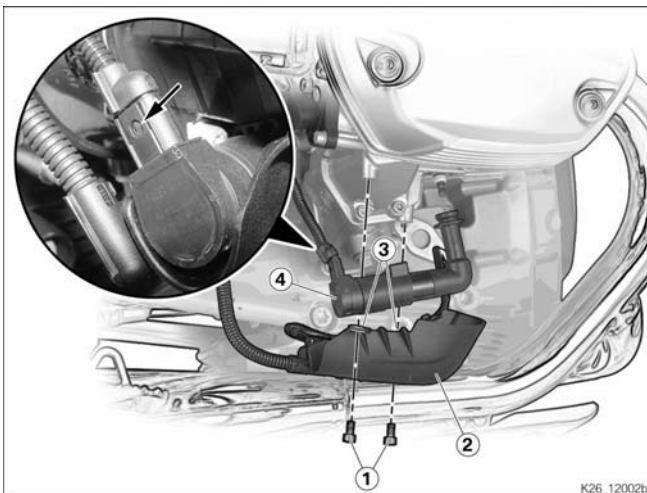


- Slacken screws (1) and remove cover (2) with sleeves (3).

⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing secondary spark plug



- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.

(-) Checking condition of spark plugs

- Visually inspect the spark plugs.
- If the appearance of the spark plugs is abnormal, ascertain and rectify the cause.

(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

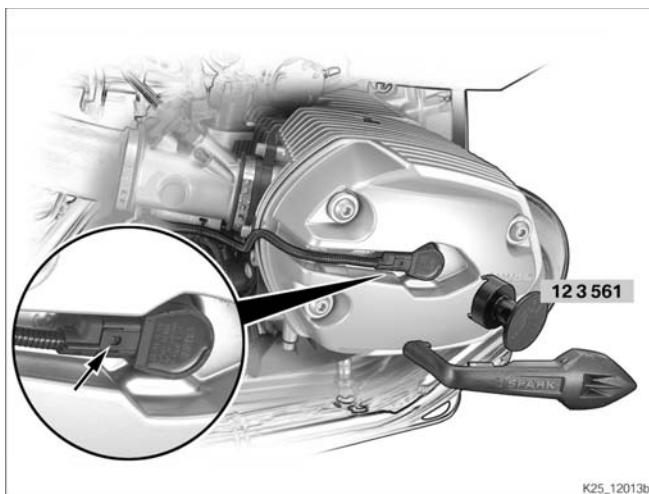


- Remove the primary spark plug cover.

⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

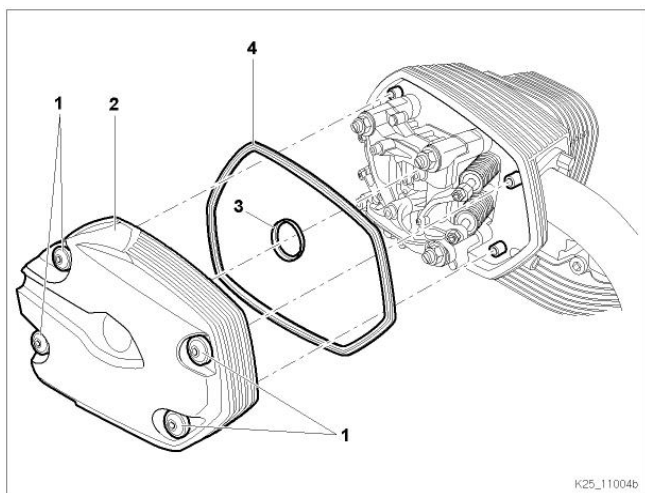
(-) Removing cylinder head cover

- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).

📄 Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.





Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

(-) Setting engine to firing TDC



- Engage the highest gear and turn the rear wheel until the piston of the cylinder in question is at firing TDC (TDC = top dead centre).
- » The inlet and exhaust valves in the cylinder concerned are closed; those of the other cylinder are at overlap.
- You can make sure the cylinder is at TDC by inserting locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

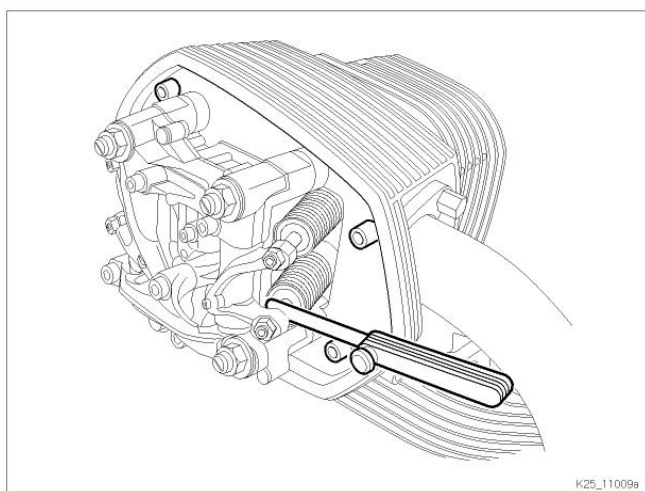
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

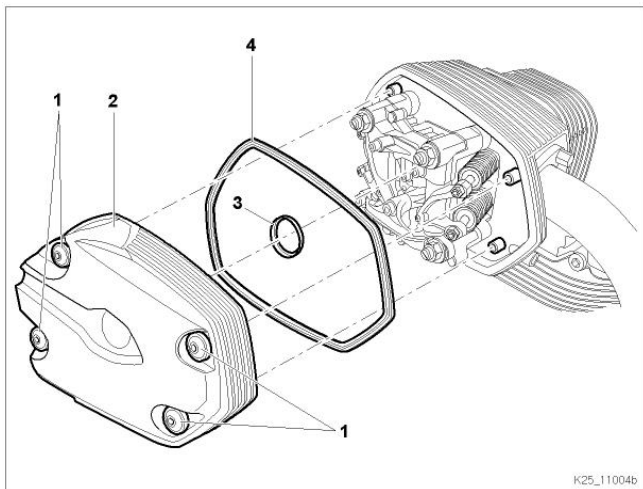
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.


 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

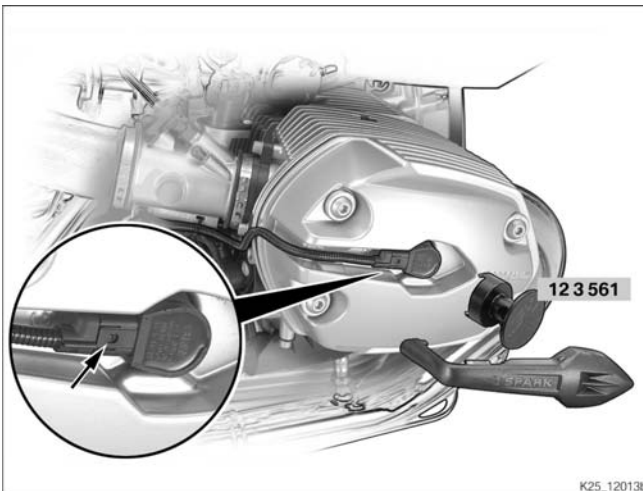
(-) Installing cylinder head cover



- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	


(-) Installing direct ignition coil

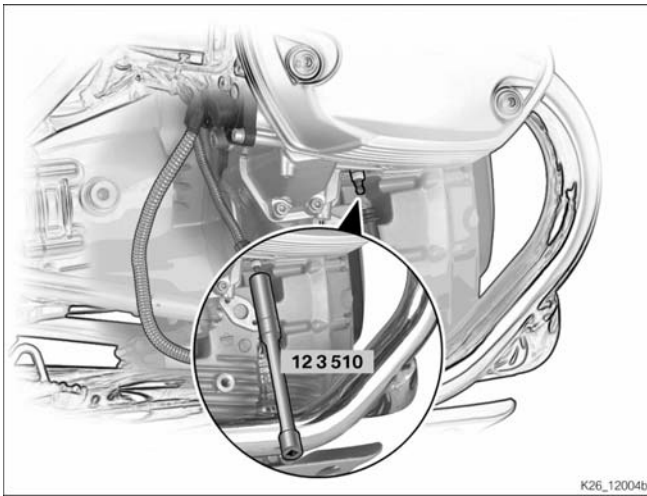


- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.

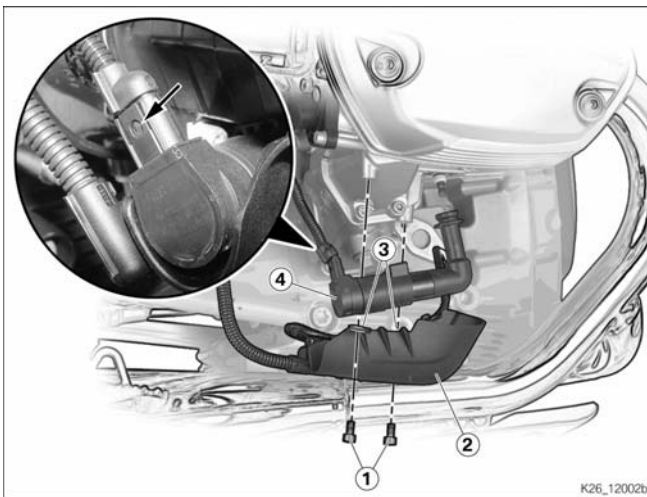
 Tightening torques		
Secondary spark plug to	Initial	



cylinder head, M12 x 1.25, Thread free of oil and grease	tightening and retightening step, 23 Nm	
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Technical data		
Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE

(-) Installing secondary spark plug coil



- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.

Consumables/lubricants		
Talcum powder	Assembly aid	

- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	

(-) Removing TDC locating pin



- Remove TDC locating pin (No. 11 2 650) .

(-) Securing trim panels

- Install front screw (1) in both bottom sections of the fairing.



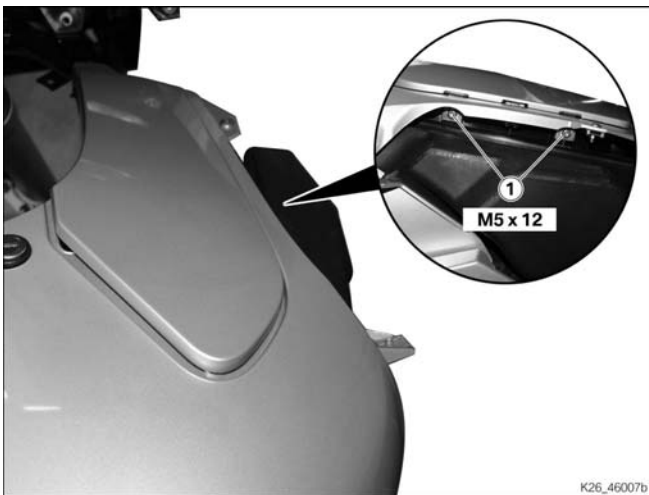
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

11 34 020 Replacing one valve



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



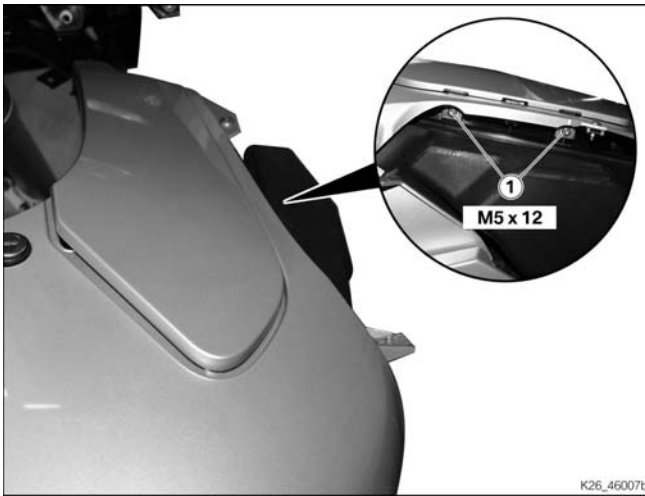
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



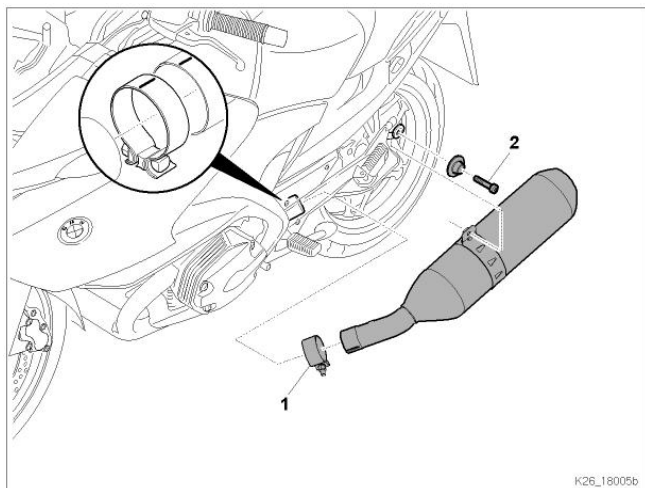
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

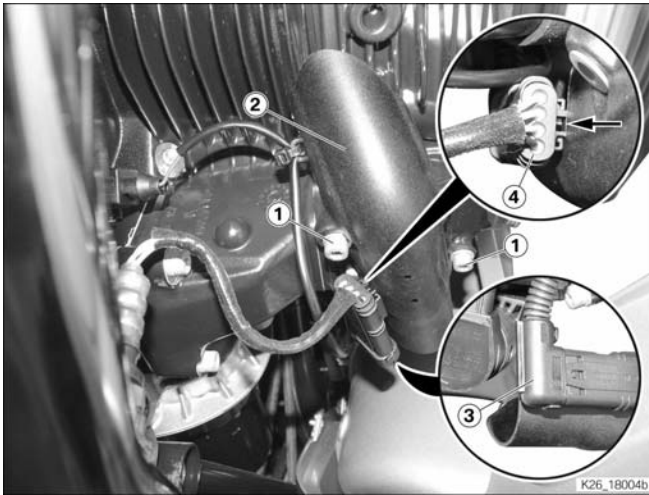
- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



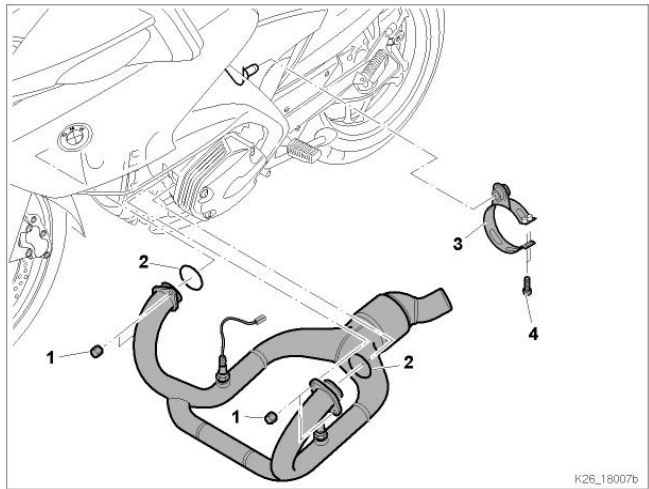
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.

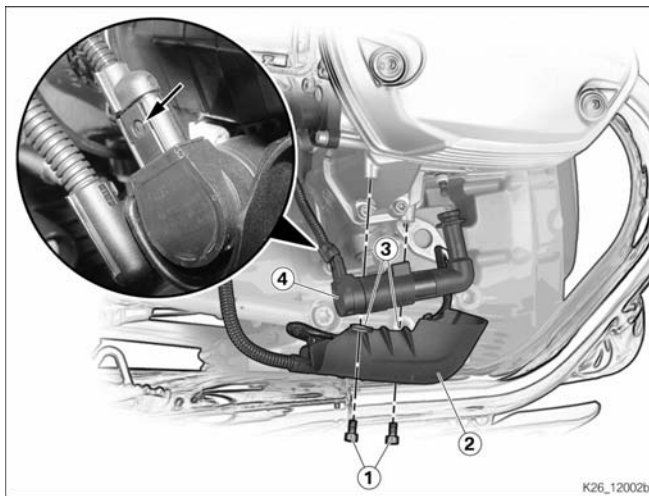
(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF



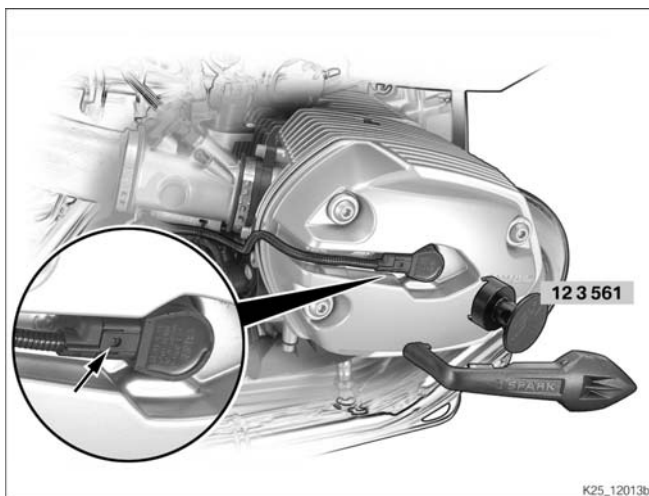
- Remove the primary spark plug cover.

Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.



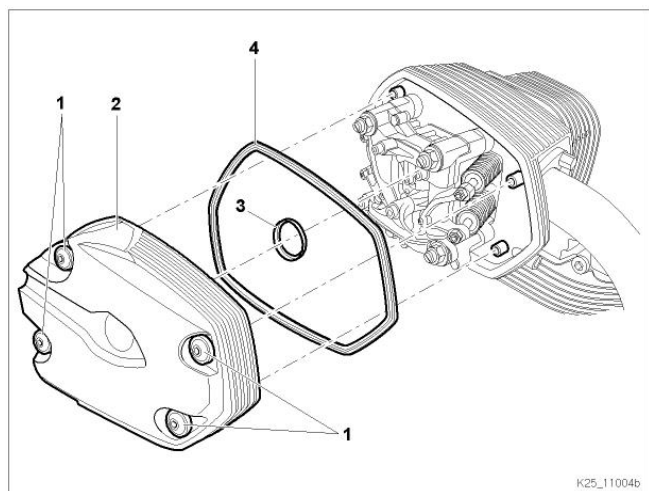
(-) Removing cylinder head cover


- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



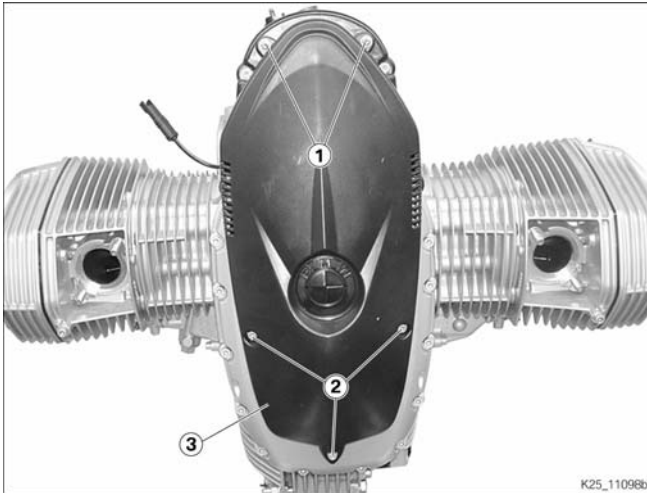
 Technical data			
Permissible projecting threaded length of the	free threaded length	max. 16.5 mm	

bottom left tiebolt on the inlet side			
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- Remove gaskets (3) and (4).

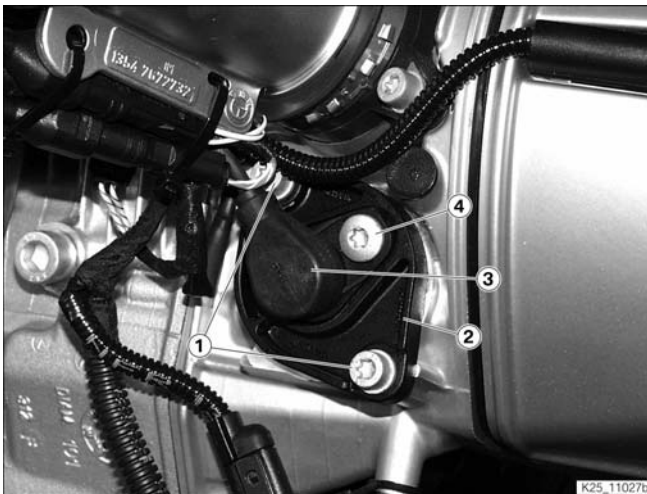
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

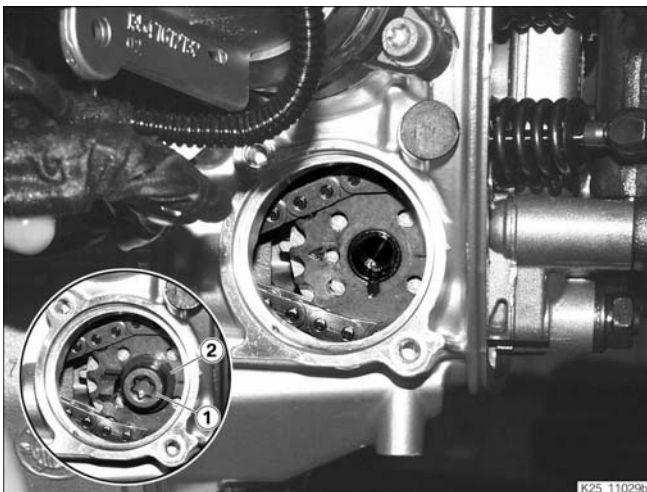
- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is at firing TDC (TDC = top dead centre).

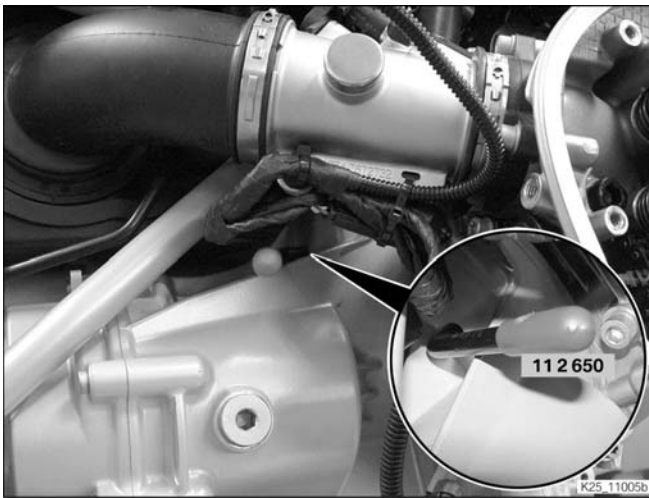


Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.





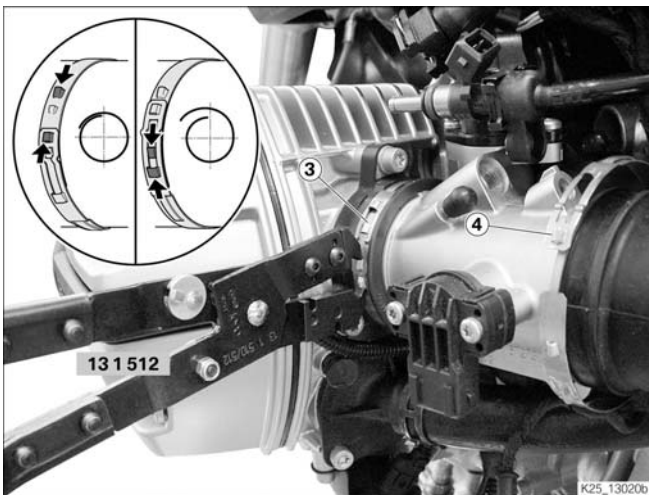
- Insert locating pin (No. 11 2 650) to lock the engine in position.

(-) Disconnecting plugs of engine sensors, right



- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).

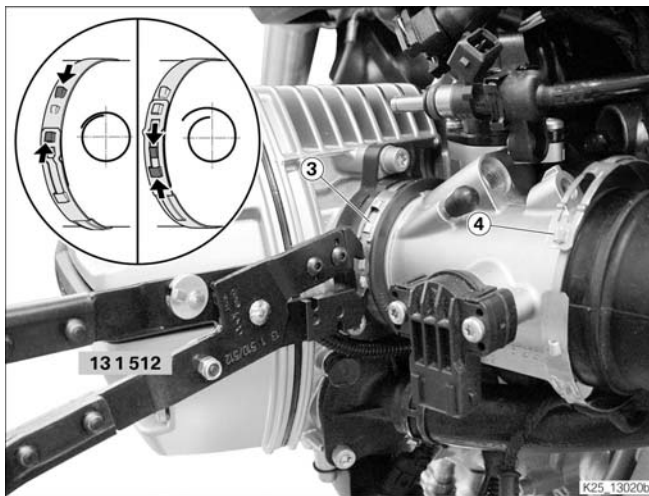
(-) Disconnecting intake air pipe from throttle-valve stub



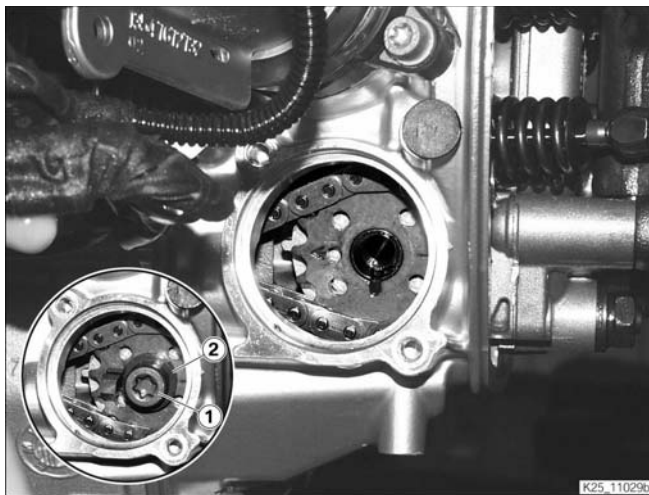
- Open clips (4) on left and right with pliers (No. 13 1 512) .

(-) Disconnecting right throttle-valve stub

- Open hose clips (3) at the right throttle valve stub with pliers (No. 13 1 512) .



- Cut through the cable tie (arrow) on the right.
- Disconnect plug of right idle actuator (1).
- Pull off the throttle-valve stub on the right and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.



(-) Removing trigger for camshaft sensor

- Slacken screw (1).



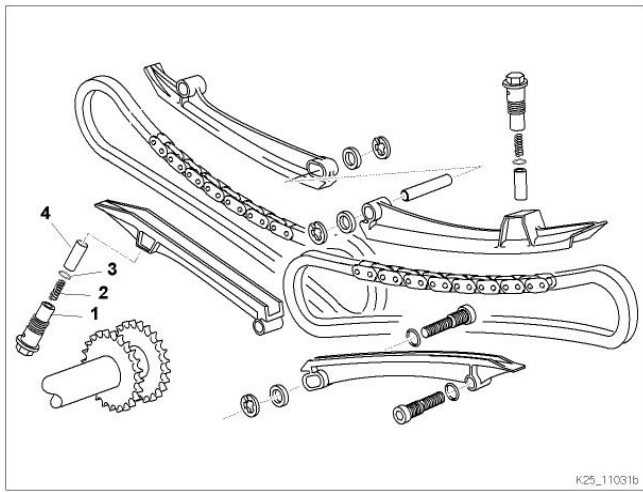
Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with trigger for camshaft sensor (2).

(-) Removing right chain tensioner

- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.



(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

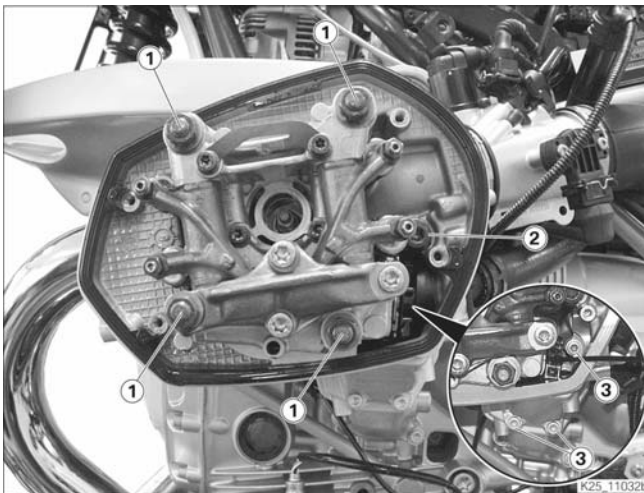
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



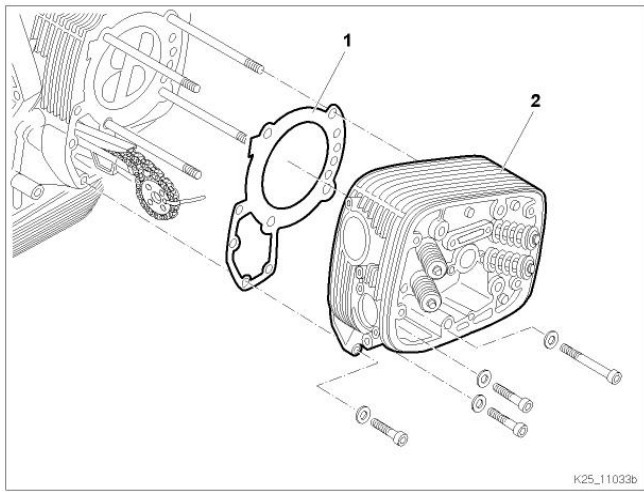
Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



K25_11033b

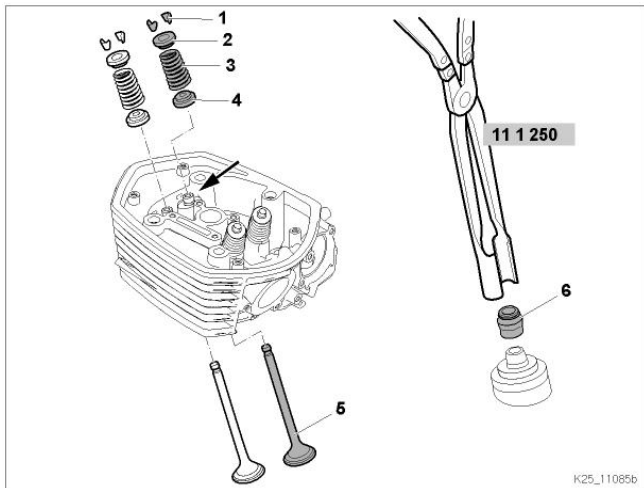
(-) Removing valve

- Lay the cylinder head on a clean, non-abrasive surface; take care not to damage the sealing faces.
- Install valve spring compressor (No. 11 5 697), (No. 11 5 691), (No. 11 5 696), (No. 11 5 695) and (No. 11 5 692).
- Compress the valve springs.



K25_11095b

- Separate valve collets (1) from the valve spring retainers by tapping **lightly** on the bottoms of the valves (valve heads) and remove the valve collets.
- Release the valve springs.
- Remove upper spring retainer (2), Valve spring (3) and lower spring retainer (4).
- Remove valve (5).



K25_11085b

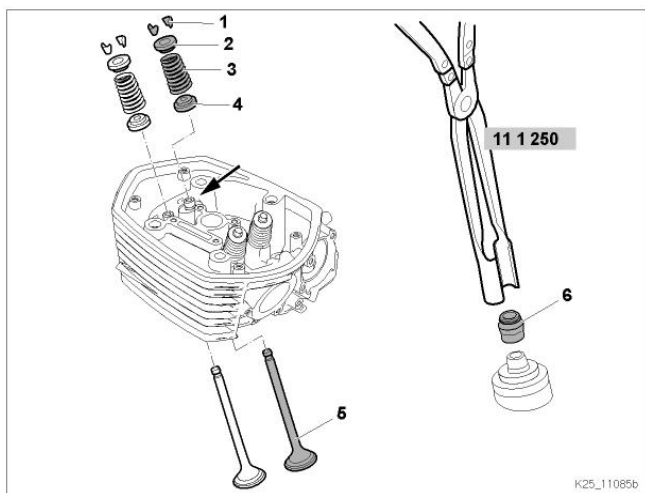
(-) Installing valve

- Install valve (5) with the stem oiled.

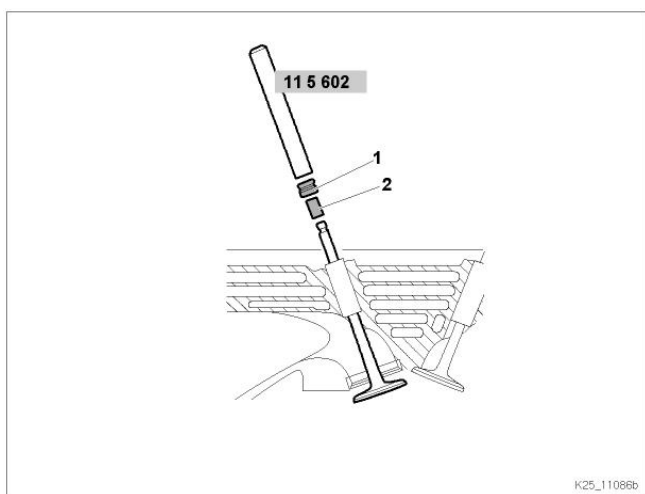


Note

The valve stem seal must always be replaced whenever

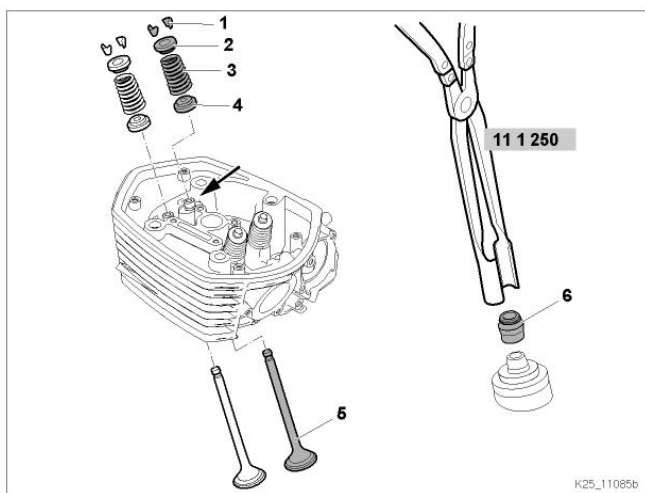


a valve is removed.



► **Installing valve stem seal**

- Shrink a short length of shrink-down plastic tubing (2) onto the end of the valve stem.
- Install valve stem seal (1) with drift (No. 11 5 602).
- Remove shrink-down plastic tubing (2).



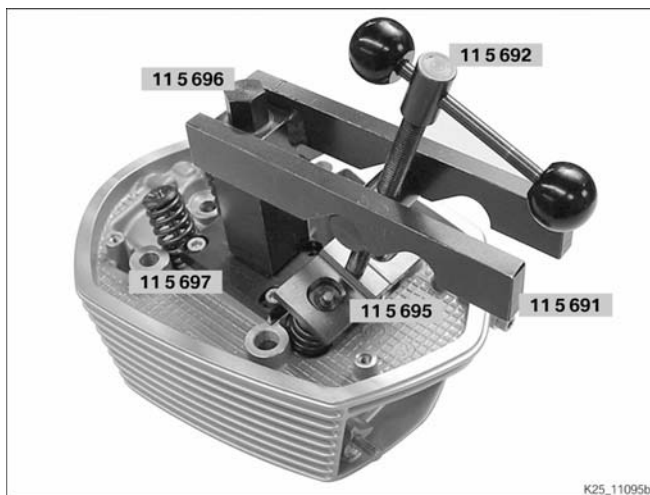
- ◀ Install lower valve spring retainer (4), Valve spring (3) and upper valve spring retainer (2), making sure that the valve spring is installed with the coloured mark down.
- Compress the valve springs.

! Attention

Nature: If they are not correctly installed, the valve collets can drop out of their seats when the valve moves. If this happens the valve is no longer secured and can drop into the combustion chamber.

Avoidance: Make sure that valve collets are correctly seated in the valve stem grooves.

- Install valve collets (1) with a blob of grease (to facilitate assembly).
- Slowly release the valve springs.
- Remove valve spring compressor (No. 11 5 697), (No. 11 5 691), (No. 11 5 696), (No. 11 5 695) and (No. 11 5 692).



(-) Checking valves for leaks

Test

- Fill intake or exhaust port with fuel.

Result: Fuel escapes at the valve heads.

Measure:

- Rework valve seat.

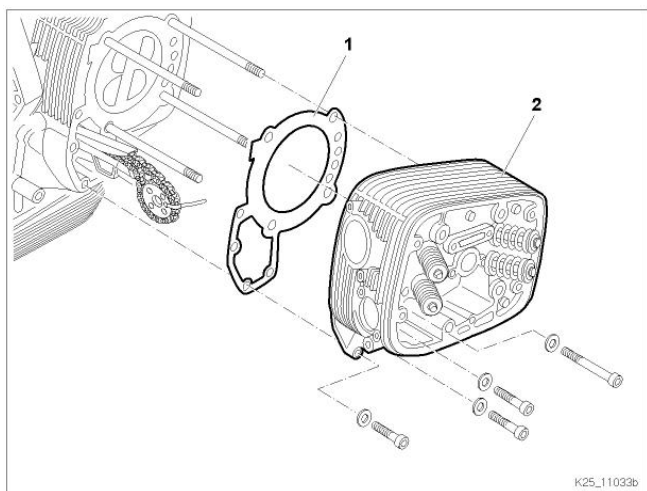
Result: No fuel escapes at the valve heads.

Measure:

- Valve seat does not need to be reworked.

(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



⚠ Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

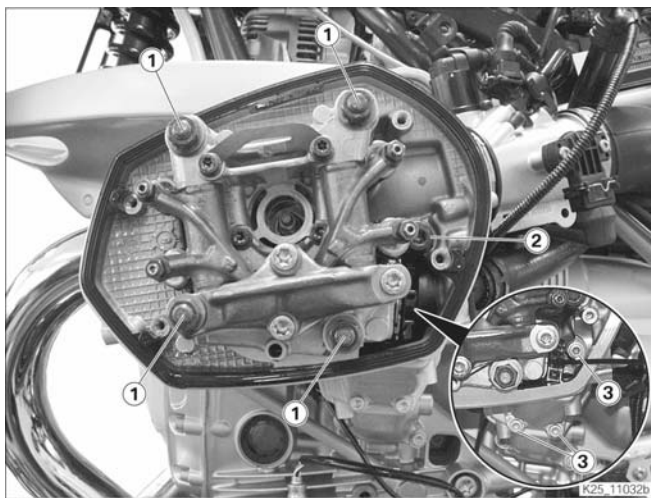
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

⚠ Attention


Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after

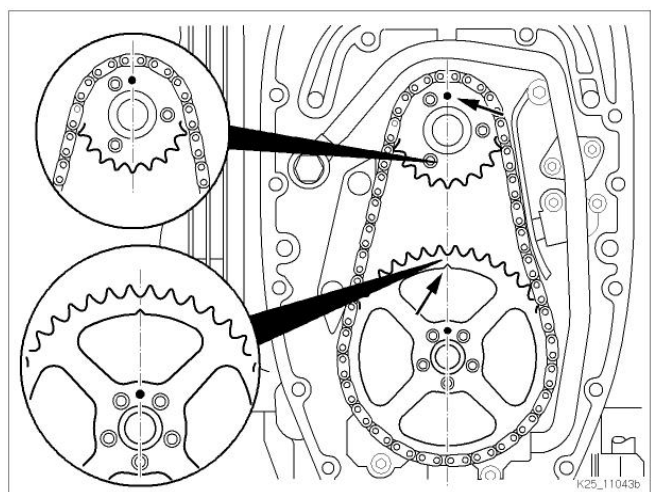


1000km / 600mls at the latest.

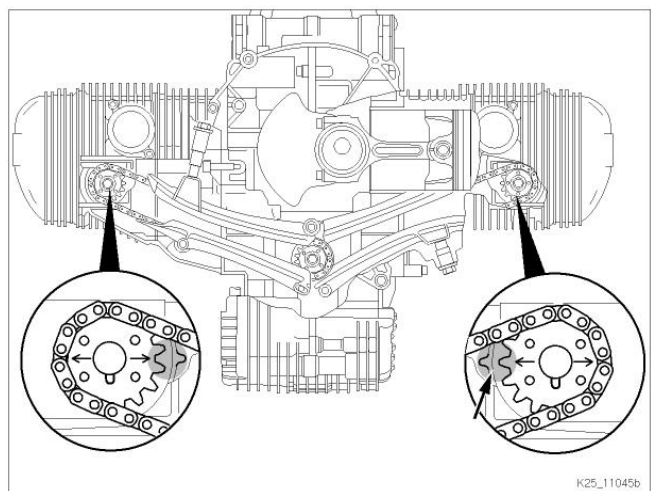
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, right (cylinder No. 1)



- Make sure that the crankshaft and countershaft are in the "**firing TDC, right cylinder**" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

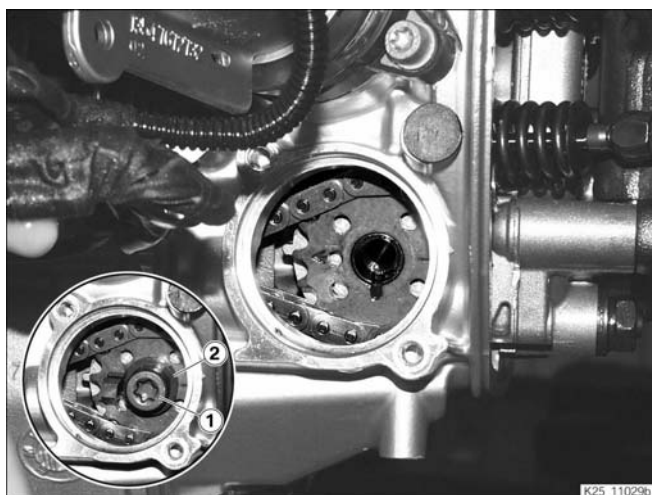


- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



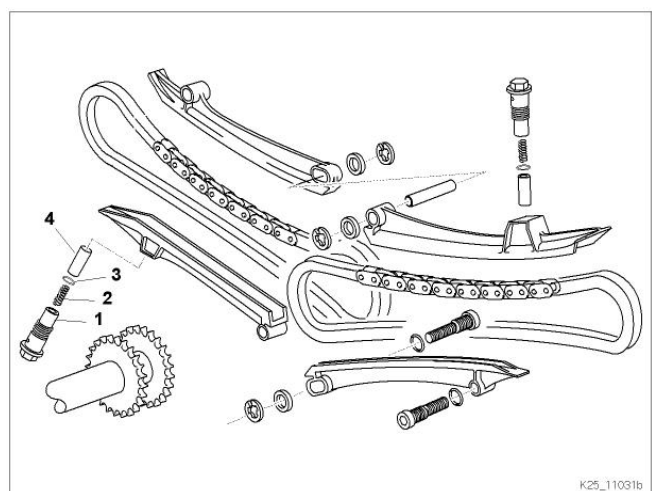
► Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



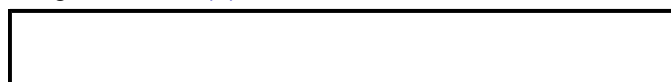
- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.

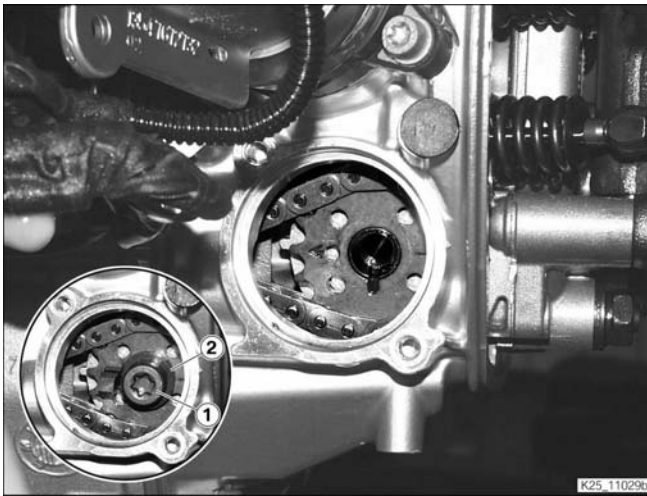


 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).





Tightening torques

Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	
--	-------	--

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

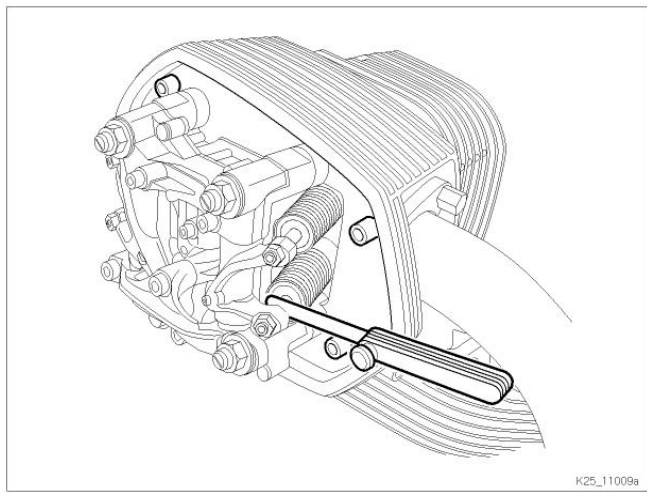
Test


- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.



 Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	
Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	

Result: Valve clearance is out of tolerance.

Measure:

- Correct valve clearance with adjusting screw and tighten locknut.



Tightening torques

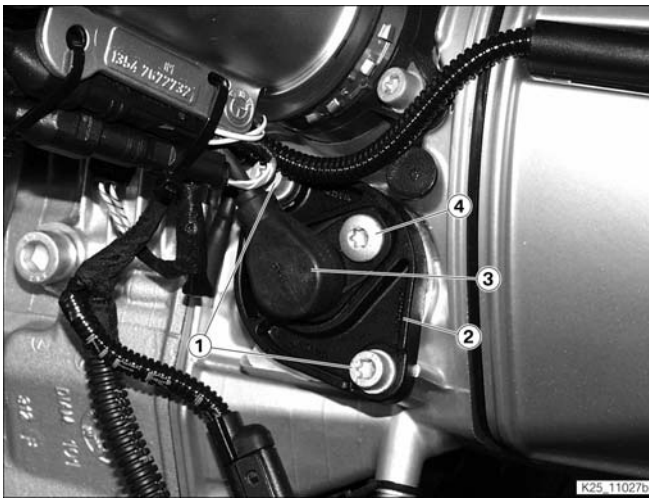
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	
--	------	--

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



Attention

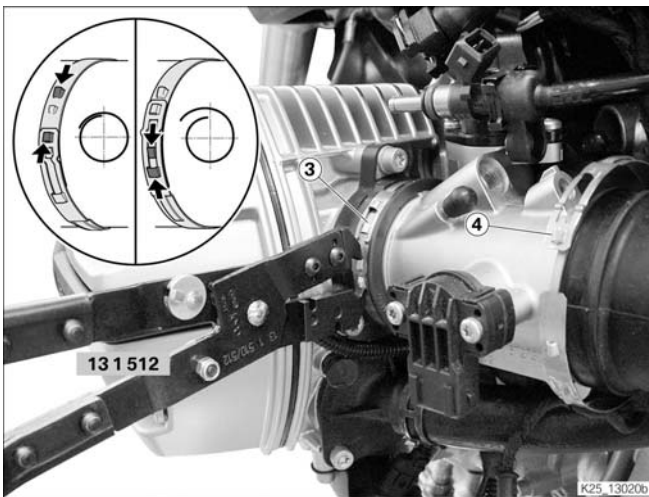


Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

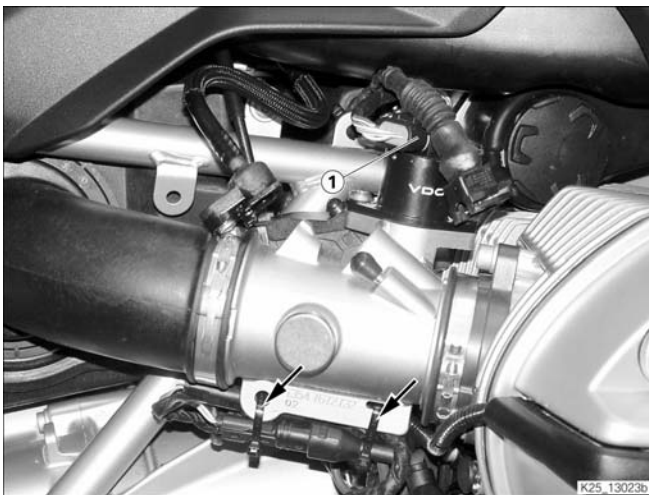
Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

(-) Installing right throttle-valve stub



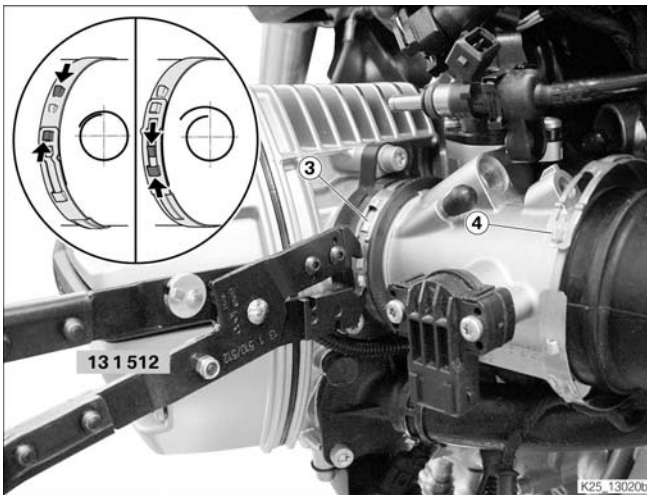
- Remove the cover from the intake.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamp (3) and close it with pliers (No. 13 1 512).



- Connect plug of right idle actuator (1).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stub on right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing air intake pipe

- Install the intake pipe between the intake air silencer and the throttle-valve stub.




- Secure hose clips (4) on the throttle-valve stubs.
- Close hose clips with pliers (No. 13 1 512) .



(-) Connecting plugs of engine sensors, right

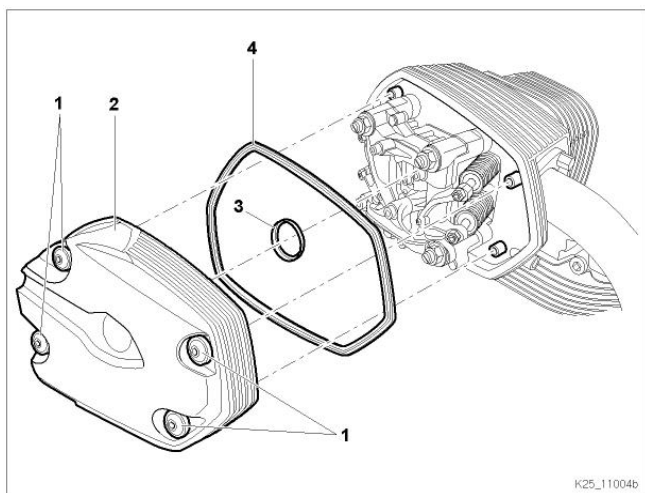
- Secure earth lead (1) to the cylinder head.

 Tightening torques		
left and right, M6 x 10	8 Nm	


- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

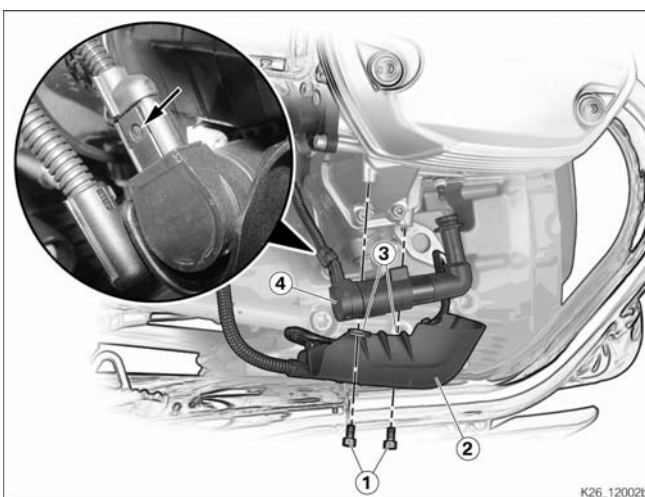
(-) Installing cylinder head cover

- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
-




Install and tighten the screws.

 Tightening torques		
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	




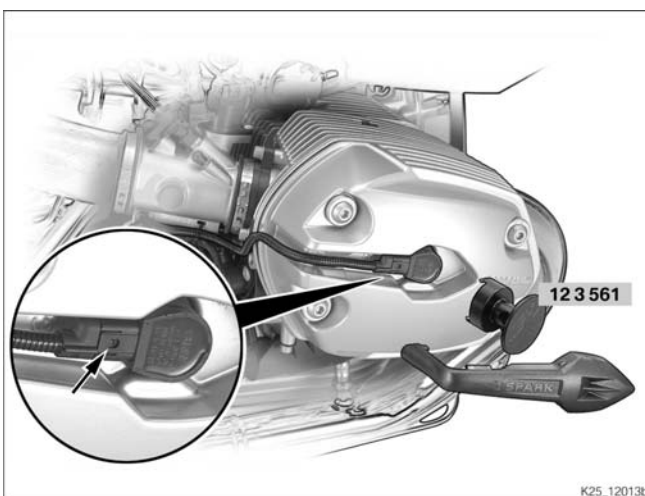
(-) Installing secondary spark plug coil

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.

 Consumables/lubricants		
Talcum powder	Assembly aid	

- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	

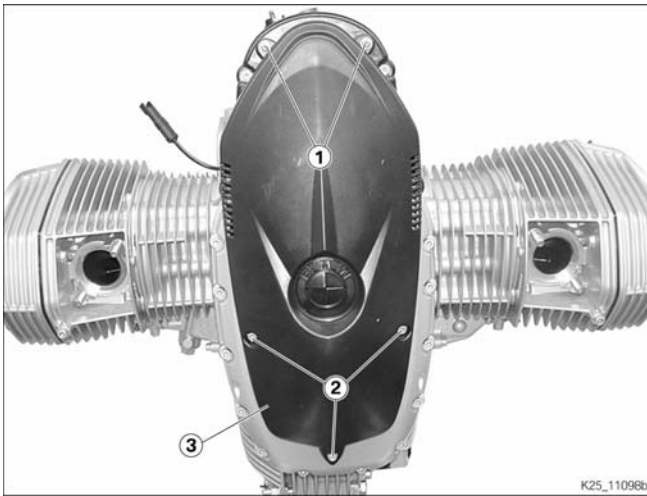



(-) Installing direct ignition coil

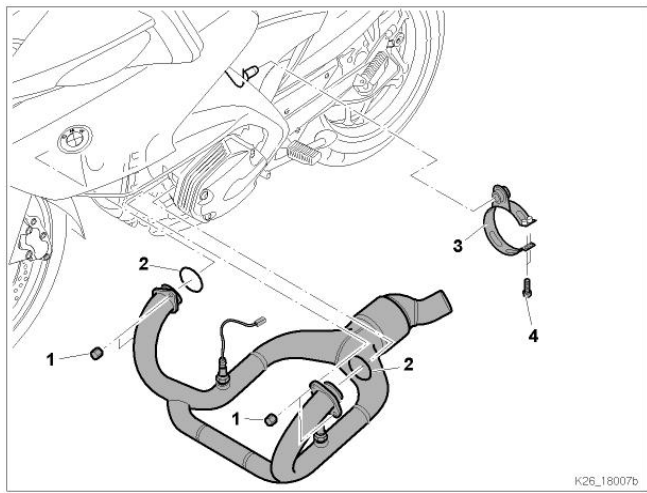
- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).




 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	




(-) Installing exhaust elbow


- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

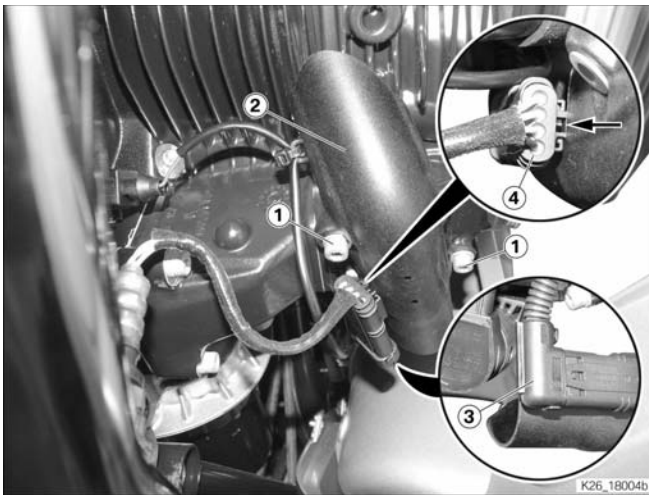
 Tightening torques		
Manifold to cylinder head, Acorn nut M8	21 Nm	

- Align the clamp (arrow) on the manifold and tighten screws (1).

 Tightening torques		
Clamp, elbow, rear, M6 x	8 Nm	




20		
Optimoly TA		



► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	

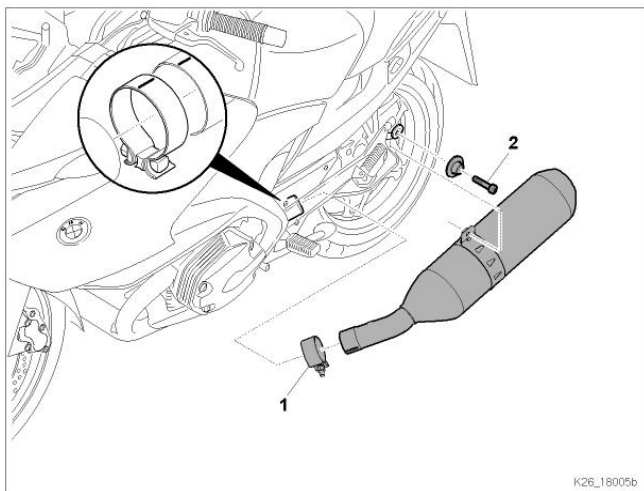


- Install front screw (1) in both bottom sections of the fairing.

◄ **(-) Installing silencer**

- Grease the inner face of Torca clamp (1).

		
Consumables/lubricants		



K26_18005b



K28_18007d

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

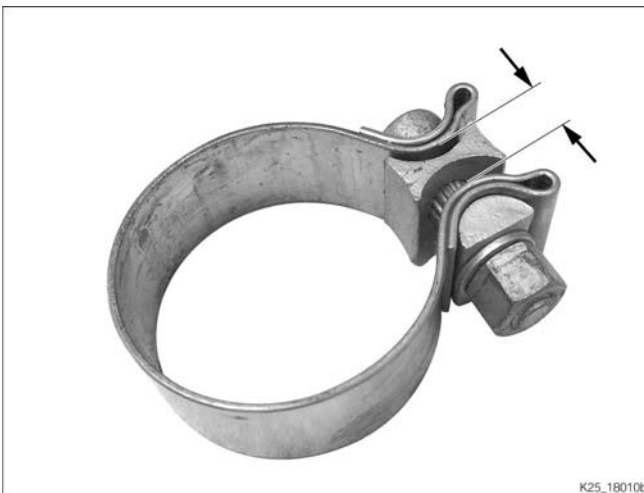
 Tightening torques		
---	--	--

End silencer to footrest support, M8	19 Nm	
--------------------------------------	-------	--

- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--



K25_18010b

► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
---	--	--

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
--	-------	--

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

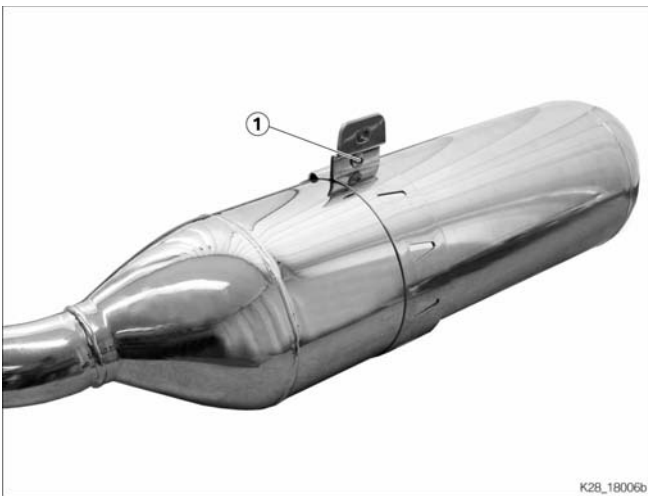
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




 **Attention**


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.


- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	




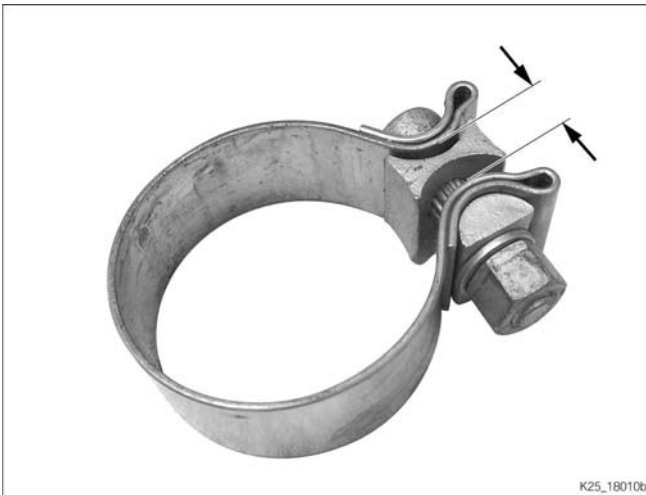
▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	



K25_18010b


Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



K26_18001b

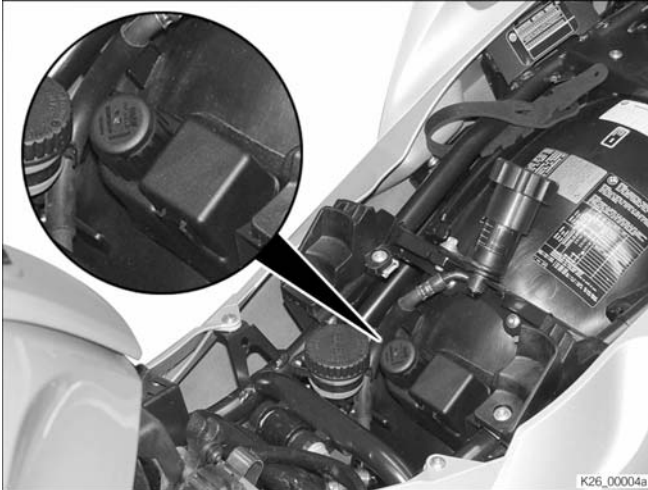


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software



and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

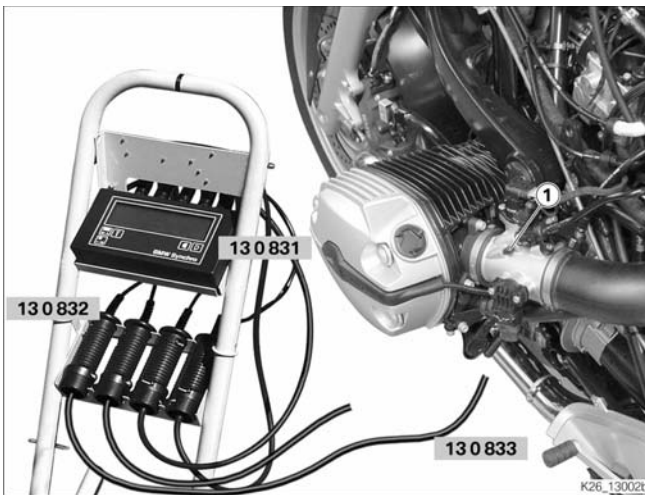
- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.

- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► **1. Checking idle**

Test



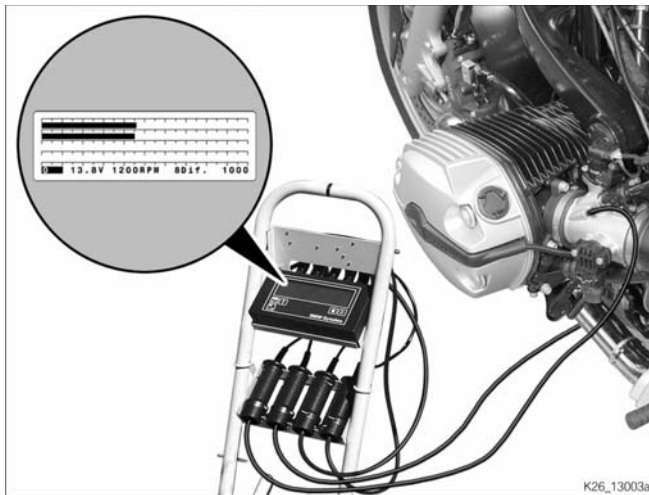
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

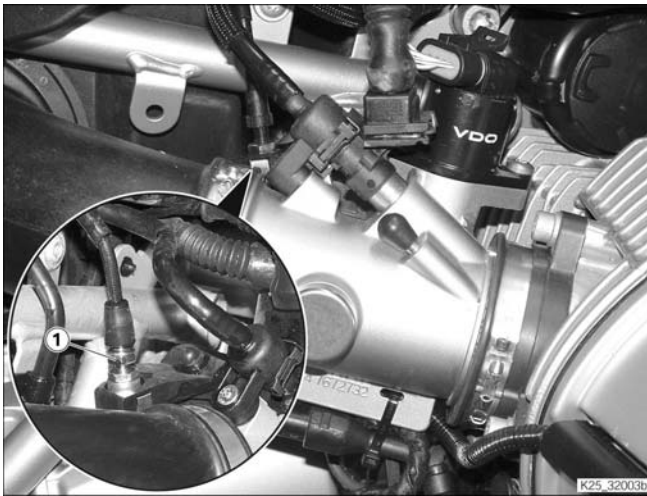
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) ,



(No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
 » Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

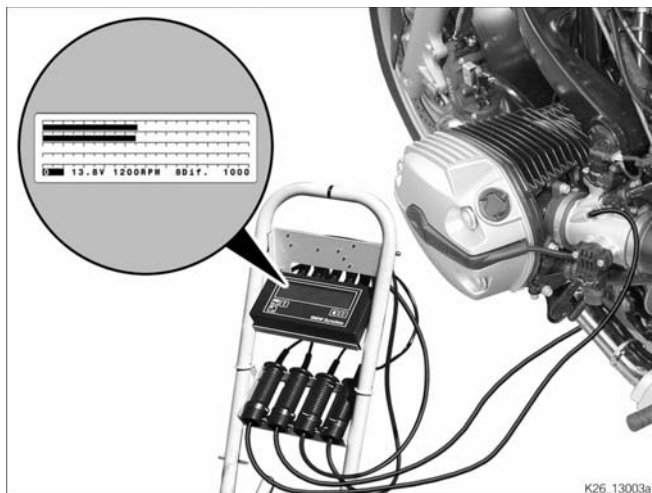
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic

system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

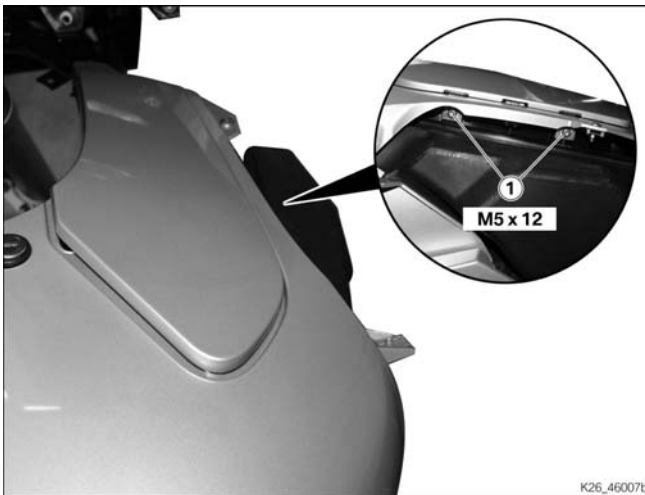
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



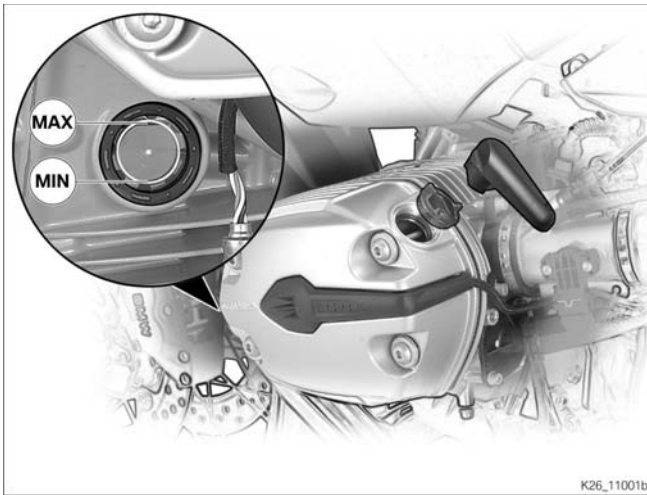
Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

11 34 040 Replacing valve stem seals



Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.



K26_46016a

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

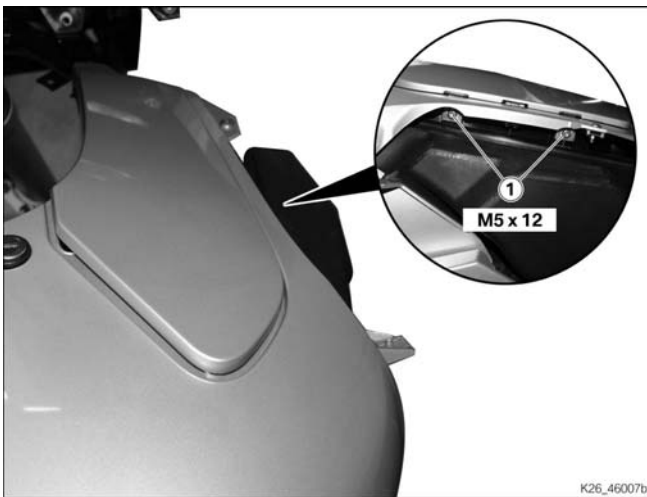
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



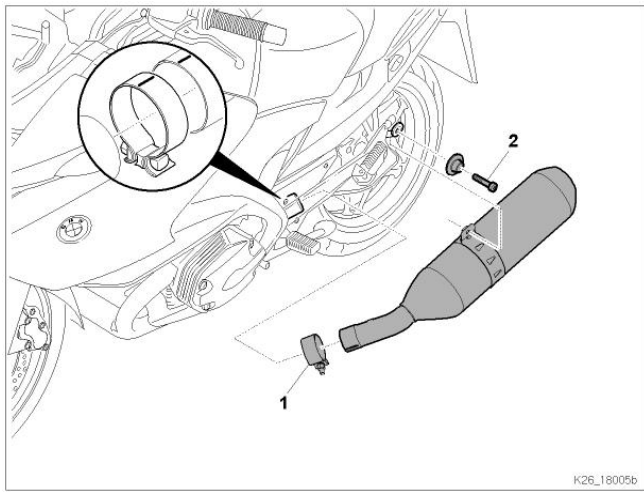
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



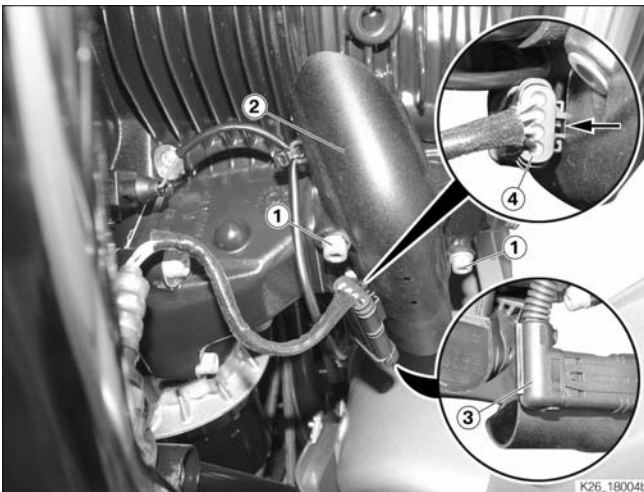
(-) Removing exhaust elbow

► Disconnecting both oxygen sensor plugs

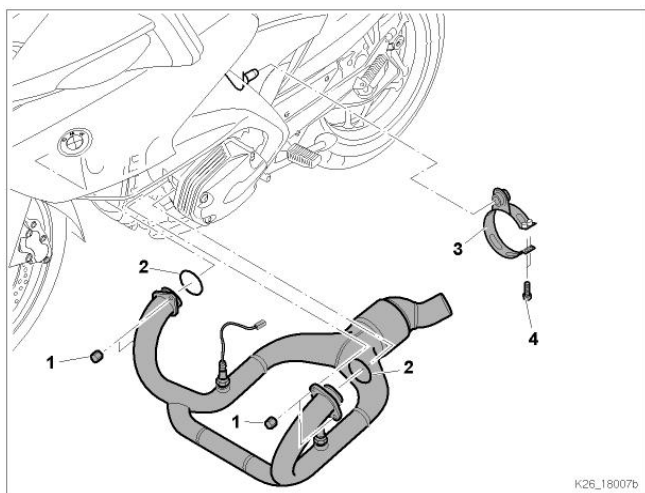
- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



- Remove nuts (1) from the manifold on left and right.
- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.



(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



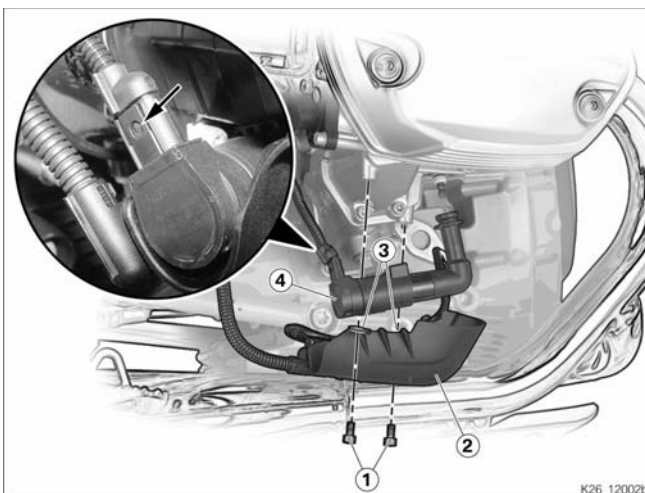
- Slacken screws (1) and remove cover (2) with sleeves (3).



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF



- Remove the primary spark plug cover.

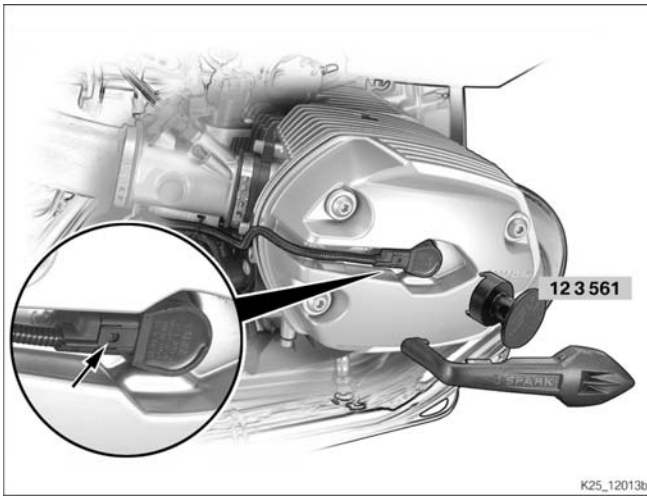


Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

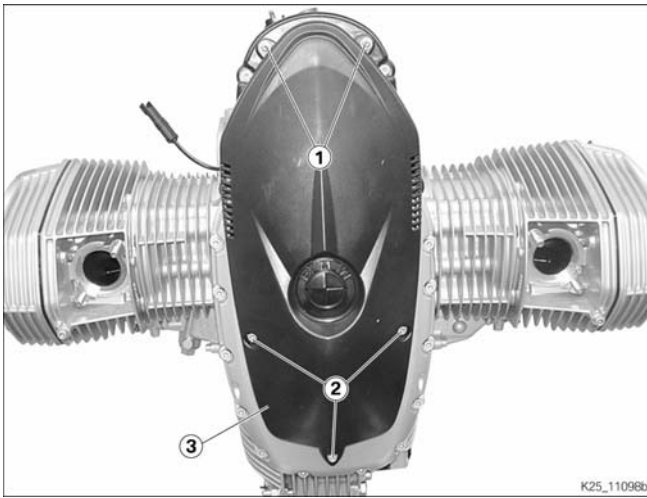
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.



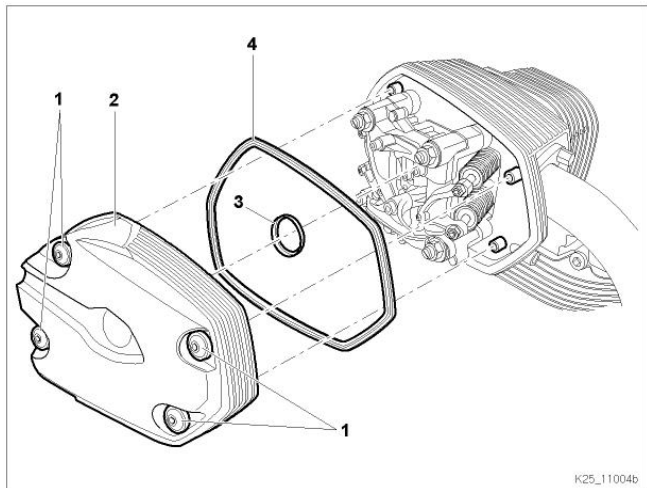
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing belt guard



- Remove screws (1) and (2).
- Remove belt guard (3).

(-) Removing cylinder head cover



- Catch escaping oil in a suitable container.
- Remove screws (1).
- Remove cylinder head cover (2).



Note

On account of engine design, however, the depth to which the tiebolt on the lower left on the inlet side can be screwed in is limited, and the projecting threaded shank is noticeably longer.



Technical data

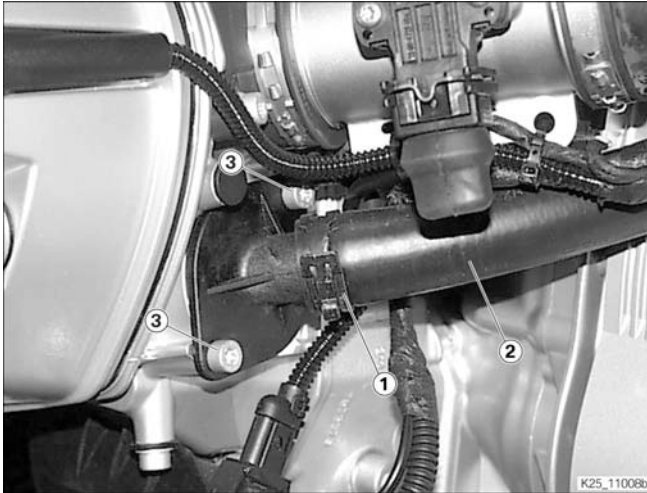
Permissible projecting threaded length of the bottom left tiebolt on the inlet side	free threaded length	max. 16.5 mm	
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- Remove gaskets (3) and (4).

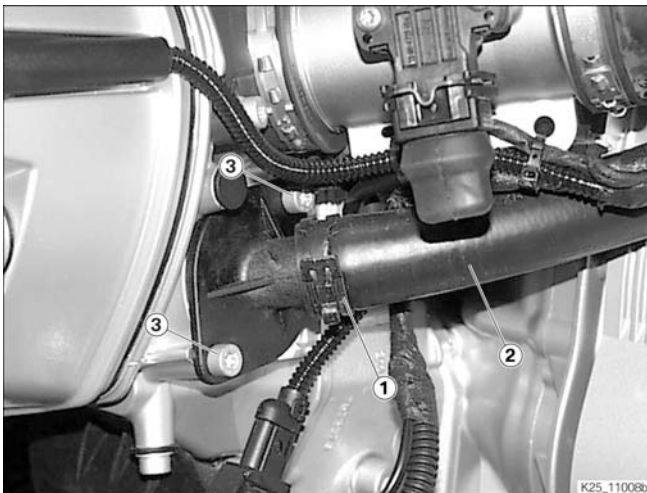
(-) Removing left camshaft cover

► Disconnecting hose for crankcase breather

- Expand clip (1) and push it along the hose to the rear.
- Disconnect hose (2) from the camshaft cover.

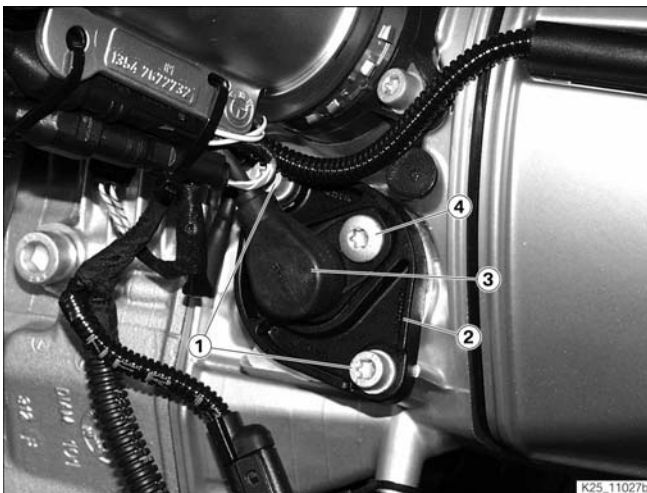


- Remove screws (3).
- Remove the camshaft cover complete with O-ring from the cylinder head.



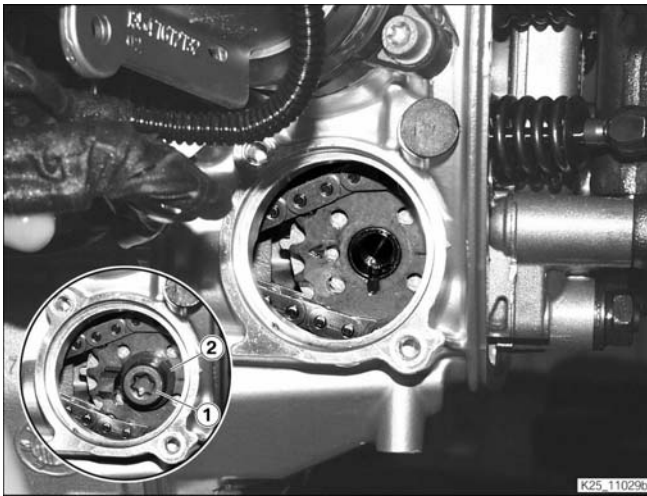
(-) Removing right camshaft cover

- Remove screws (1).
- Remove camshaft cover (2) complete with O-ring and camshaft sensor (3) from the cylinder head.



(-) Setting right cylinder to firing TDC

- By means of the crankshaft pulley, turn the engine in the normal direction of rotation until the right cylinder is



at firing TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The inlet and exhaust valves of the right cylinder are closed; those of the left cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.



- Insert locating pin (No. 11 2 650) to lock the engine in position.

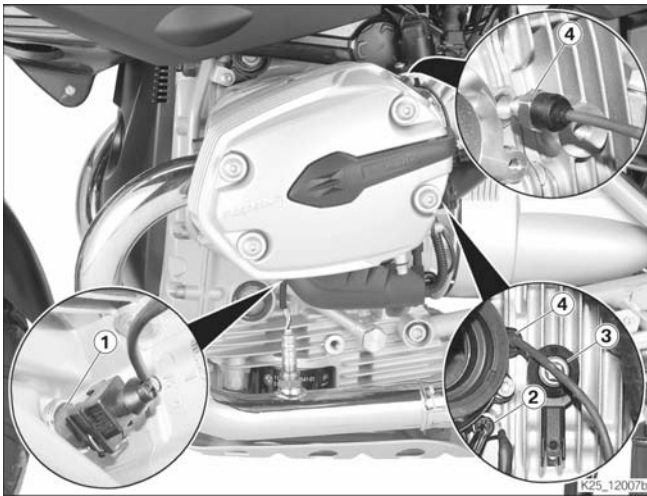


(-) Disconnecting plugs of engine sensors, right

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).

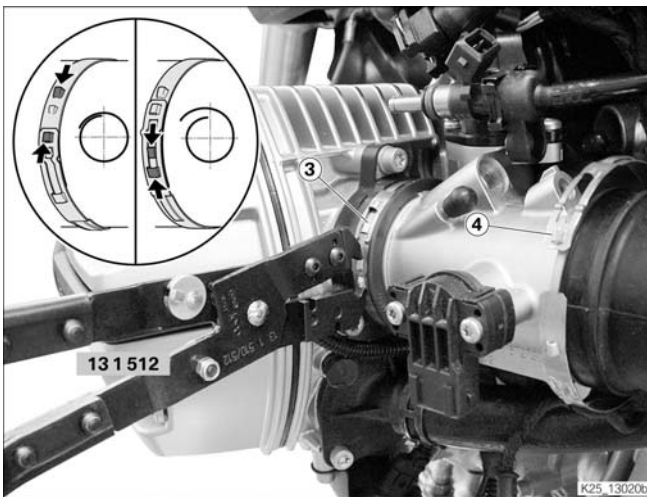
(-) Disconnecting plugs of engine sensors and switches, left

- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).

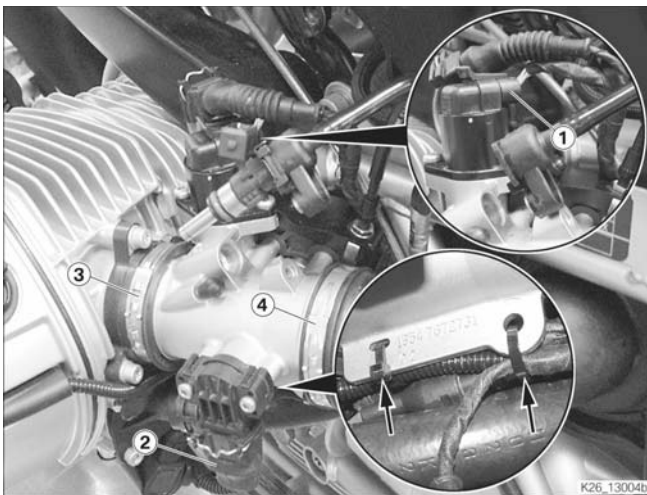


(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.



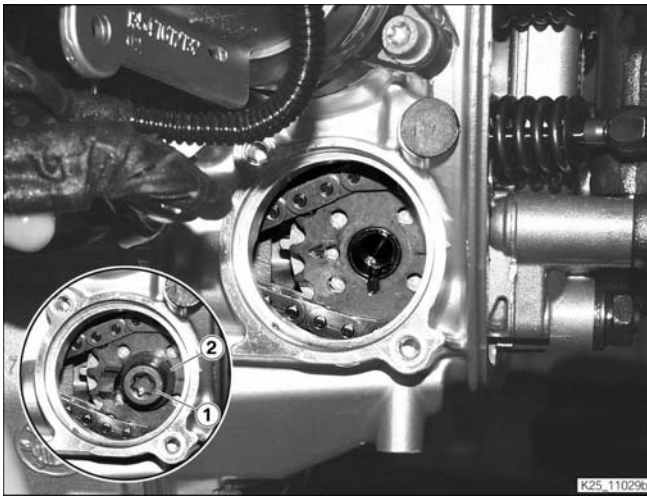
(-) Removing trigger for camshaft sensor

- Slacken screw (1).



Note

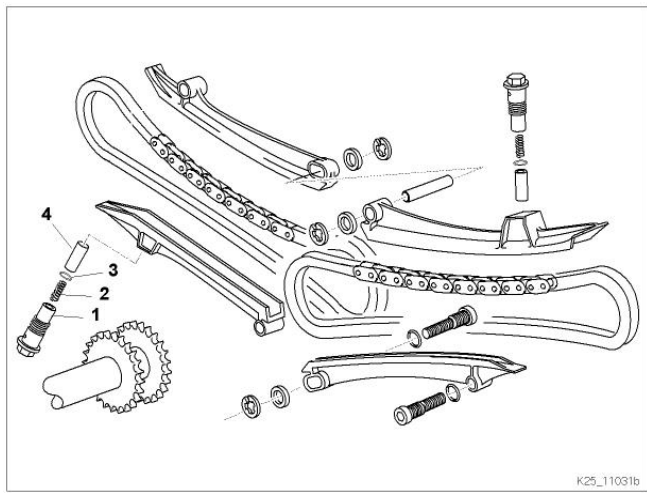
The timing-chain tensioners have to be installed when



the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with trigger for camshaft sensor (2).

(-) Removing right chain tensioner



- Remove chain tensioner (1) and dispose of sealing ring (3) in the approved, environmentally friendly manner.
- Remove spring (2) and piston (4) from the cylinder.

(-) Removing right camshaft sprocket

- Use cable ties to secure the timing chain to the camshaft sprocket.



Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing right cylinder head

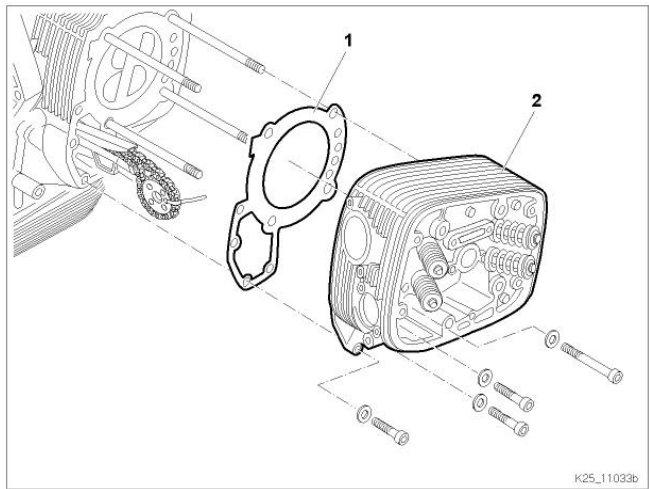
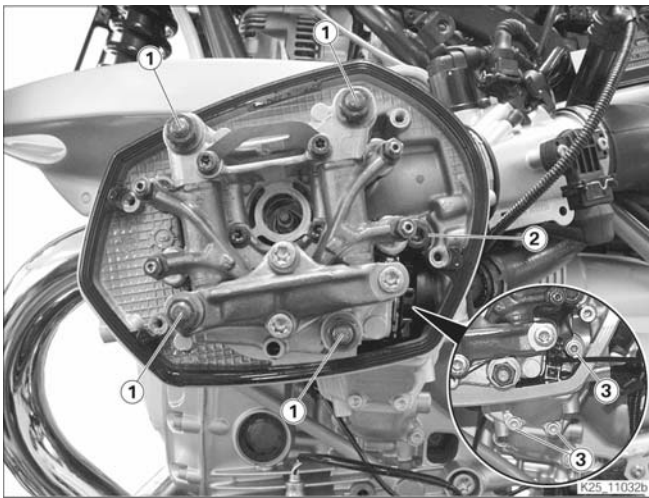
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with



washers.

- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



(-) Removing breather plate

- Slacken screw (1).



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.

- Remove screw (1) with breather plate (2).

(-) Removing left camshaft sprocket

- Release left timing-chain tensioner



Note

There is not much clearance available in the vicinity of the left timing-chain tensioner, so it is not easy to remove or install the tensioner. You will find the job of removal and installation easier if you hold the timing

chain in such a way that the slide rail hangs as far down as possible.

The timing-chain tensioner is easier to remove and install if the camshaft sprocket is removed.

- Use cable ties to secure the timing chain to the camshaft sprocket.



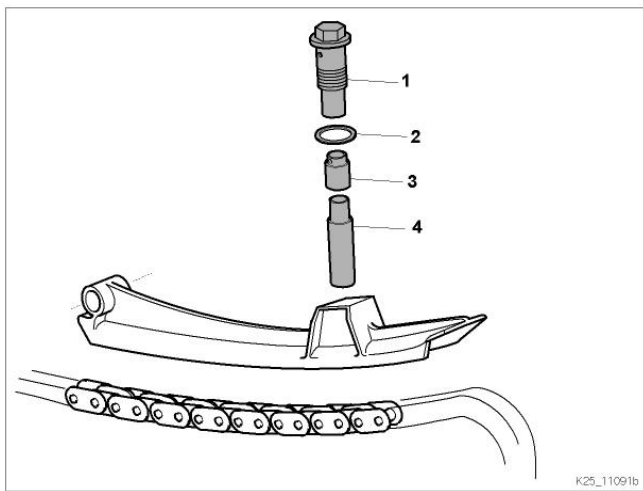
Note

When the engine is being reassembled, it is easier to set the timing with the timing chain located on the camshaft sprockets.

- Remove the camshaft sprocket from the camshaft.

(-) Removing left timing-chain tensioner

- Remove chain tensioner (1) with piston (3) and dispose of sealing ring (2) in the approved, environmentally friendly manner.
- Remove piston (4) from the cylinder.



(-) Removing left cylinder head

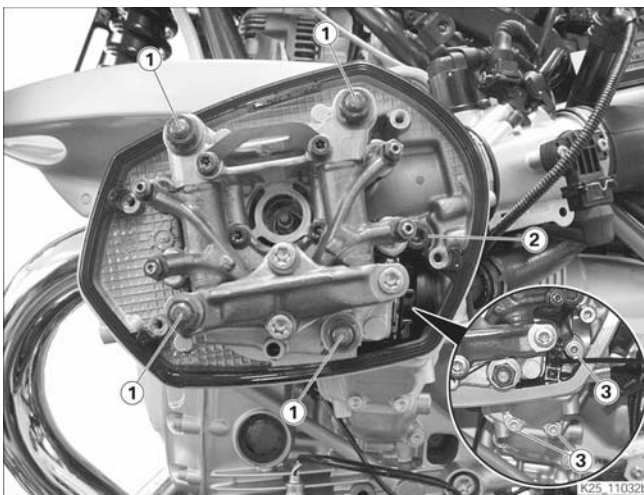
- Push cloths into the chain cavity to prevent parts from dropping into the engine.
- Remove screws (3).



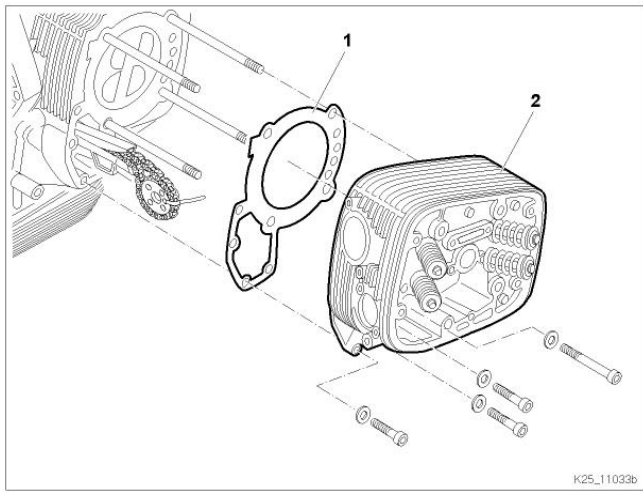
Note

When removing and installing the screws in the chain cavity, take care not to drop parts into the engine.

- Remove screw (2).
- Working in diagonally opposite sequence, loosen nuts of tie bolts (1) and remove the nuts complete with washers.



- Remove cylinder head (2).
- Remove cylinder-head gasket (1) and dispose of it in the approved, environmentally friendly manner.



K25_11033b

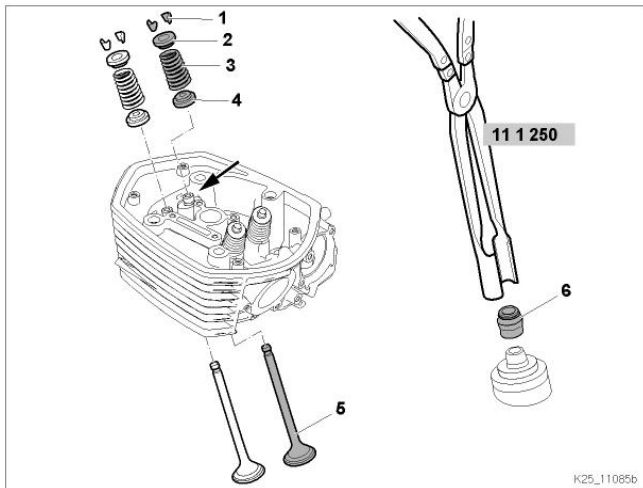
(-) Removing valve

- Lay the cylinder head on a clean, non-abrasive surface; take care not to damage the sealing faces.
- Install valve spring compressor (No. 11 5 697), (No. 11 5 691), (No. 11 5 696), (No. 11 5 695) and (No. 11 5 692).
- Compress the valve springs.



K25_11095b

- Separate valve collets (1) from the valve spring retainers by tapping **lightly** on the bottoms of the valves (valve heads) and remove the valve collets.
- Release the valve springs.
- Remove upper spring retainer (2), Valve spring (3) and lower spring retainer (4).
- Remove valve (5).



K25_11085b

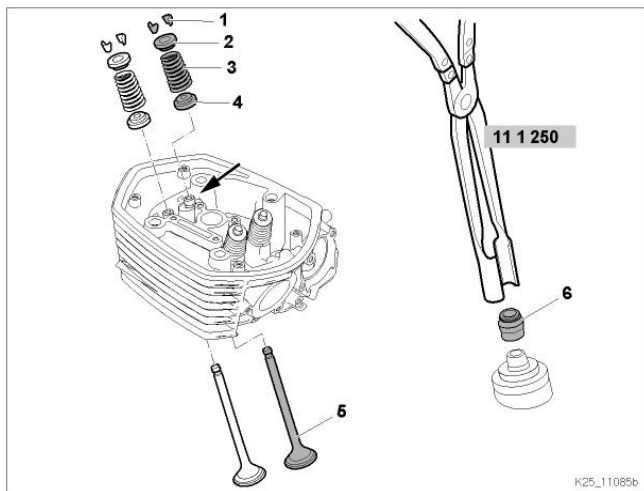
(-) Installing valve

- Install valve (5) with the stem oiled.



Note

The valve stem seal must always be replaced whenever

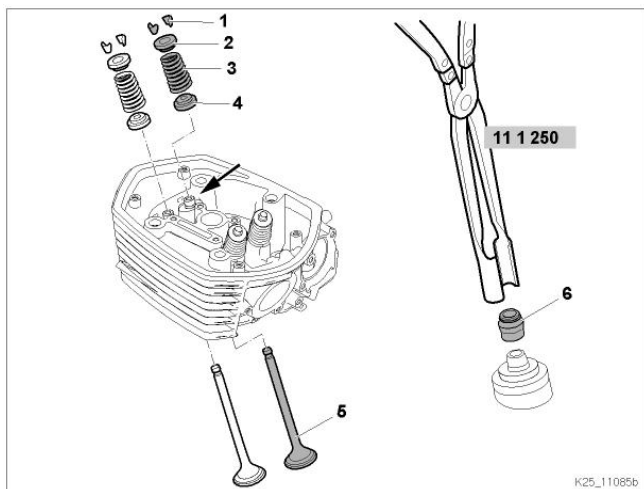


a valve is removed.



► **Installing valve stem seal**

- Shrink a short length of shrink-down plastic tubing (2) onto the end of the valve stem.
- Install valve stem seal (1) with drift (No. 11 5 602).
- Remove shrink-down plastic tubing (2).



- ◀ Install lower valve spring retainer (4), Valve spring (3) and upper valve spring retainer (2), making sure that the valve spring is installed with the coloured mark down.
- Compress the valve springs.

! Attention

Nature: If they are not correctly installed, the valve collets can drop out of their seats when the valve moves. If this happens the valve is no longer secured and can drop into the combustion chamber.

Avoidance: Make sure that valve collets are correctly seated in the valve stem grooves.

- Install valve collets (1) with a blob of grease (to facilitate assembly).
- Slowly release the valve springs.
- Remove valve spring compressor (No. 11 5 697), (No. 11 5 691), (No. 11 5 696), (No. 11 5 695) and (No. 11 5 692).



(-) Checking valves for leaks

Test

- Fill intake or exhaust port with fuel.

Result: Fuel escapes at the valve heads.

Measure:

- Rework valve seat.

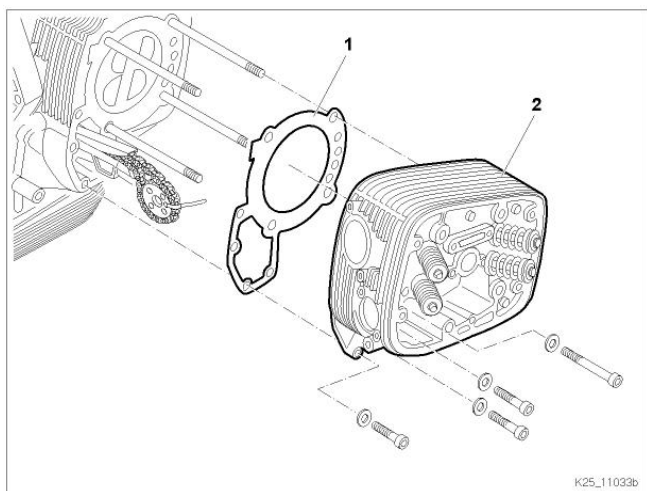
Result: No fuel escapes at the valve heads.

Measure:

- Valve seat does not need to be reworked.

(-) Installing right cylinder head

- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



⚠ Attention

Nature: If the cylinder head is installed with the timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

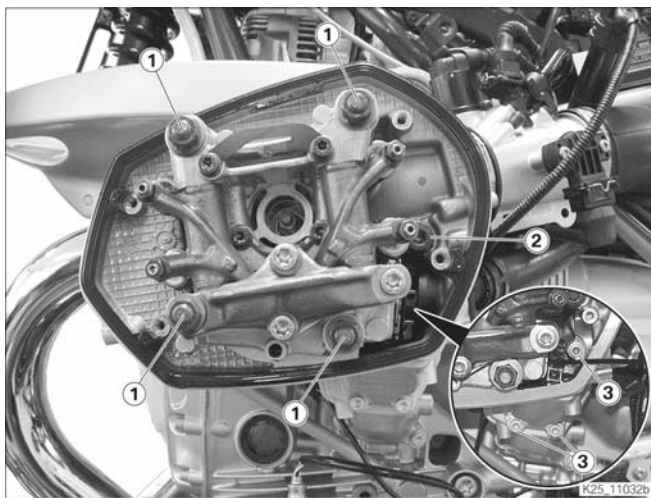
Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

⚠ Attention


Nature: The tiebolts of the cylinder heads have a tendency to settle.

Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after

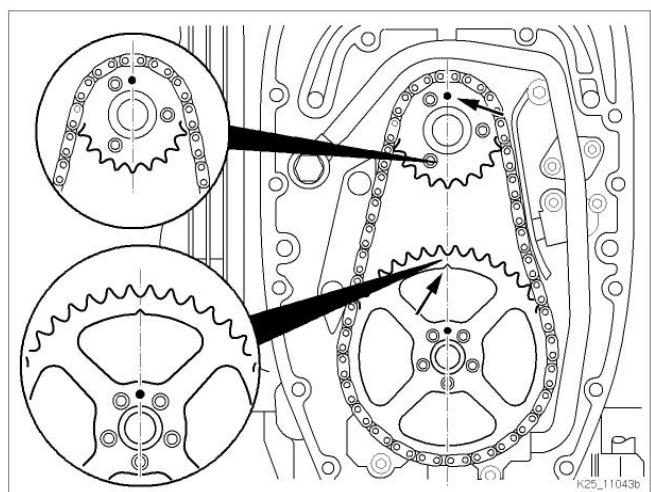


1000km / 600mls at the latest.

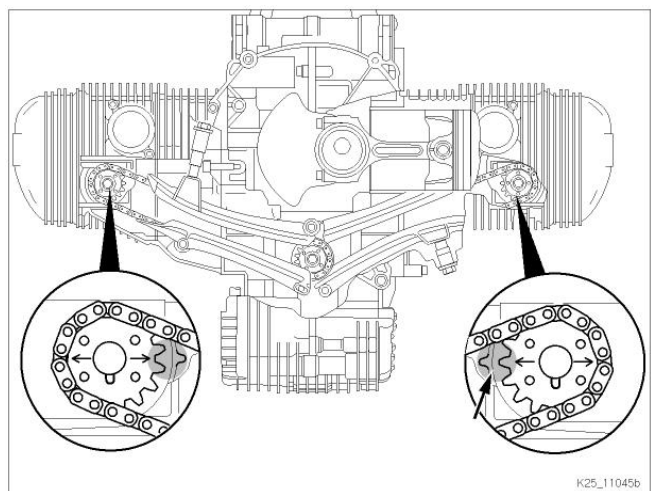
- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

 Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, right (cylinder No. 1)



- Make sure that the crankshaft and countershaft are in the "**firing TDC, right cylinder**" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the countershaft timing-chain sprocket is **up** in line with the split line between the two halves of the crankcase.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **down**.
- » The valves in the right-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing trigger for camshaft sensor

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

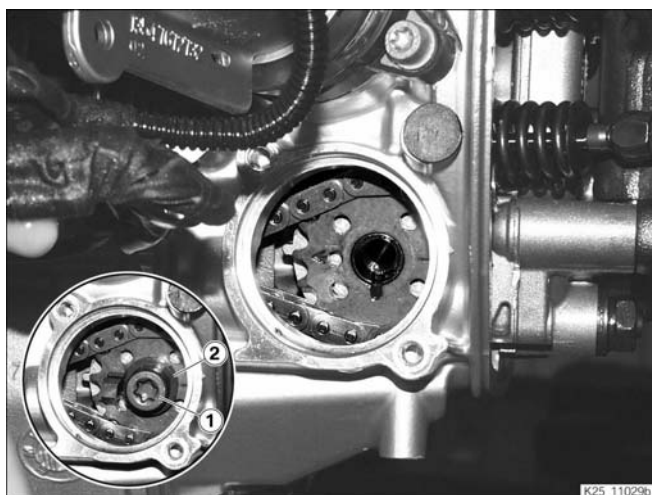


- Introduce trigger for camshaft sensor (2) with locator into the bore in the camshaft sprocket.
- Tighten screw (1) until hand-tight.



Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing right camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the trigger for the camshaft sensor are correctly positioned and the that the screw is tightened hand-tight.



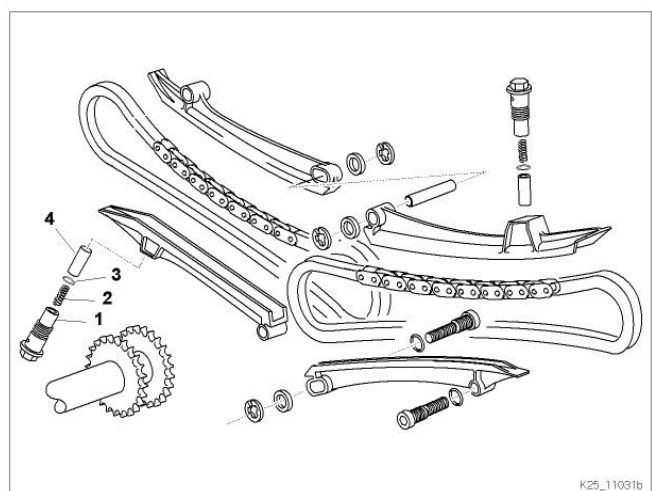
► Installing right timing chain tensioner


Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.



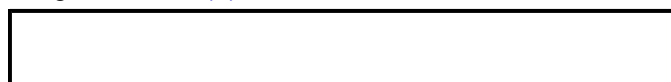
- Install chain tensioner (1) with new sealing ring (3), spring (2) and piston (4) in the cylinder.

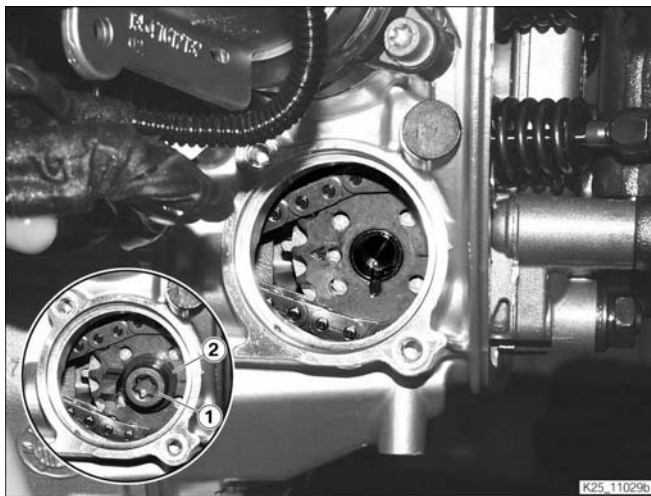


 Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	



- Tighten screw (1).





Tightening torques

Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	
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- Remove TDC locating pin (No. 11 2 650) .

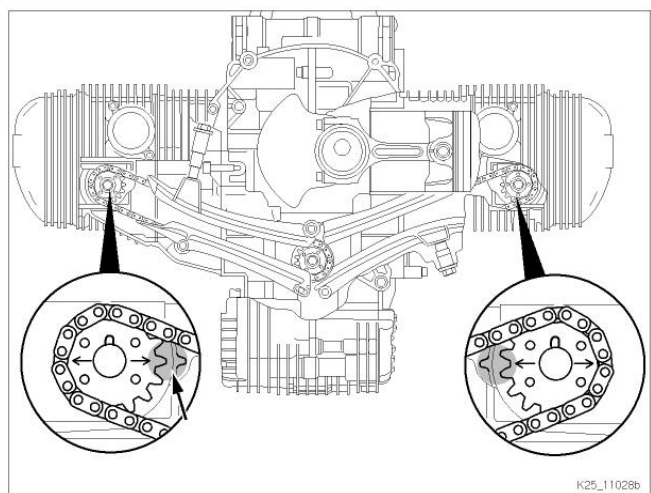
(-) Setting left cylinder to firing TDC

- Turn over engine at crankshaft pulley in direction of engine rotation until the left cylinder is set to ignition TDC (TDC = top dead centre).



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.



- » The inlet and exhaust valves of the left cylinder are closed; those of the right cylinder are at overlap.
- » The arrows on the camshaft sprockets point toward the lugs (arrow) on the timing-gear carrier.
- » The TDC locating pin can be inserted.

- Insert locating pin (No. 11 2 650) to lock the engine in position.



(-) Installing left cylinder head

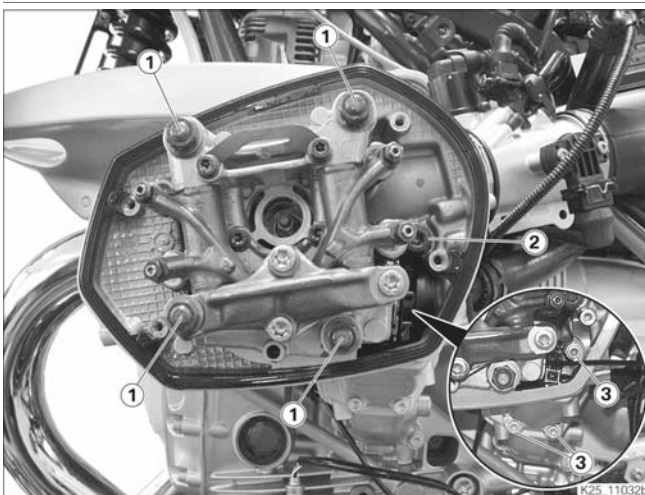
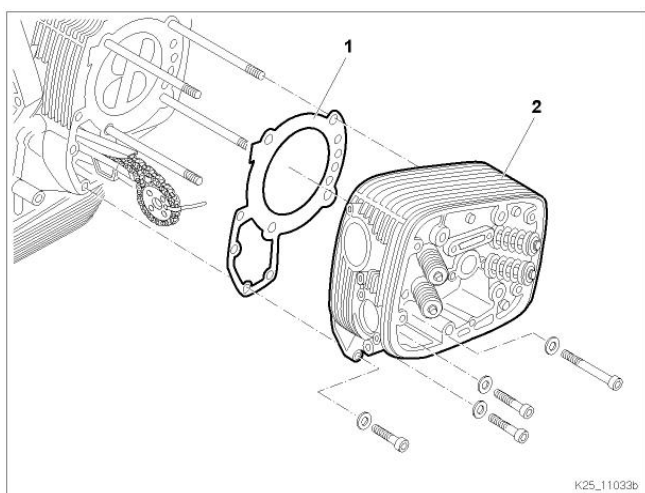
- Lay new cylinder-head gasket (1) on the clean, degreased sealing face of the cylinder and position it on the reamed sleeve.



Attention

Nature:

If the cylinder head is installed with the



timing-gear carrier already in position, the valves could be damaged if the camshaft is turned out of line.

Avoidance: Make sure that the camshaft is positioned such that either all valves are closed (firing TDC) or all valves are slightly open (overlap).

Turn the camshaft to an appropriate position if necessary.

- Install cylinder head (2), simultaneously guiding timing chain, tensioning and guide rails through the timing-chain cavity.

Attention

Nature: The tiebolts of the cylinder heads have a tendency to settle.

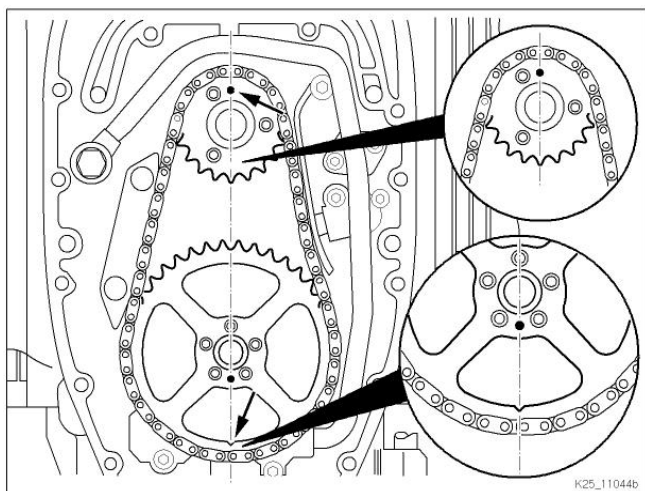
Avoidance: After initial assembly and if the nuts of the tiebolts are backed off or removed within the framework of repairs, the security of the cylinder head has to be checked after 1000km / 600mls at the latest.

- Install nuts of tie bolts (1) with the collars toward the cylinder head.
- Install screws (2) and (3) and tighten the fasteners of the cylinder head in the correct tightening sequence.

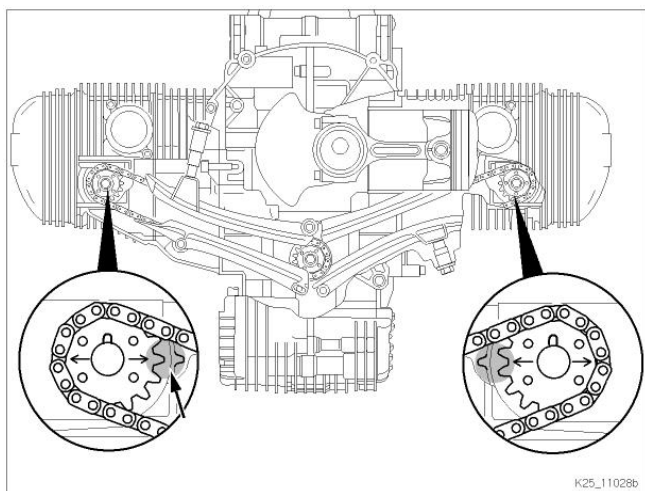
Tightening torques		
Nuts of tie bolts, M10, tighten in diagonally opposite sequence	Oil screw threads lightly	
	Closing torque, 20 Nm	
	Initial torque, 90 °	
	Final torque, 90 °	
Screw, M10 x 85	40 Nm	
Screw, M6 x 30	9 Nm	

(-) Adjusting timing, left (cylinder No. 2)

- Make sure that the crankshaft and countershaft are in the "firing TDC, left cylinder" position.
- » The locating pin on the timing-chain pinion of the crankshaft is pointing **up** and the tip of a tooth on the timing-chain pinion is down in line with the split line between the two halves of the crankcase.
- » The notch in the sprocket for the timing chain of the



countershaft is **down** and at the top the split line between the two halves of the crankcase is between two teeth.



- Turn the camshaft until the groove for locating the camshaft sprocket is pointing **up**.
- » The valves in the left-hand cylinder head are closed.
- Engage the camshaft sprocket in the timing chain and seat the locating pin in the groove in the camshaft.



Note

The cylinder is at firing TDC when the arrow on the camshaft gear points to the **tooth tip** and the nose on the timing-gear carrier.

- » The arrow on the camshaft sprocket must point toward a tooth tip and the nose on the timing-gear carrier.

(-) Installing breather plate

Precondition

- Make sure that the camshaft sprocket is correctly positioned on the camshaft.

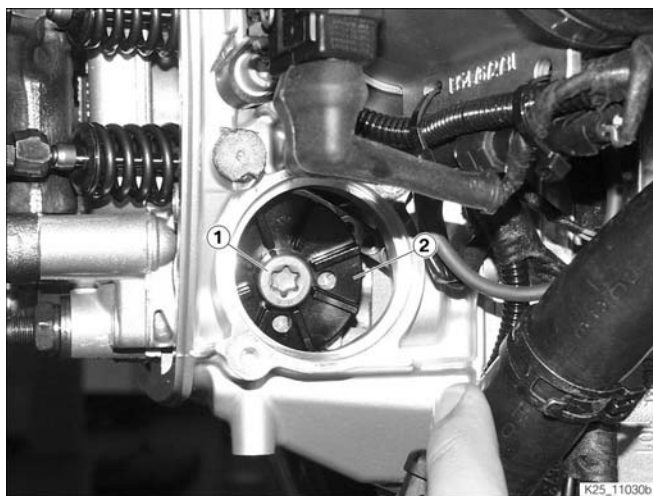


- Install breather plate (2) with screw (1).
- Align breather plate (2) such that the arrow for the TDC mark is visible through the hole in the breather plate.
- Tighten screw (1) until hand-tight.



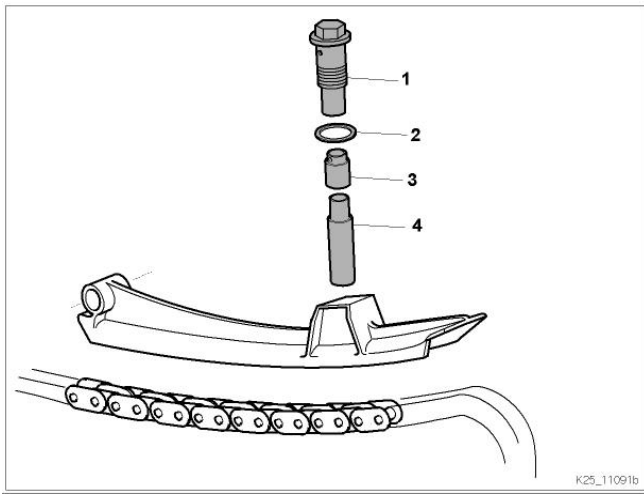
Note

The timing-chain tensioners have to be installed when the fasteners of the camshaft sprockets are released or tightened.



(-) Installing left timing chain tensioner

- Install piston (4) in the cylinder.
- Install piston (3) with chamfered side with the oil bore



up in the chain tensioner.

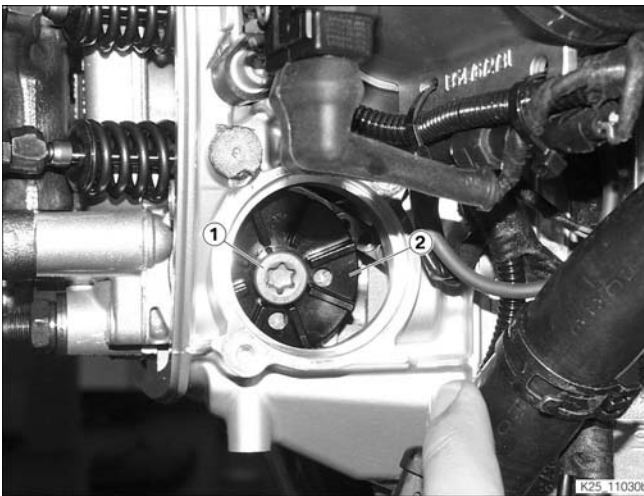
- Carefully introduce chain tensioner (1) with new sealing ring (2) into the cylinder, turning the chain tensioner slightly to do so.
- » The chain tensioner must slide onto the piston without tilting.
- Screw chain tensioner (1) into the cylinder and tighten it.

Tightening torques		
left, M18 x 1.5	32 Nm	
right, M18 x 1.5	32 Nm	

(-) Securing left camshaft sprocket

Precondition

- Make sure that the camshaft sprocket and the breather plate on the camshaft are correctly positioned and that the screw is tightened hand-tight.



- Tighten screw (1).

Tightening torques		
Camshaft sprocket to camshaft, M10 x 1.25 x 25	65 Nm	

- Remove TDC locating pin (No. 11 2 650) .

(-) Adjusting valve clearance

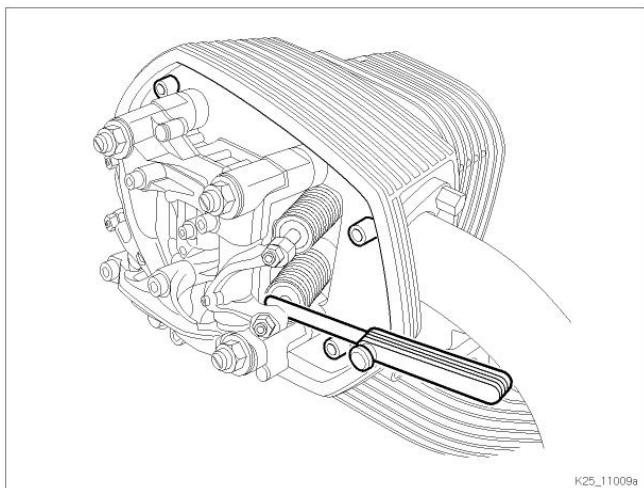
Test

- Measure valve clearance with feeler gauge.



Note

You should feel slight resistance as the blade of the feeler gauge slides between the valve stem and the rocker arm.




Technical data			
Valve clearance, inlet valve	engine cold max. 35 °C	0.15 mm	

Valve clearance, exhaust valve	engine cold max. 35 °C	0.3 mm	
--------------------------------	------------------------	--------	--

Result: Valve clearance is out of tolerance.

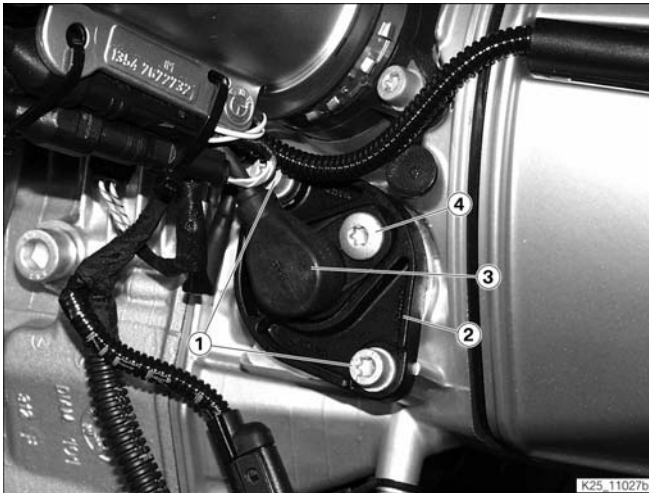
Measure:

- Correct valve clearance with adjusting screw and tighten locknut.

 Tightening torques		
Locknut, valve adjusting screw, M6 x 0.5	8 Nm	

- Recheck valve clearances.
- Set the valves actuated by a common rocker arm to exactly the same setting.
- Check valve clearances and adjust if necessary and, repeat the same procedures for the second cylinder.

(-) Installing right camshaft cover



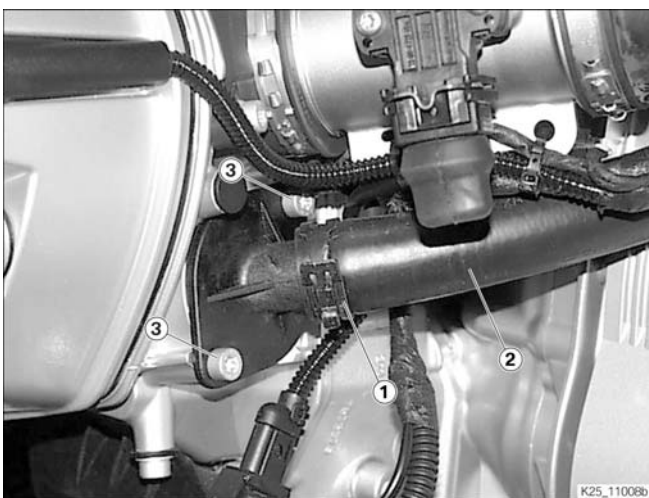
! Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install camshaft cover (2) complete with O-ring and camshaft sensor (3) in the cylinder head.
- Install screws (1).

(-) Installing left camshaft cover



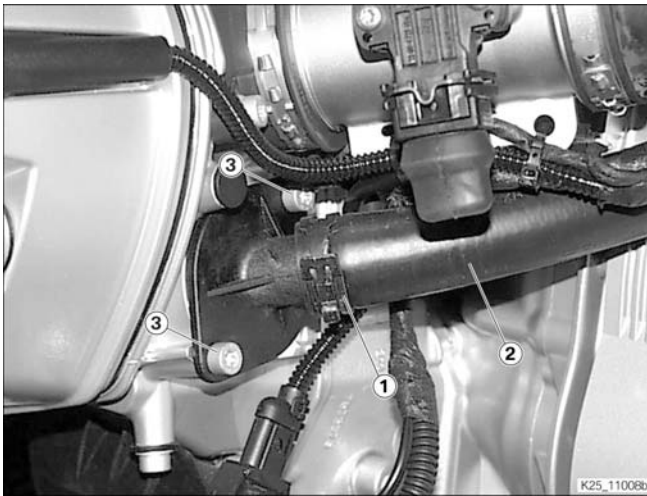
! Attention

Nature: Sharp edges of the housing can damage the O-ring in the course of assembly work.

Avoidance: Deburr sharp edges of the housing.

- Visually inspect the O-ring for damage.
- Install the camshaft cover complete with O-ring in the cylinder head.
- Install screws (3).

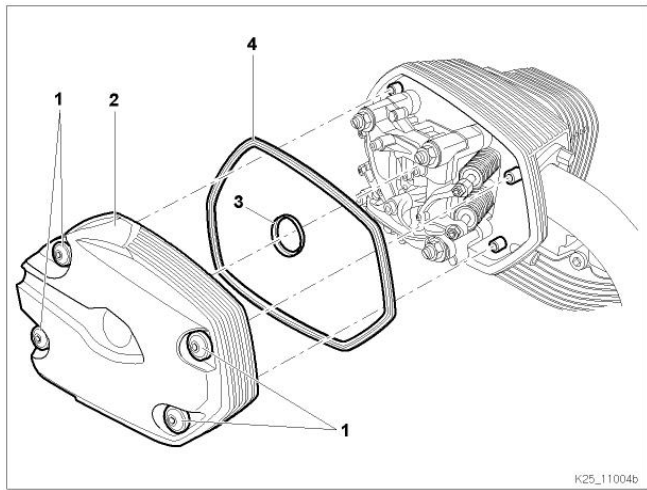
► Connecting hose for crankcase breather



- Connect hose (2) to the camshaft cover.
- Expand clip (1) and push it down the hose and into position.
- » The hose is located on the camshaft cover.



(-) Installing cylinder head cover



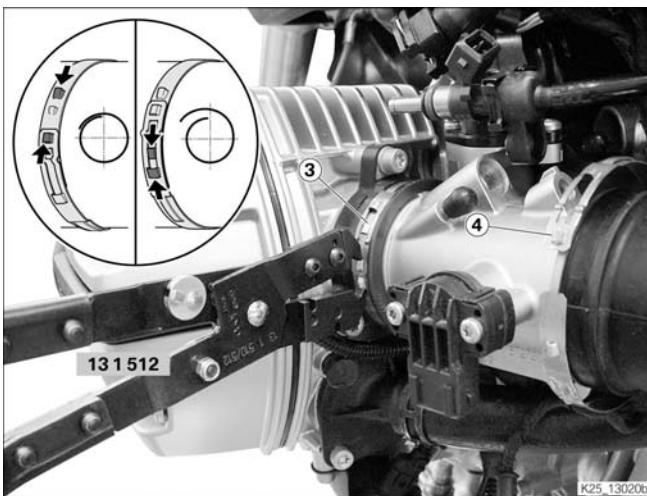
- Gaskets must be free from oil and grease, replace if damaged.
- Position gasket (3) on the cylinder-head cover.
- Position gasket (4) on the cylinder-head cover.
- Install the cylinder head cover, making sure that both gaskets are correctly seated.
- Install and tighten the screws.



Tightening torques

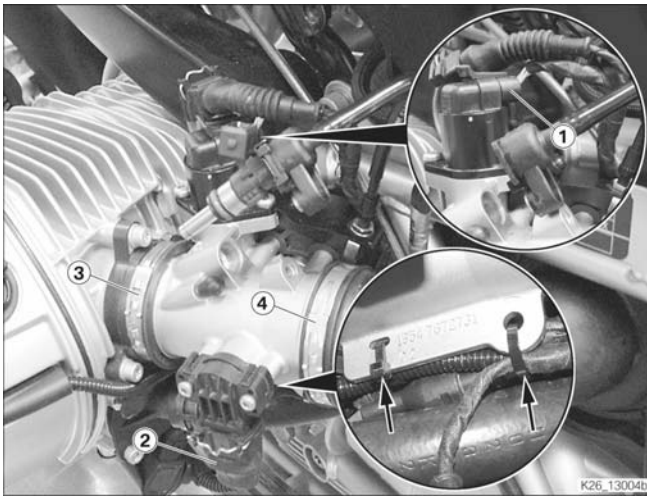
Cylinder head cover to cylinder head, tighten in diagonally opposite sequence	10 Nm	
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(-) Installing throttle-valve stub



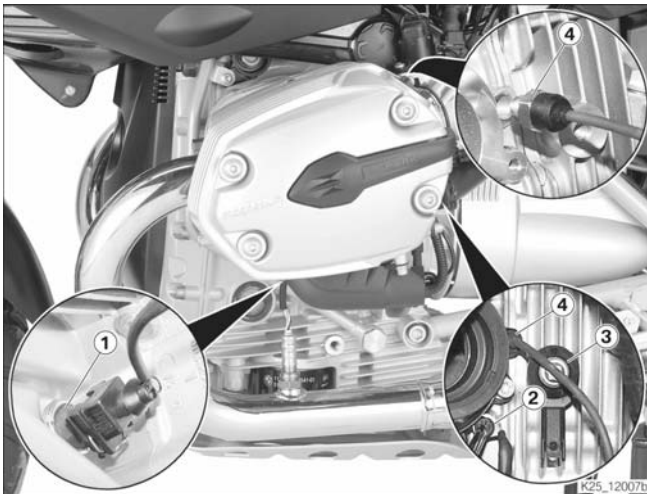
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512).

- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).




- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Connecting plugs of engine sensors and switches, left



- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.


 Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (3).
- Connect temperature sensor (4).

(-) Connecting plugs of engine sensors, right



- Secure earth lead (1) to the cylinder head.

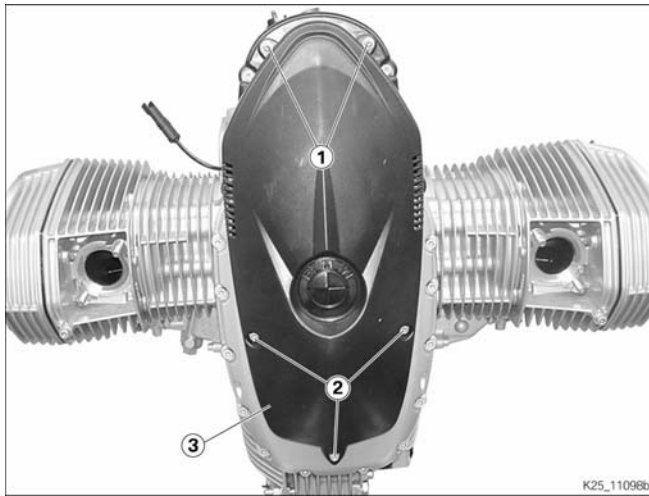
 Tightening torques		
left and right, M6 x 10	8 Nm	


- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).

(-) Installing belt guard

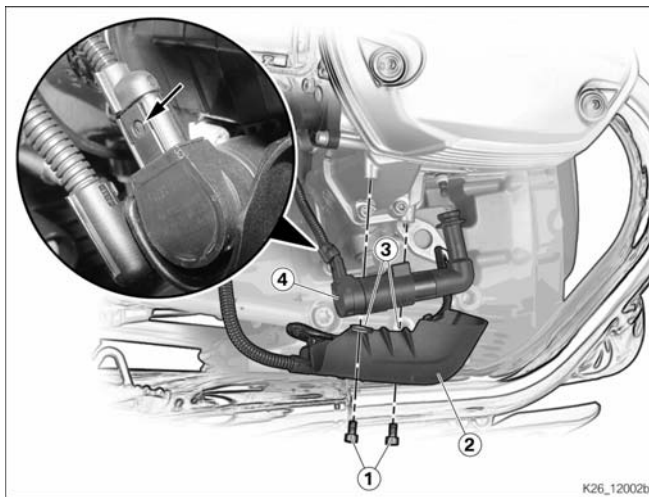
- Install belt guard (3) and secure with screws (1) and (2).

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 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	


(-) Installing secondary spark plug coil



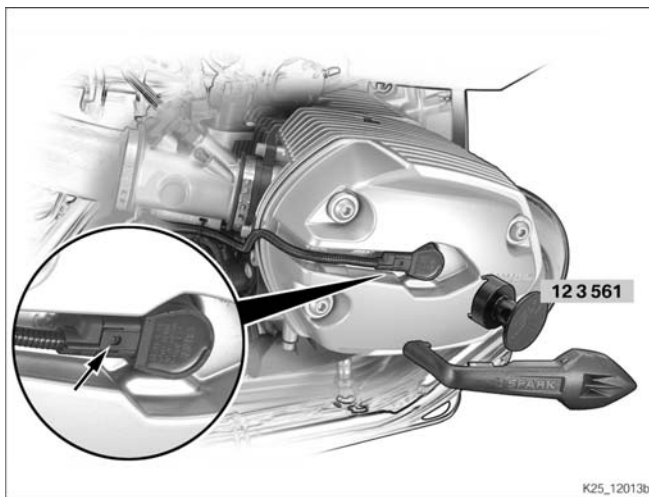
- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.

 Consumables/lubricants		
Talcum powder	Assembly aid	

- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	

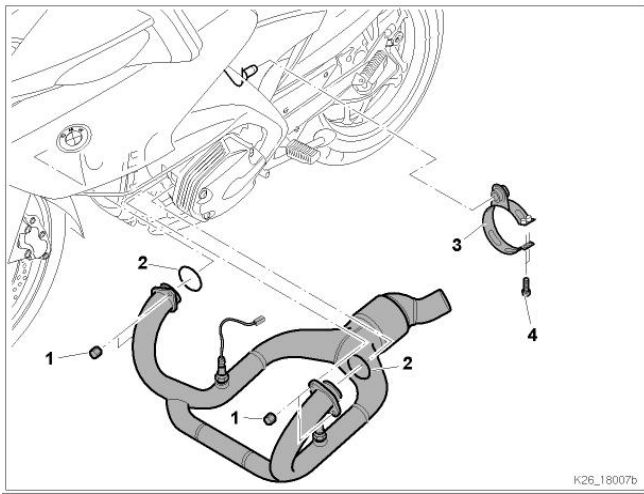
(-) Installing direct ignition coil



- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Installing exhaust elbow

- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	-----------------

- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	-----------------

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).



Tightening torques

Manifold to cylinder head, Acorn nut M8	21 Nm	
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- Align the clamp (arrow) on the manifold and tighten screws (1).



Tightening torques

Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	
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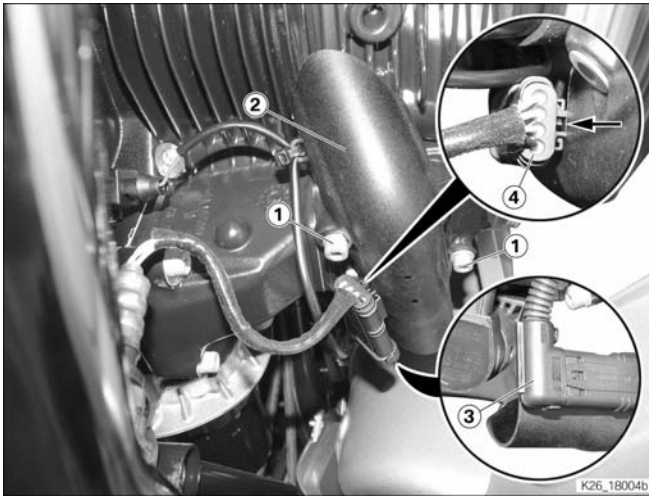
► **Securing both oxygen sensor plugs**

- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).



Tightening torques

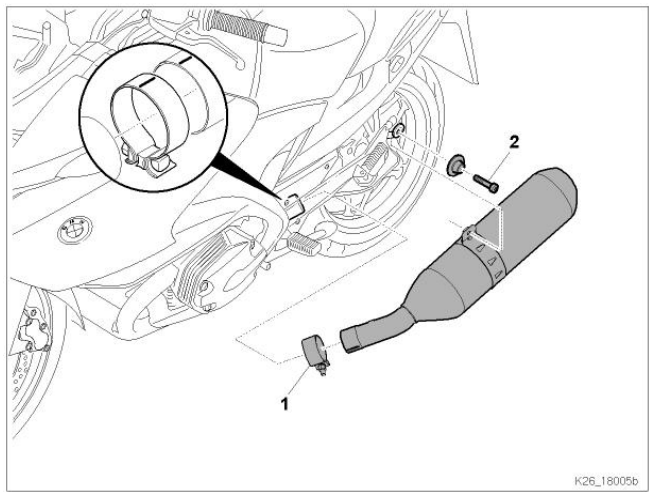
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Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
--	------	--




- Install front screw (1) in both bottom sections of the fairing.




(-) Installing silencer

- Grease the inner face of Torca clamp (1).


 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

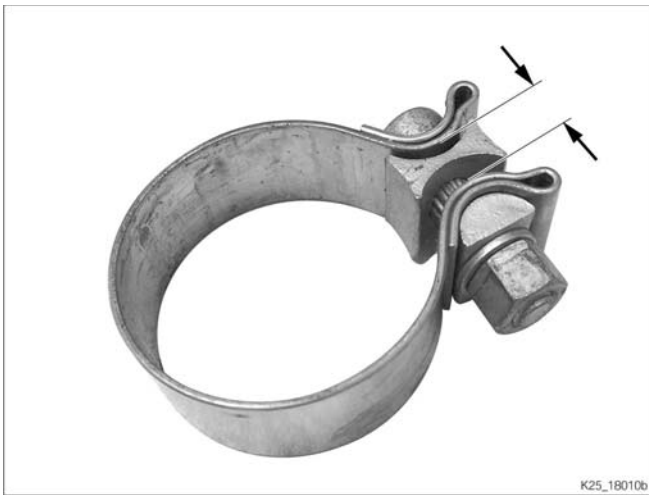
- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 <p>Tightening torques</p>		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**

Test

- Check distance ([arrows](#)) between silencer and rear wheel.



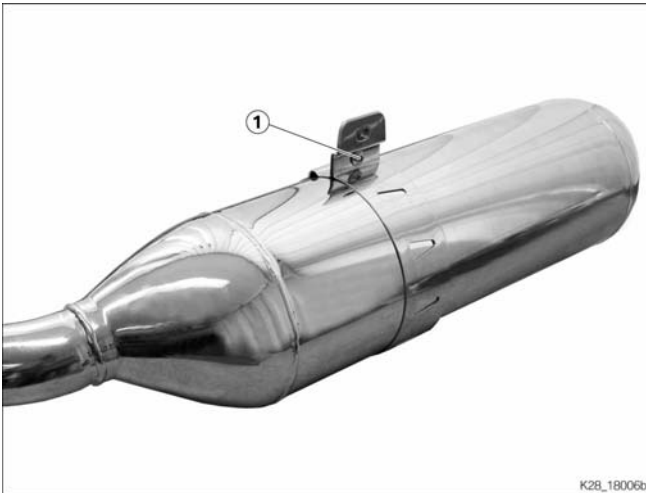
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



! Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	-----------------

- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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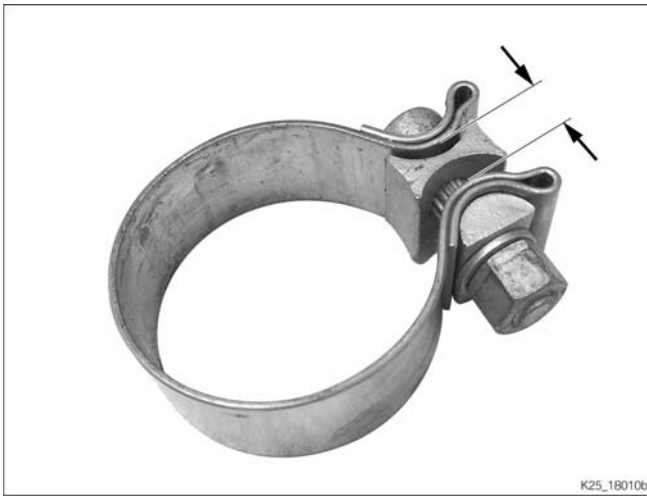



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.


Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.



 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



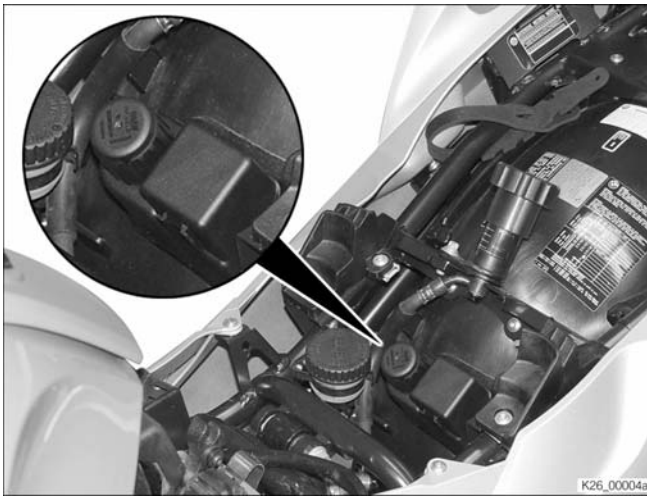
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger ([No. 61 1 581](#)), ([No. 61 1 582](#)) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

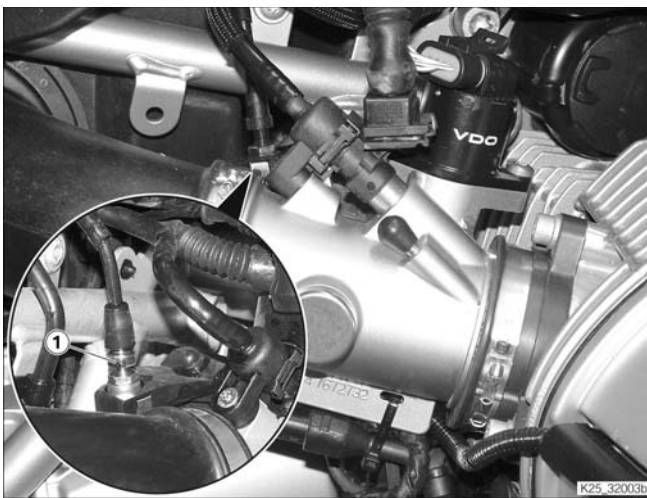
Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
---	--	------------	--

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the

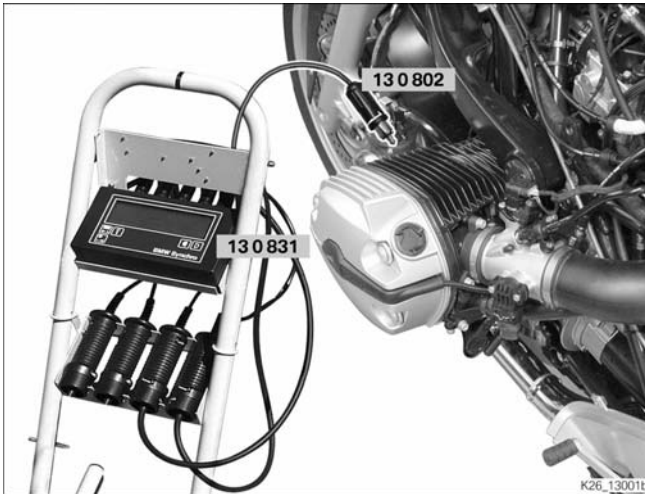
throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



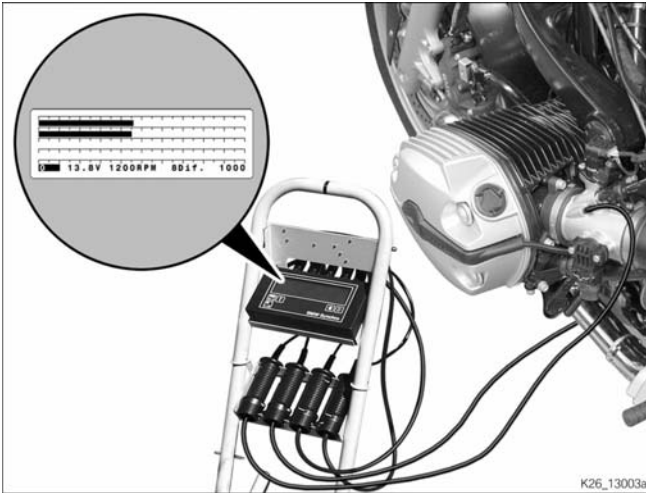
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to

synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

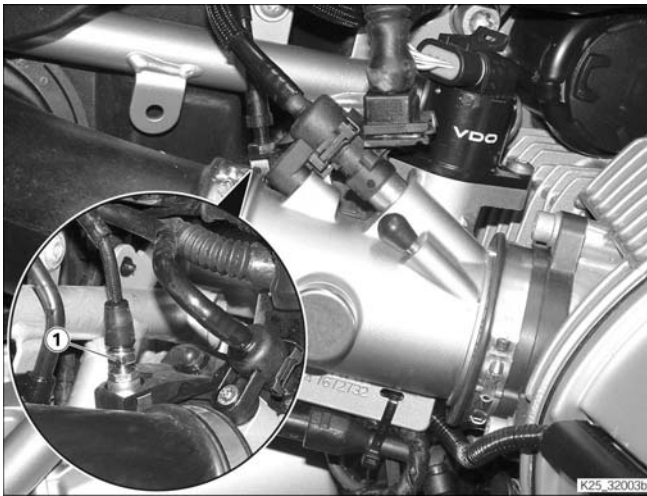
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change



- **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

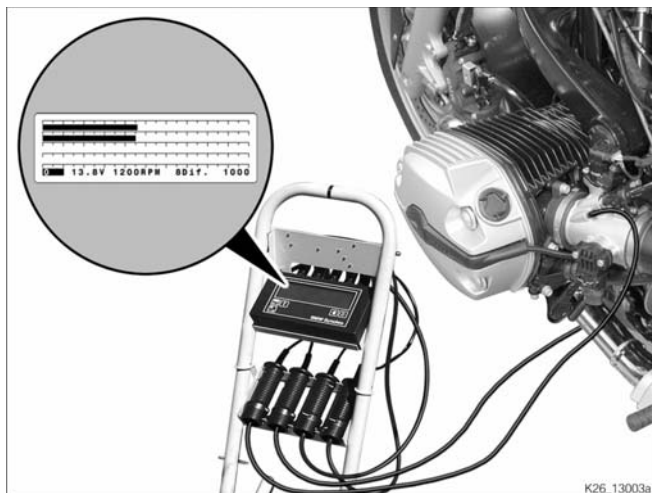
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic

system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

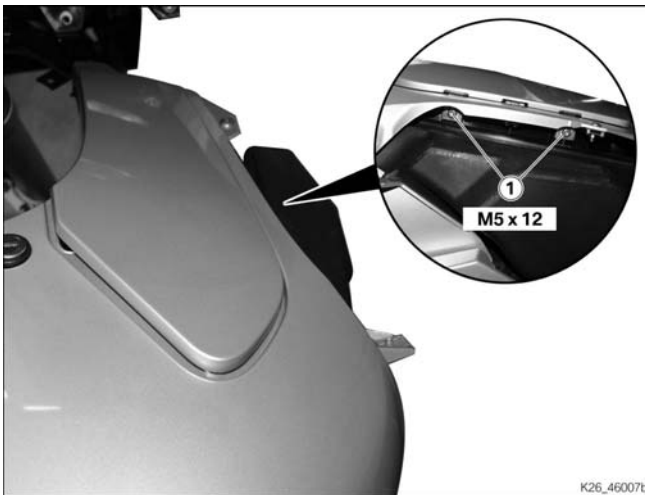
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



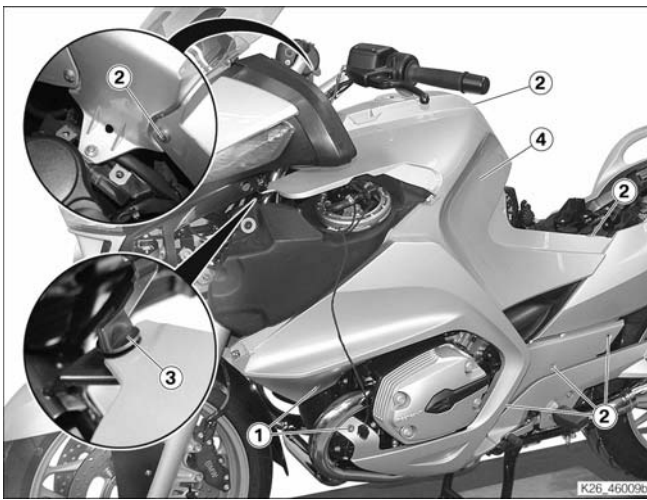
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

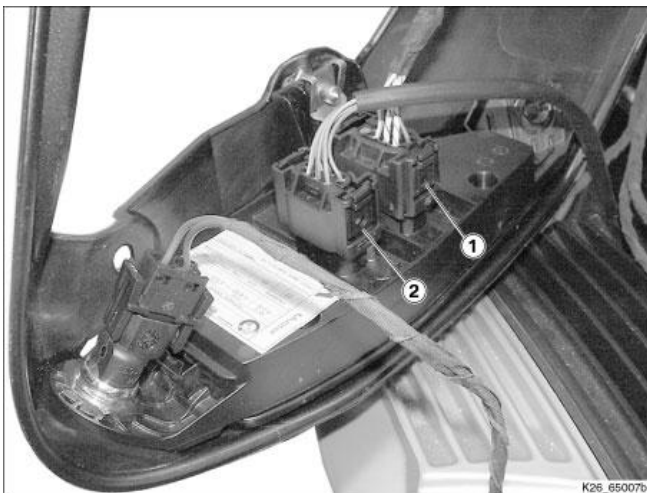
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.



Technical data

Technical data			



K26_11001b

Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 53 200 Replacing oil thermostat**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

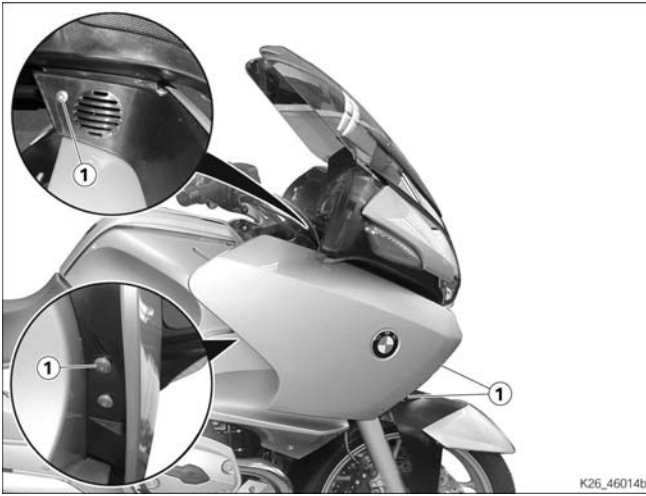


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



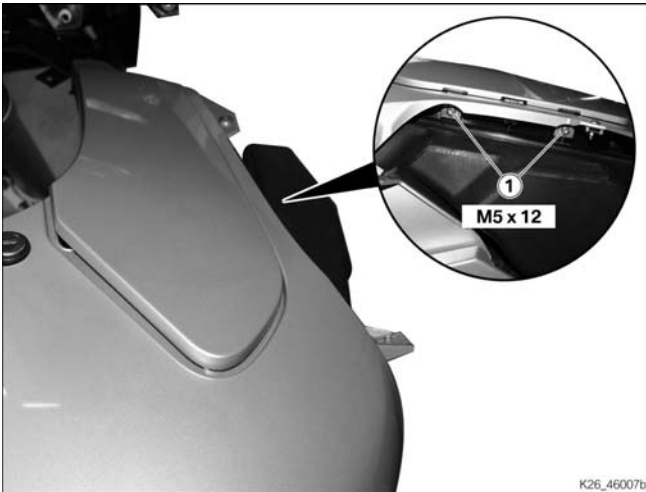
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing stowage compartment

- Remove screws (1).
- Remove the stowage compartment.



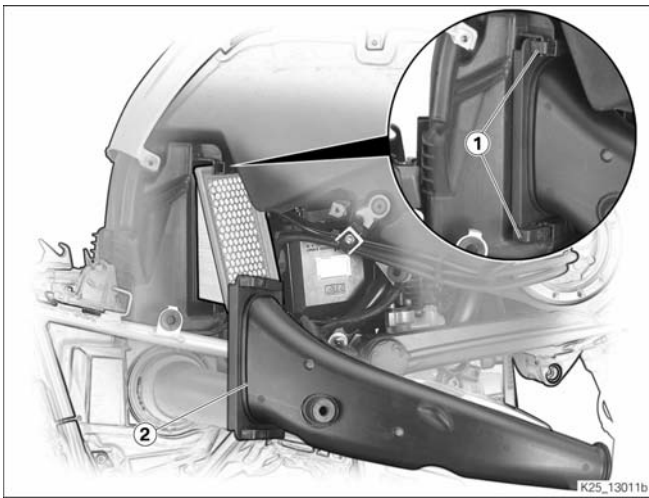
Variant, Radio with CD player

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



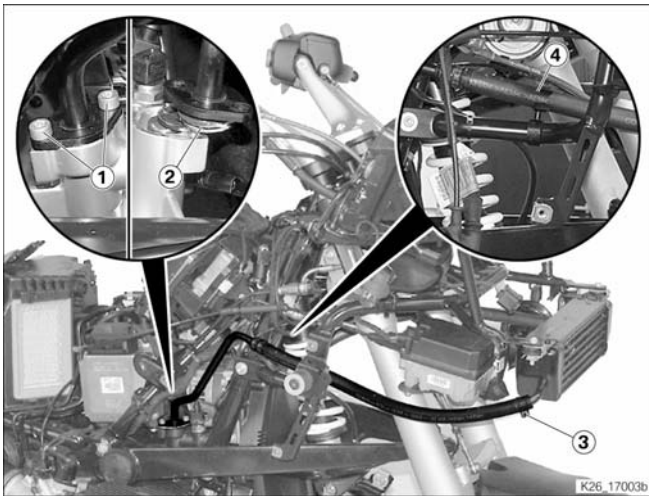
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



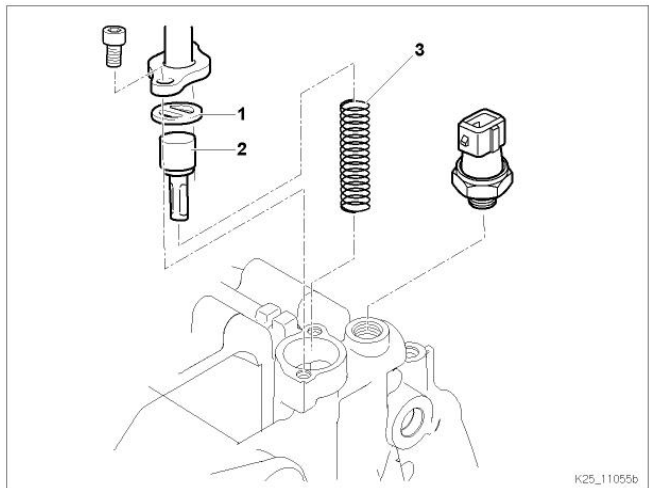
(-) Disconnecting oil cooler line, feed, from engine

- Remove screws (1) from the crankcase.
- Catch the escaping oil.



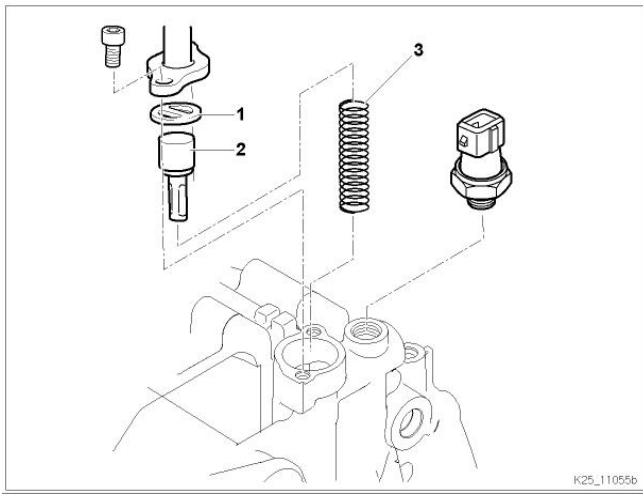
(-) Removing oil thermostat

- Remove supporting plate (1), control element (2), and spring (3).



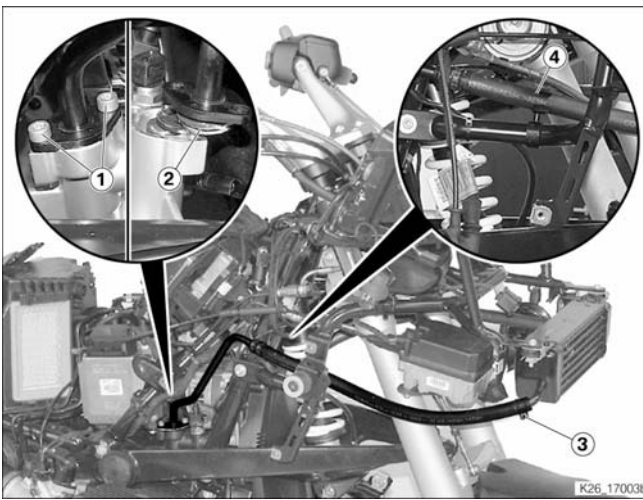
(-) Installing oil thermostat


- Install spring (3), control element (2), and supporting plate (1).



(-) Connecting oil cooler line, feed, to engine

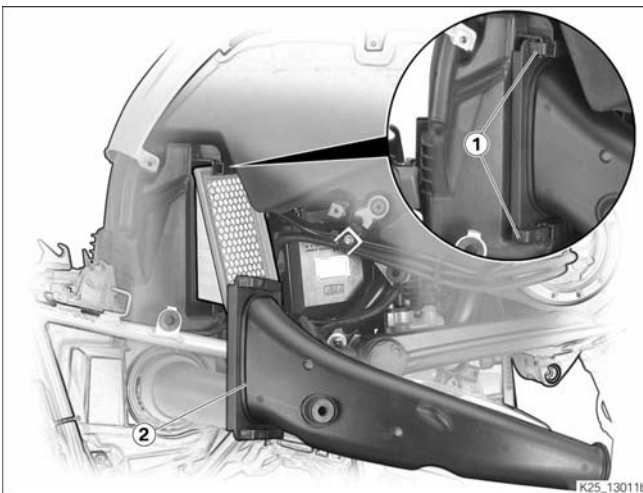
- Check sealing ring (2) for damage. Replace the sealing ring if it is damaged.
- Push the thermostat into the crankcase and install the oil cooler line with screws (1).



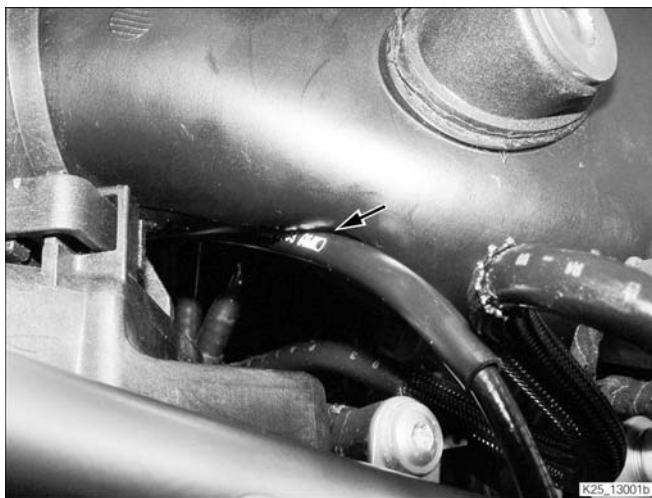
 Tightening torques		
Oil cooler line, flow line, to crankcase, M6 x 16	8 Nm	

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

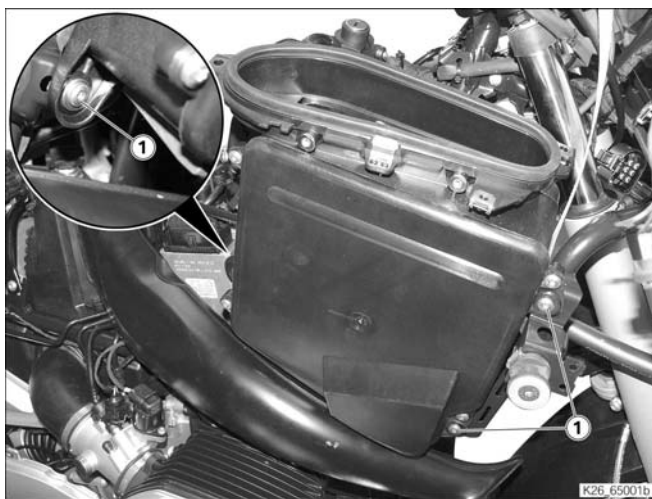


- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.



(-) Installing stowage compartment

- Place the stowage compartment in position and align it correctly.
- Install screws (1).



Variant, Radio with CD player

- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).



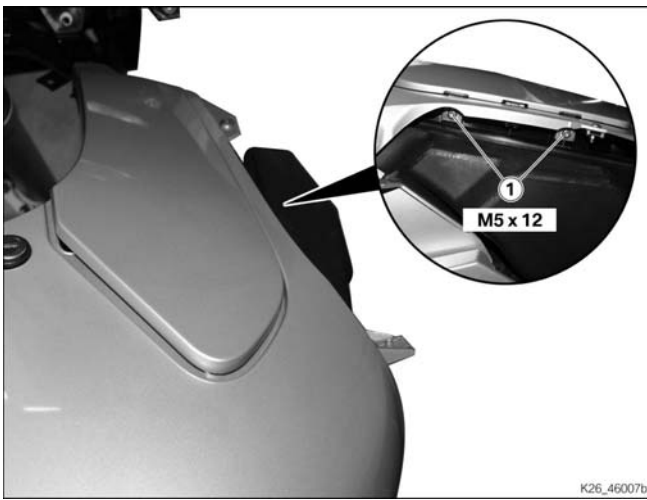
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **11 61 176 Replacing one air intake stub**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing left-hand trim panel

- Remove screws (1).

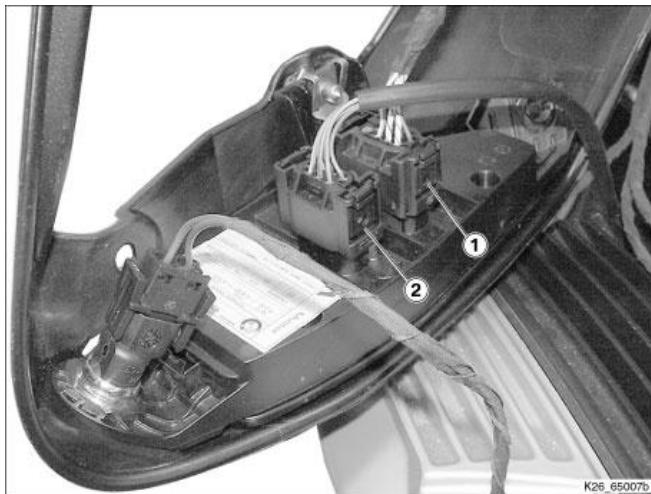


- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

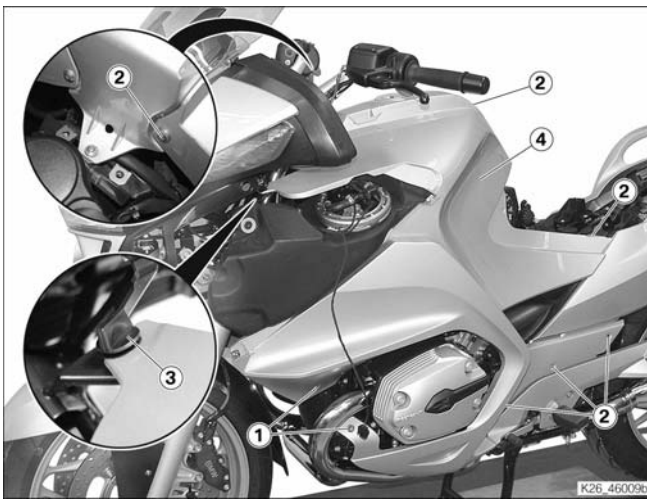
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



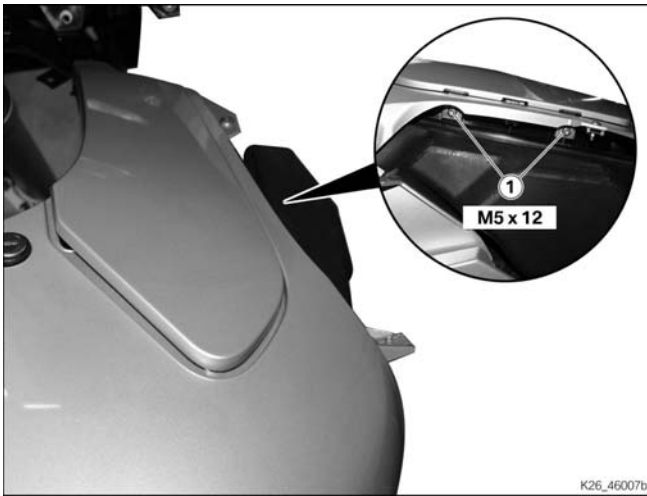
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



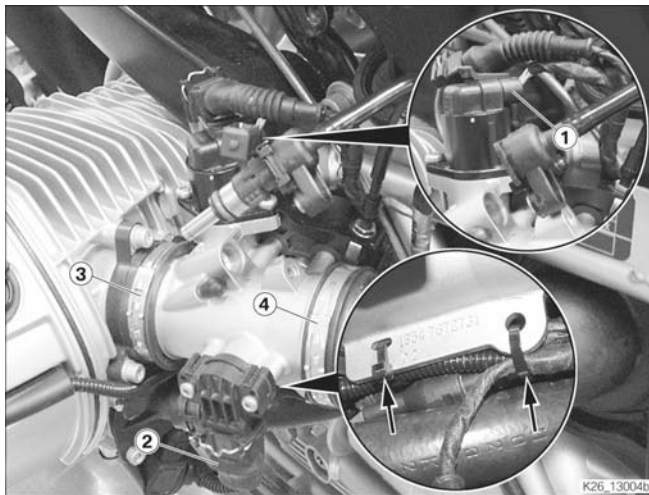
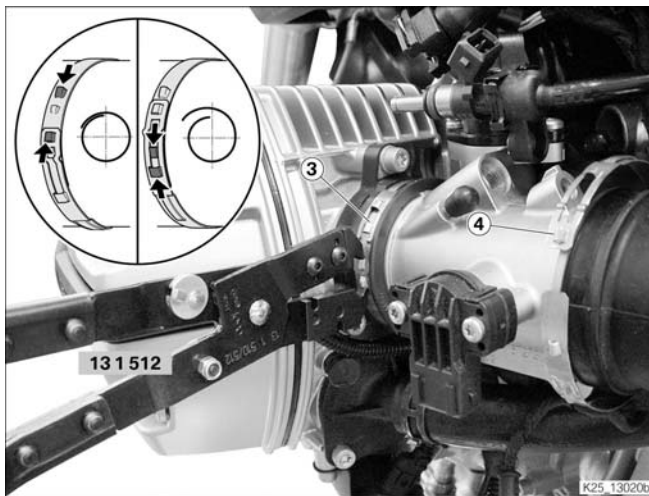
(-) Removing air intake pipe

- Use pliers (No. 13 1 512) to open the clip on the intake air silencer.
- Disconnect the intake pipe from the intake air silencer.



(-) Disconnecting left throttle-valve stub

- Open hose clips (3) at the left throttle valve stub with pliers (No. 13 1 512) .



- Cut through the cable tie (arrow) on the left.
- Disconnect plug of left idle actuator (1).
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the throttle-valve stub on the left and, taking care not to pinch or bend the throttle cable, carefully allow it to dangle to one side.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.


(-) Removing air intake stub



- Remove screws (1).
- Remove the air intake stub.

(-) Installing air intake stub

- Place the air intake stubs in position.
- Install screws (1).

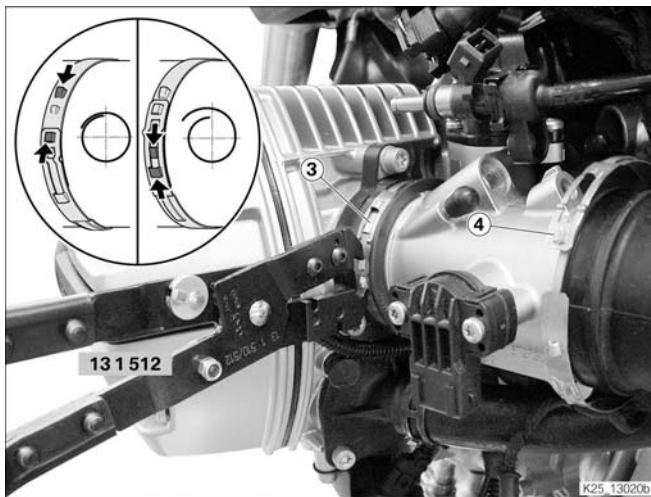
 Tightening torques		
Air intake to cylinder head	8 Nm	



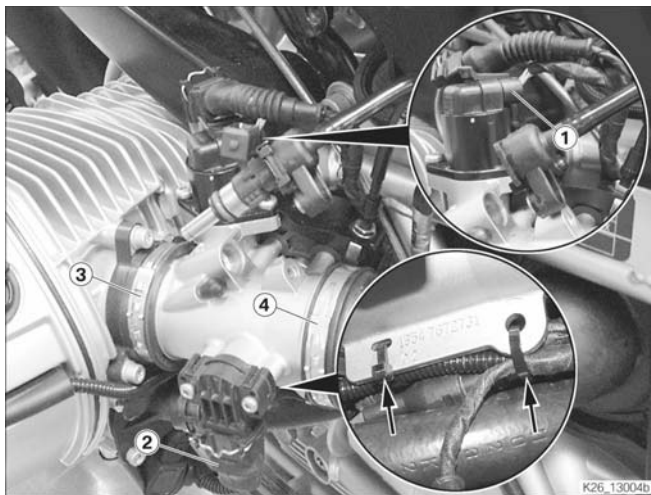
left/right, M6 x20		
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(-) Installing left throttle-valve stub

- Remove the cover from the intake.
- Introduce the throttle-valve stub into the air intake and position it correctly.
- Align hose clamps (3) and close them with pliers (No. 13 1 512) .



- Connect plug of left idle actuator (1).
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stub on left.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.



(-) Securing intake pipe

- Introduce the intake pipe into the air intake and position it correctly.
- Use pliers (No. 13 1 512) to close the clip on the intake air silencer.

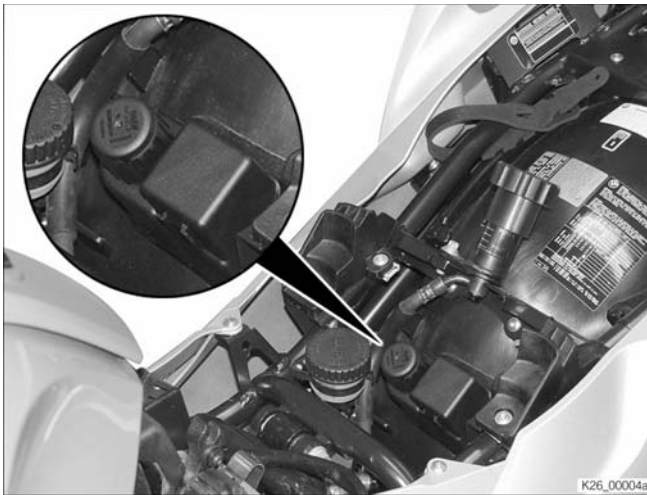


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking freedom of movement of throttle cable and checking for kinks and chafing



Note


The throttle cable must be correctly adjusted in order for the electronic engine management system to function correctly.

Test

- Check the throttle cable for kinks and chafing.
- » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
- » The throttle twistgrip returns to the closed position by

itself.

- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
- >> Slight play perceptible.

 Technical data			
Test criterion, throttle cable		Results of all test steps satisfied	

Result: Test criterion not satisfied.

Measure:

- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- >> Both throttle valves reach the idle stops.
- >> Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve		0.5 - 1 mm	

stubs			
-------	--	--	--

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

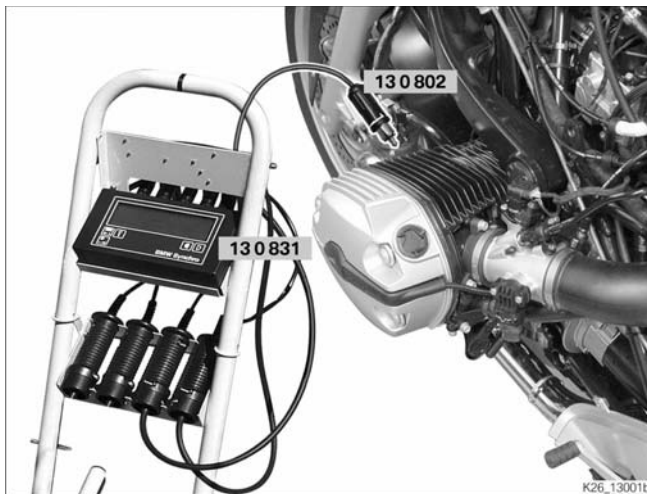
- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.

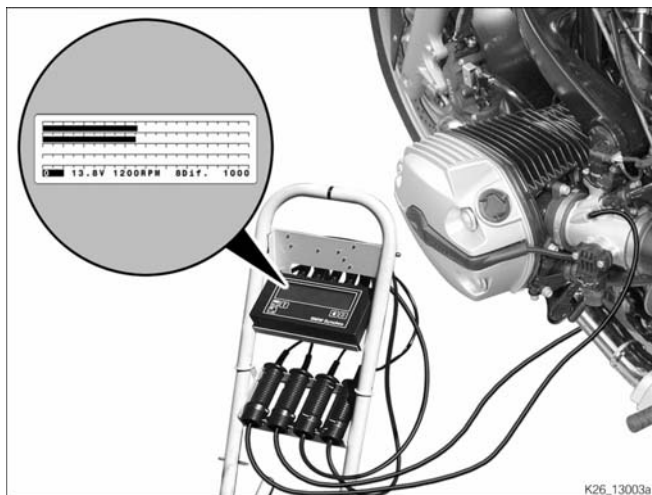


Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.



► 1. Checking idle

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



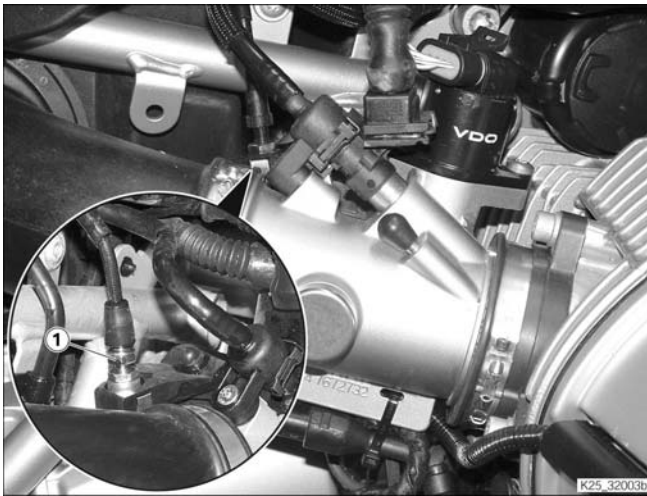
► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test



- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

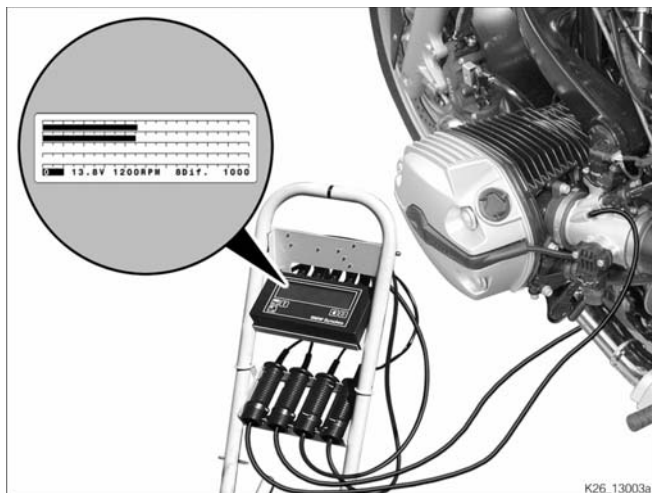
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.

- Disconnect the BMW Motorrad battery charger from the vehicle.

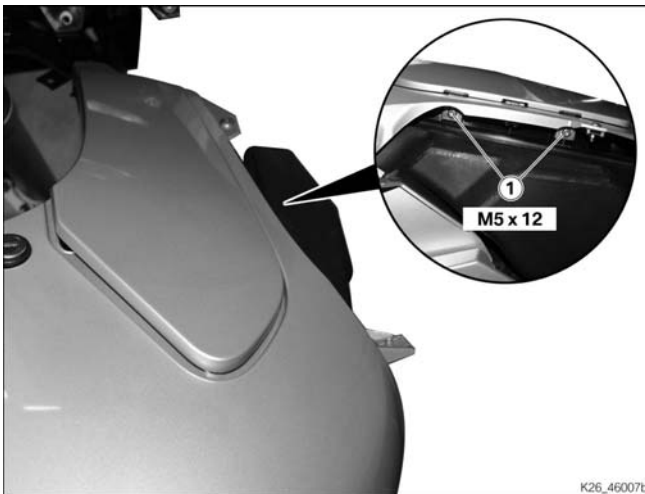
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



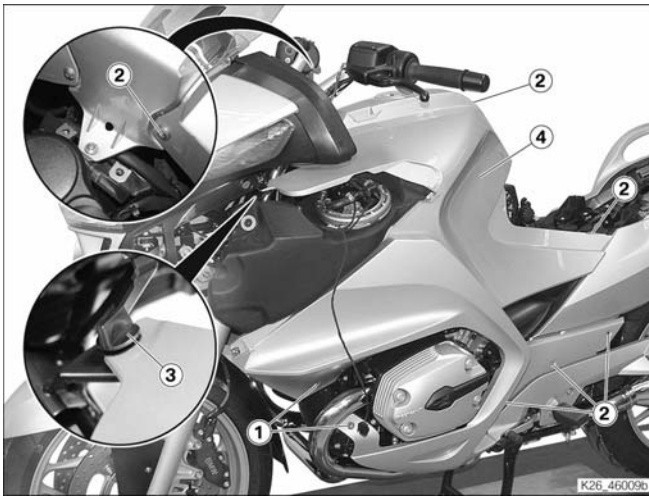
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).



- Secure quick-release catch (3).
- Install screws (1).

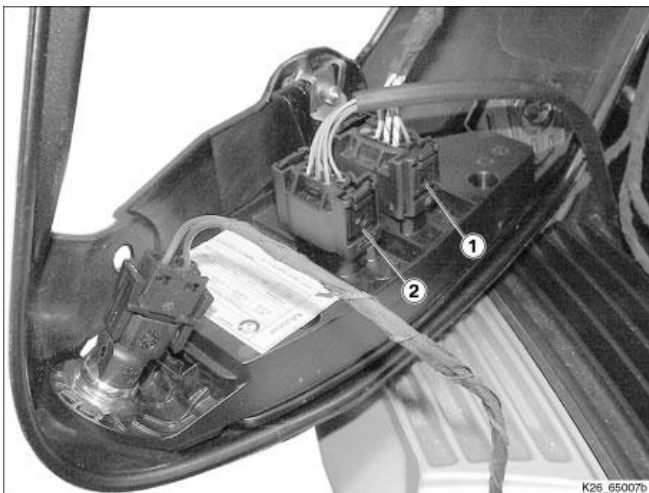
(-) Installing tank rail



- Fit tank rail.
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **12 00 015 Reading fault-code memories with the BMW Motorrad diagnostic system**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

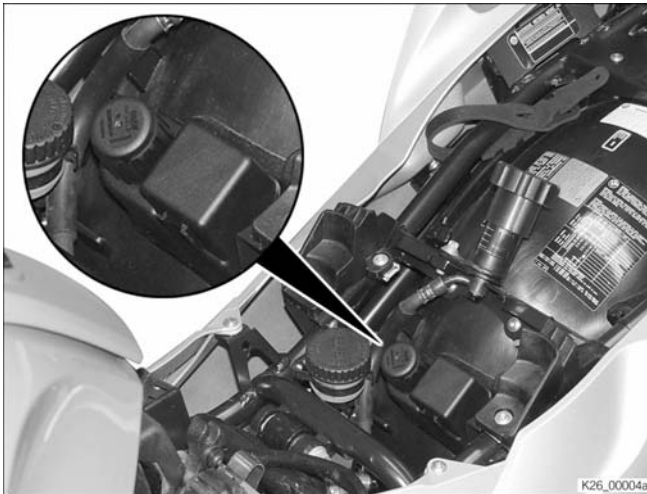
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group

Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating



- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **12 12 011 Replacing all spark plugs**



(-) Removing trim panels

- Undo front screw (1) from both bottom sections of the fairing.

(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF

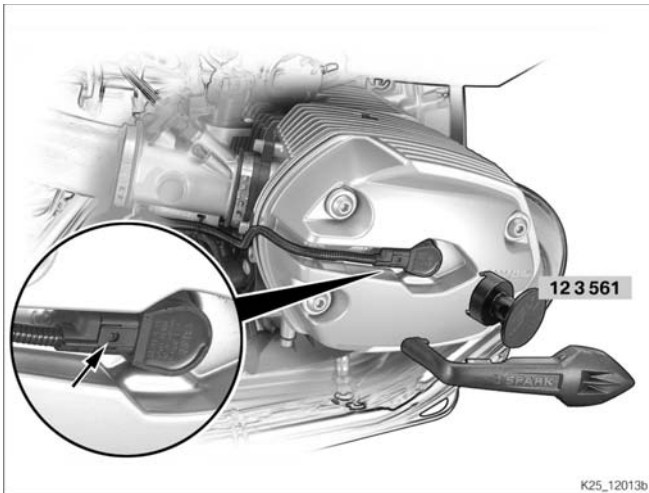


- Remove the primary spark plug cover.

 **Attention**

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF

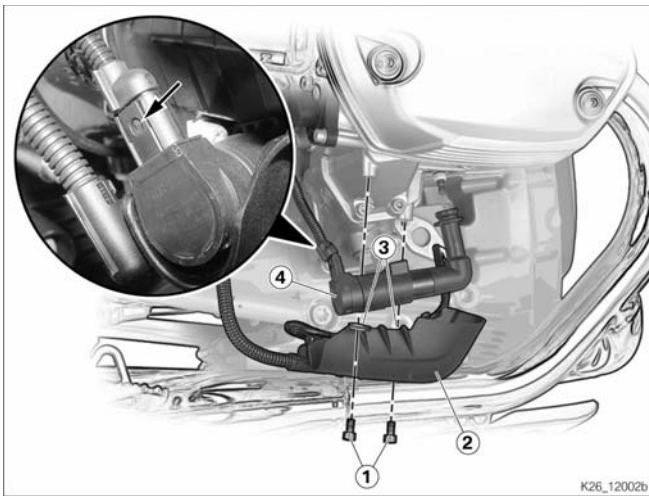


- Slacken screws (1) and remove cover (2) with sleeves (3).

 **Attention**

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab;



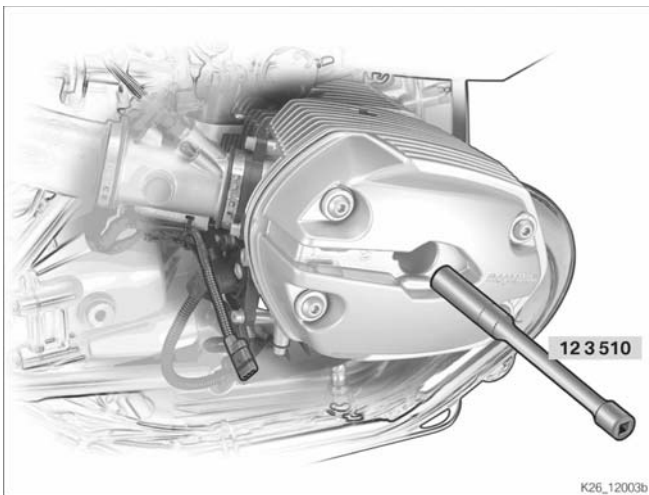
do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Changing spark plugs

► Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the primary spark plug.



◄ Removing secondary spark plug

- Use spark plug socket (No. 12 3 510) to remove the secondary spark plug.



- ◄ Remove the spark plugs from the other cylinder in the same way.

► Checking condition of spark plugs





- Visually inspect the spark plugs.
- If the appearance of the spark plugs is abnormal, ascertain and rectify the cause.



- Dispose of the old spark plugs in an environmentally compatible manner and install new spark plugs.

► **Installing secondary spark plug**

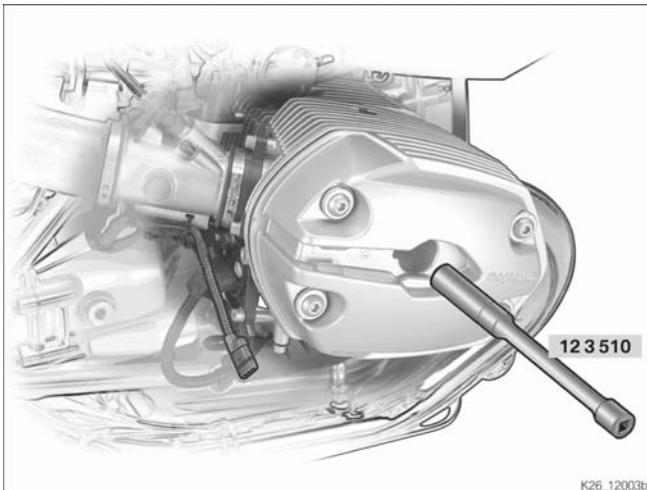
- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.



 Tightening torques			
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm		
 Technical data			
Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE	



► **Installing primary spark plug**

- Using spark plug wrench (No. 12 3 510) , install and tighten the primary spark plug.



 Tightening torques			
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm		
 Technical data			
Spark plug, manufacturer and designation		Bosch YR 5 LDE	

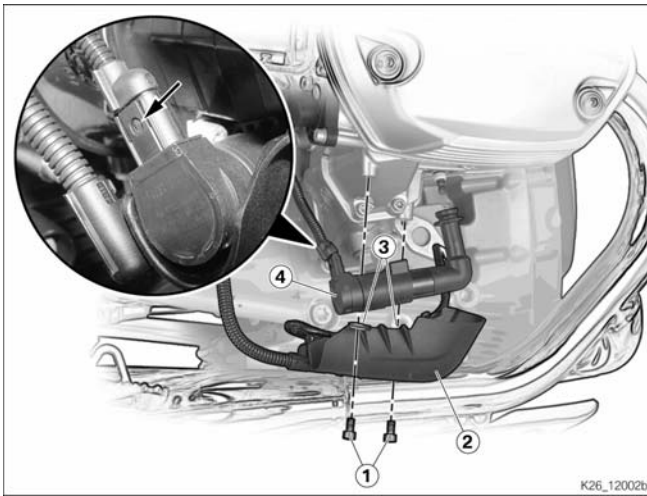


- Install the spark plugs in the other cylinder in the same way.

(-) **Installing secondary spark plug coil**

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.





Consumables/lubricants

Talcum powder	Assembly aid	
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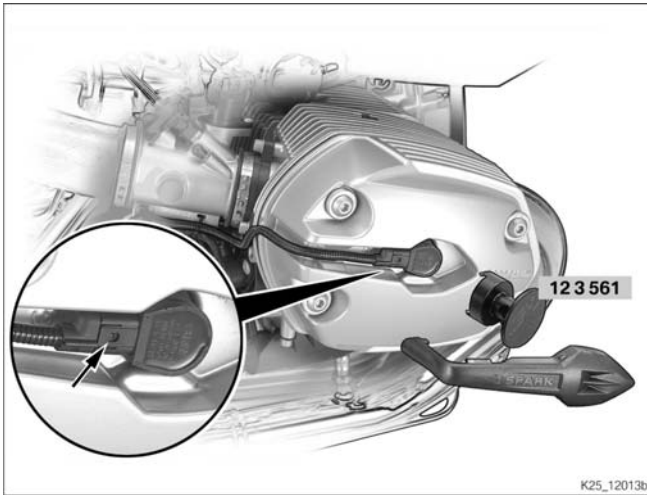
- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.



Tightening torques

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
--	------	--

(-) Installing direct ignition coil



- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

(-) Securing trim panels



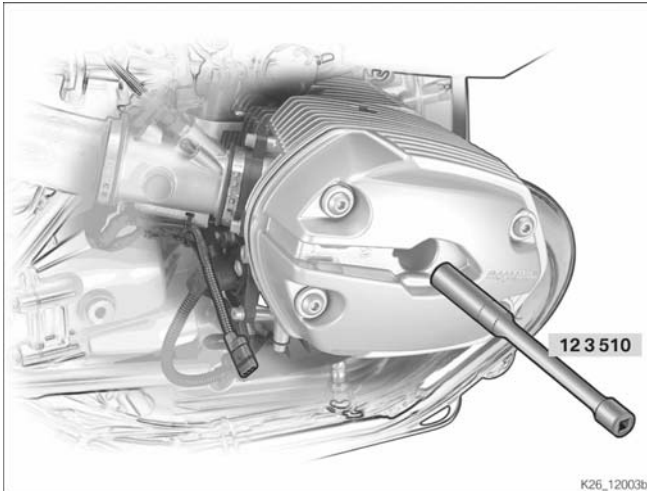
- Install front screw (1) in both bottom sections of the fairing.

12 12 509 Replacing all spark plugs (for maintenance)

(-) Replacing spark plugs

► Removing primary spark plug

- Use spark plug socket (No. 12 3 510) to remove the primary spark plug.



- ◄
- Remove the spark plug from the other cylinder in the same way.

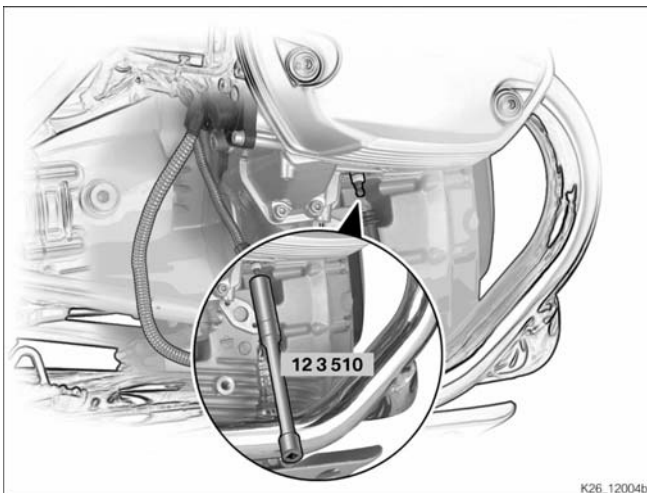
► Checking condition of spark plugs


- Visually inspect the spark plugs.
- If the appearance of the spark plugs is abnormal, ascertain and rectify the cause.


- ◄
- Dispose of the old spark plugs in an environmentally compatible manner and install new spark plugs.

► Installing secondary spark plug

- Using spark plug wrench (No. 12 3 510) , install and tighten the secondary spark plug.

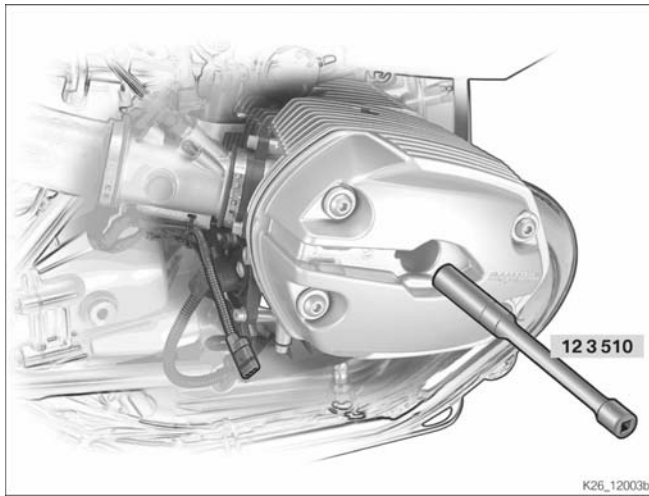


 Tightening torques		
Secondary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm	



 Technical data			
Secondary spark plug, manufacturer and designation		Bosch YR 5 LDE	

◄
► Installing primary spark plug

- Using spark plug wrench (No. 12 3 510) , install and



tighten the primary spark plug.

 Tightening torques			
Primary spark plug to cylinder head, M12 x 1.25, Thread free of oil and grease	Initial tightening and retightening step, 23 Nm		
 Technical data			
Spark plug, manufacturer and designation		Bosch YR 5 LDE	



- Install the spark plugs in the other cylinder in the same way.

 **12 13 155 Replacing direct ignition coil**

(-) Removing direct ignition coil

Precondition

- Ignition is switched OFF



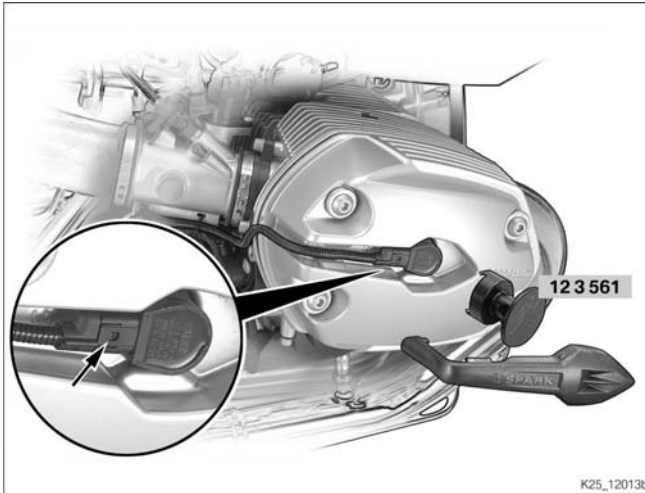
- Remove the primary spark plug cover.



Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

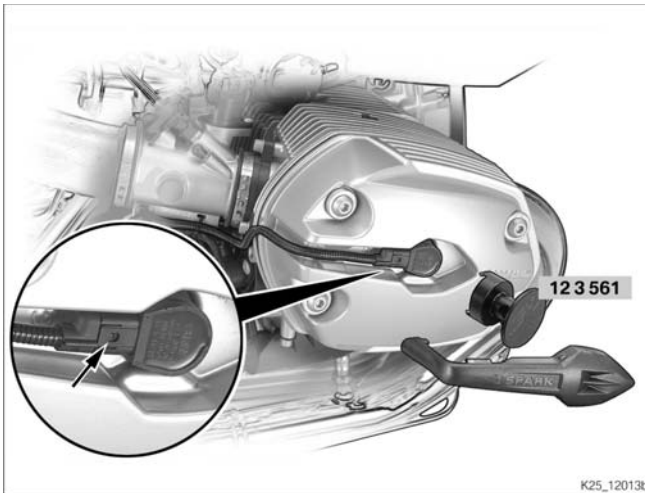
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.



- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Use the special tool for direct ignition coils (No. 12 3 561) to remove the direct ignition coil.

(-) Installing direct ignition coil

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.



 **12 13 165 Replacing secondary direct ignition coil**



(-) Removing trim panels

- Undo front screw (1) from both bottom sections of the fairing.

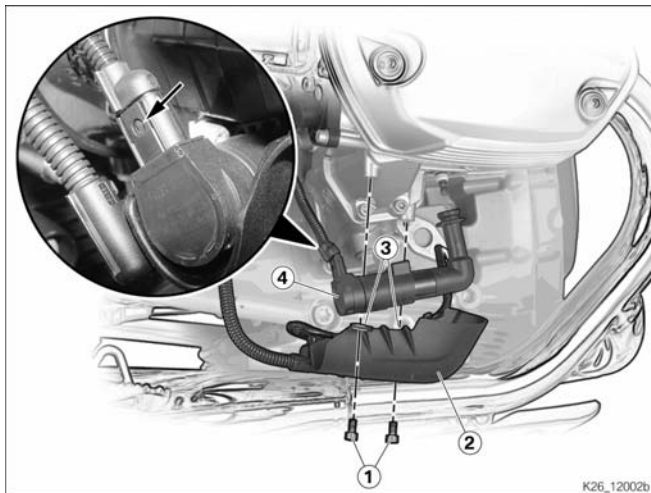
(-) Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF



- Slacken screws (1) and remove cover (2) with sleeves (3).



 **Attention**

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

(-) Installing secondary spark plug coil

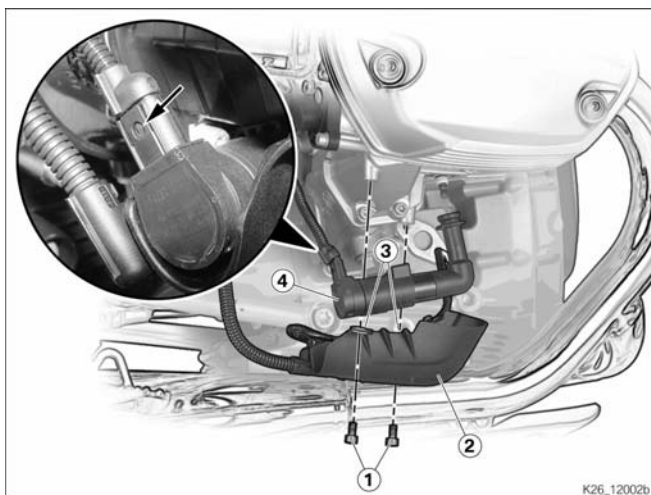
- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.



Consumables/lubricants

Talcum powder	Assembly aid	
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- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.



Tightening torques

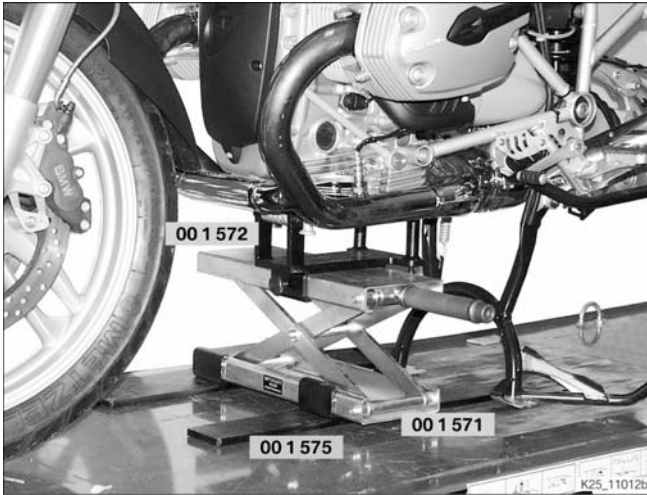
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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(-) Securing trim panels

- Install front screw (1) in both bottom sections of the fairing.



 **12 31 022 Replace alternator**



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



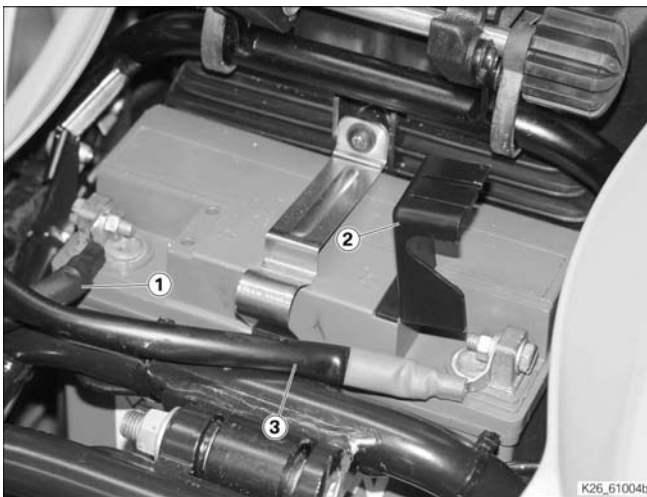
(-) Disconnecting battery

- Switch off the ignition.

! Attention

Nature: Disconnection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.



- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

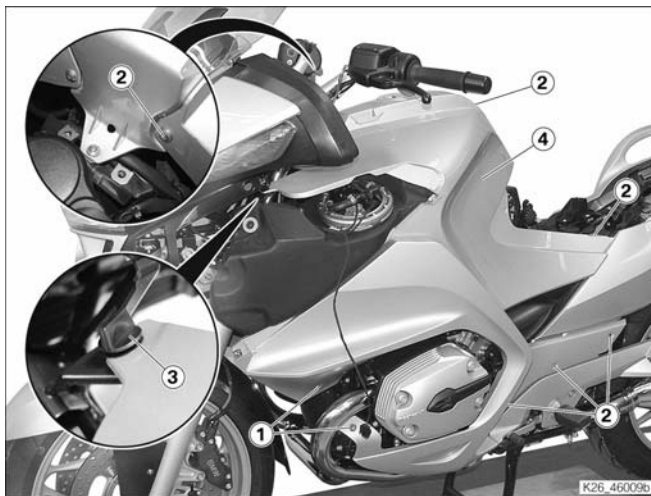
- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



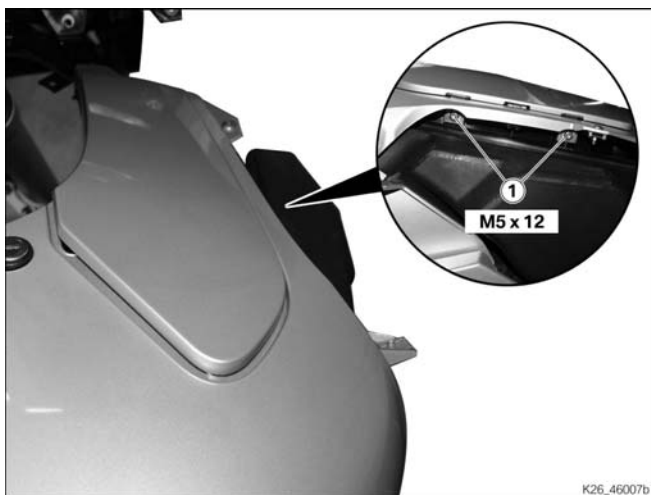
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



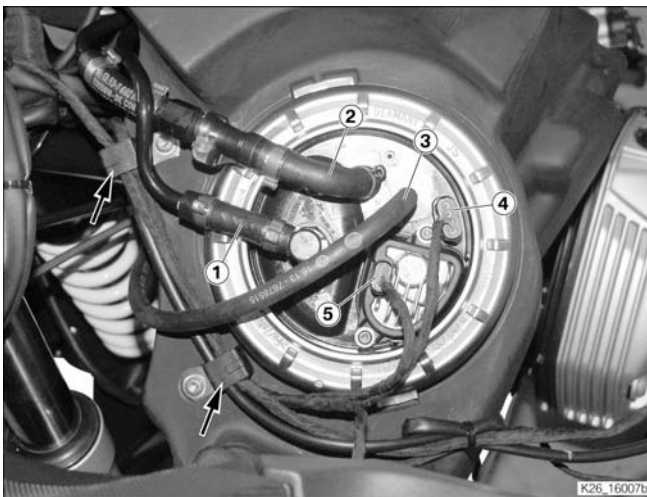
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

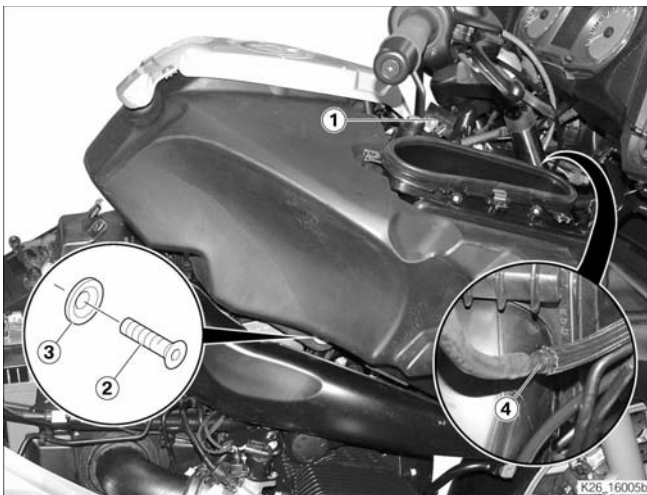


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

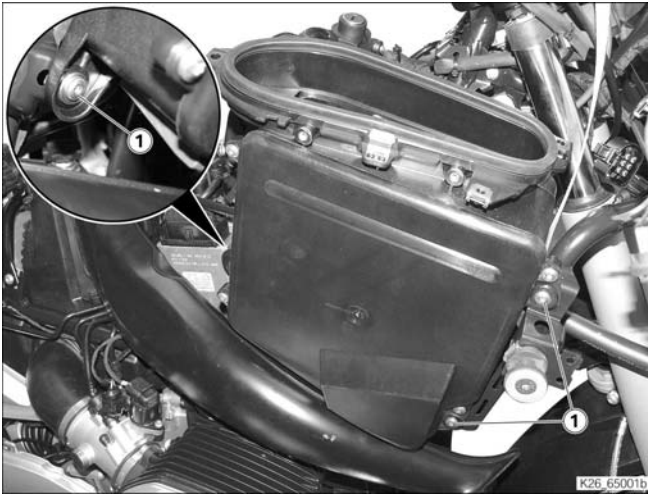


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



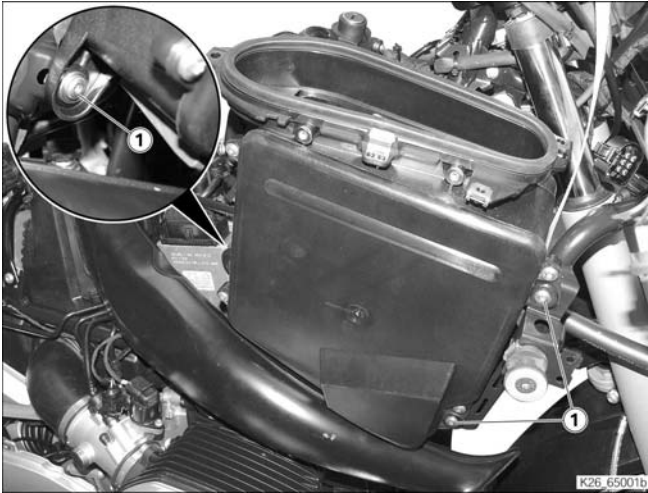
(-) Removing stowage compartment

- Remove screws (1).
- Remove the stowage compartment.



Variant, Radio with CD player

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



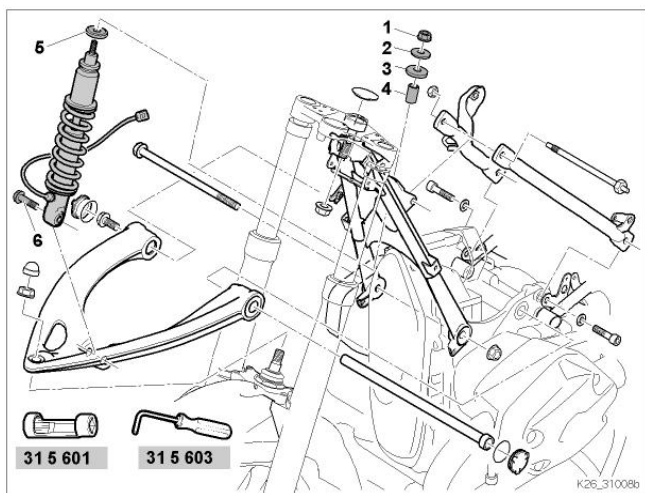
(-) Removing spring strut

Variant, ESA

- Disconnect plug (7).
- Open the cable tie (arrow).

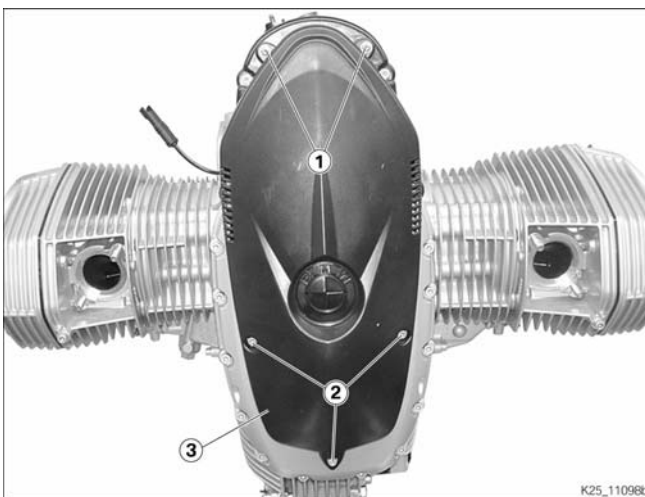


- Remove nut (1) at top.
- Remove washer (2) and rubber buffer (3).
- Remove screw (6) at bottom.
- Lower the spring strut and manoeuvre it forward to remove.
- Remove spacing sleeve (4) and rubber buffer (5).



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

- Gearbox in neutral.



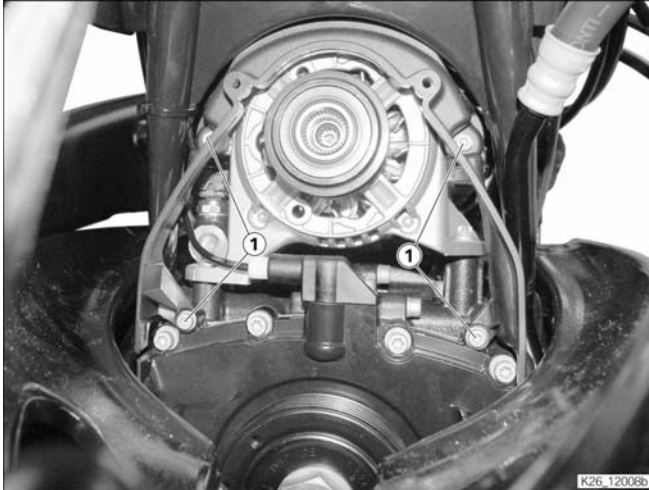
Warning

Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



(-) Removing alternator



► **Removing belt cover, rear**

- Remove screws (1) and pull cover downward to remove.
- Remove the belt guard.



► **Disconnecting cables of alternator**

Precondition

- Battery is disconnected.



- Remove cap (1).
- Disconnect "alternator positive" cable (2).
- Disconnect plug (3).




- Remove screws (1) and (2) and lift alternator from engine block.
- Pull alternator in forward direction to remove.



(-) Installing alternator




- Fit alternator in position from front and install screws (1) and (2).

 Tightening torques		
Alternator to crankcase, M8	18 Nm	



► **Connecting cables of alternator**

- Connect "alternator positive" cable (2).


 Tightening torques		
Flange nut, M6	6 Nm	

- Install cap (1).
- Connect plug (3).



► **Installing belt cover, rear**

- Hold the belt cover in position.
- Install screws (1).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
Belt cover to alternator, M5 x 16	5 Nm	

► **(-) Installing alternator drive belt**

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.



- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.

⚠ Attention

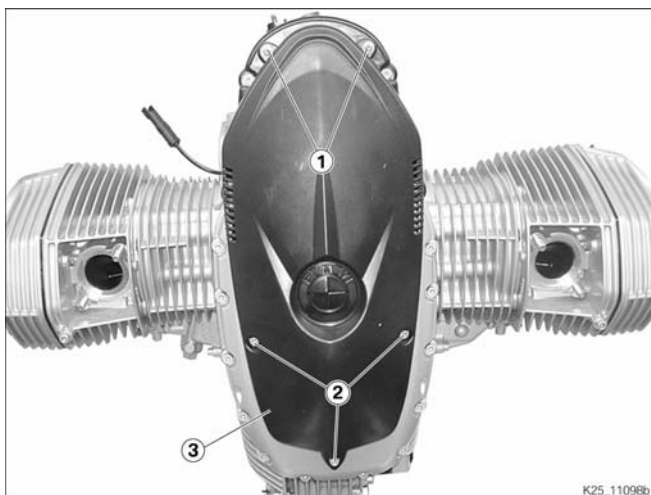
Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

(-) Installing belt guard

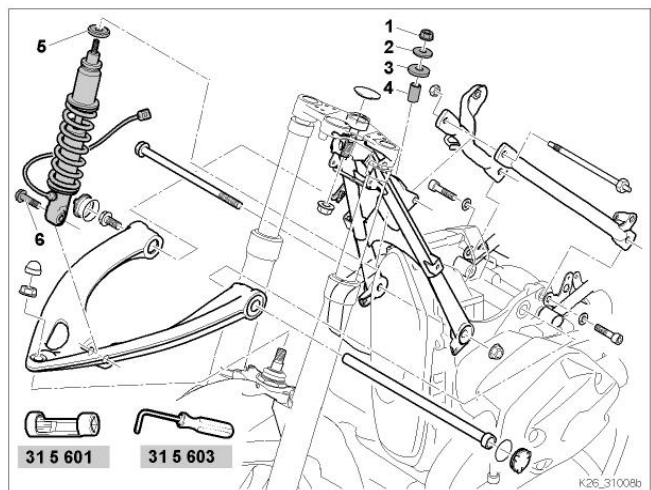
- Install belt guard (3) and secure with screws (1) and (2).




 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing spring strut

- Clean the threads in the spring strut and the leading link.
- Mount rubber buffer (5) and spacing sleeve (4) on the spring strut.
- Guide the spring strut into position from below.
- Install rubber buffer (3) and washer (2).
- Apply thread-locking compound to nut (1), install at top and tighten until hand-tight.




 Consumables/lubricants		
Loctite 243	Thread-locking compound, medium-strength	07 58 9 056 031

- Lubricate the **head** of screw (6).


 Consumables/lubricants		

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	--------------------

- Slightly raise the front wheel and insert **new** screw (6) at bottom.

 Tightening torques		
Spring strut, front, to leading link, M10 x 50 10.9 Micro-encapsulated , Optimoly TA	40 Nm	

- Tighten nut (1) at top.

 Tightening torques		
Spring strut to front frame, Hex nut M10 x 1.25 Loctite 243	35 Nm	

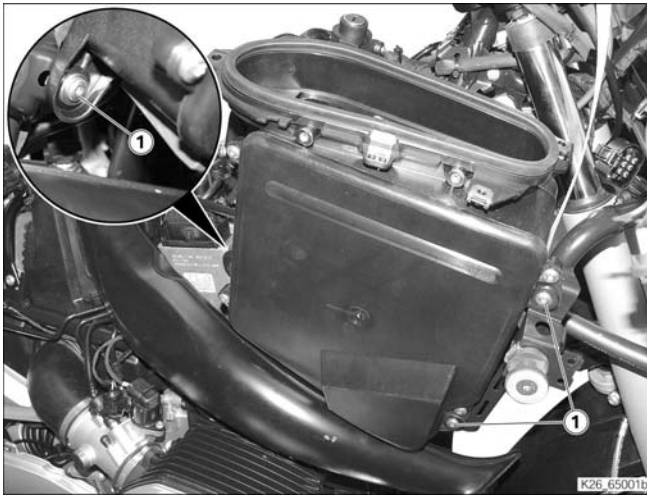


Variant, ESA

- Connect plug (7).
- Secure the cable with cable tie (arrow).

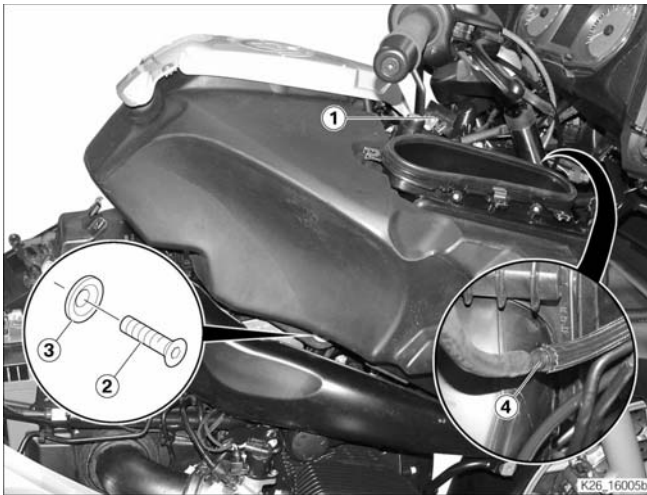
(-) Installing stowage compartment

- Place the stowage compartment in position and align it correctly.
- Install screws (1).




Variant, Radio with CD player

- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).

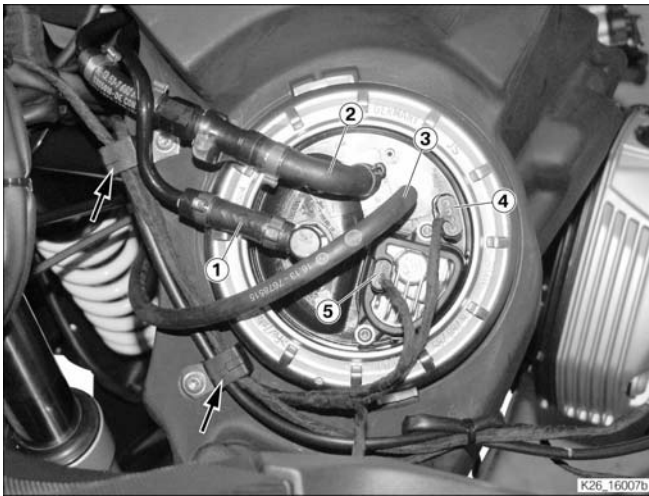


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).



- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

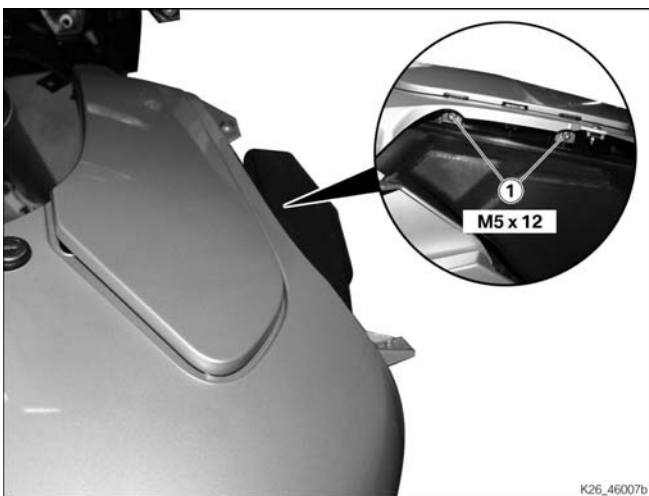
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

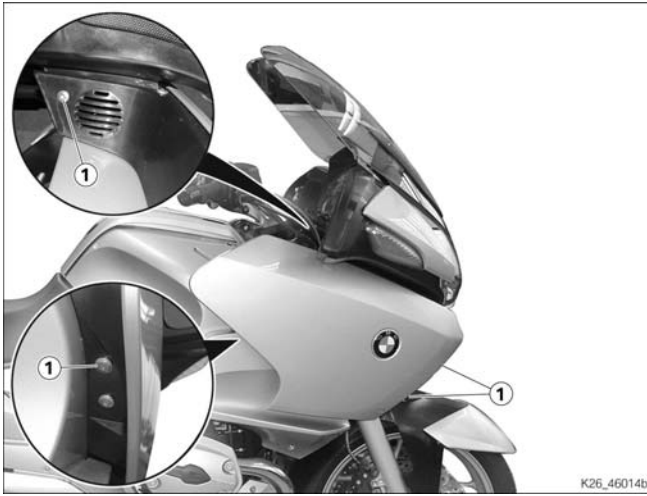
(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

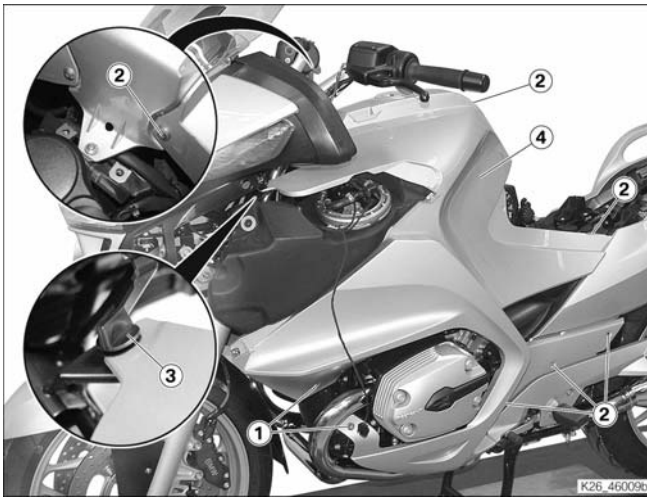
(-) Installing right-hand trim panel

-



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Connecting battery

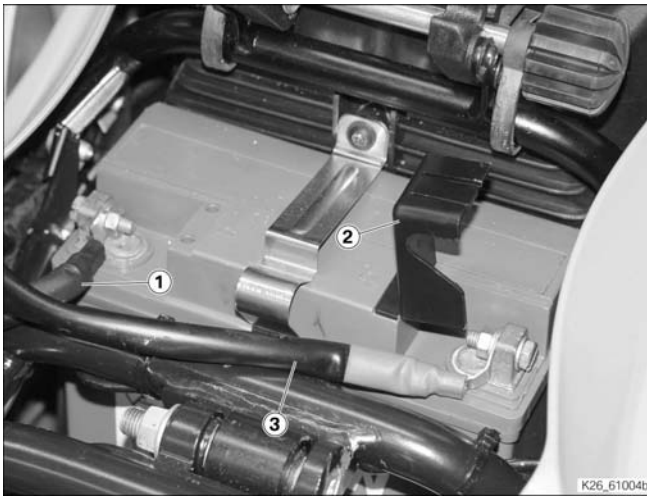


Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

Never install the battery without the



protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Installing seat



- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.

Variant, Seat heating



- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

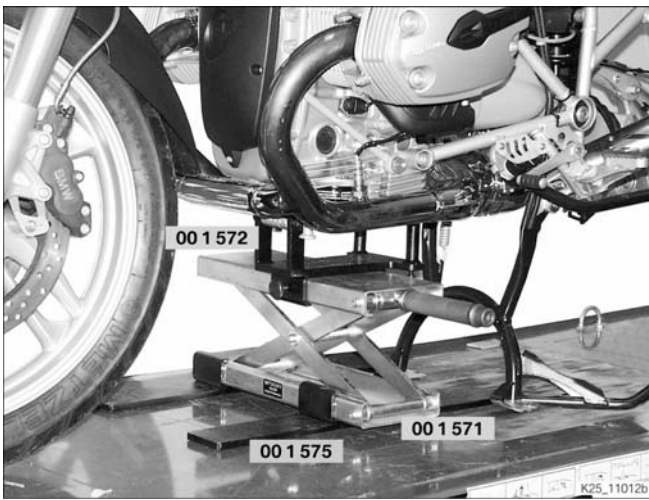
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 **12 31 220 Replace belt pulley on crankshaft**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



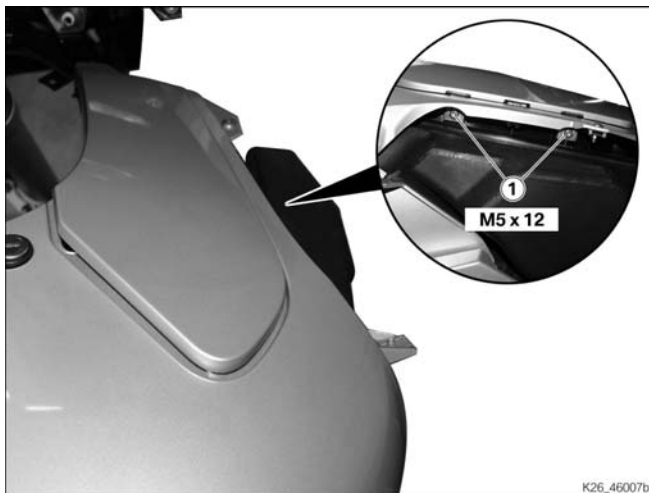
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



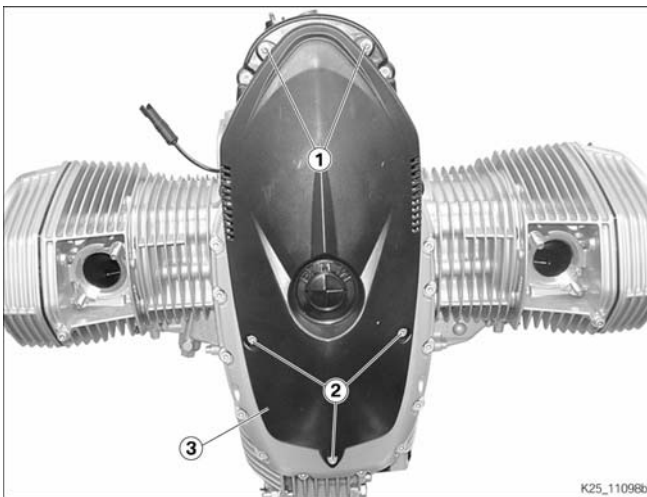
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

- Gearbox in neutral.



Warning

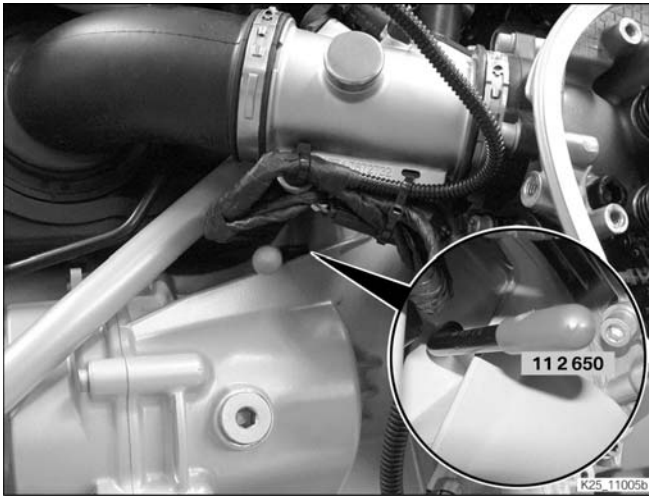
Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



(-) Locking engine at TDC

- By means of the crankshaft pulley, turn the engine in



- the normal direction of rotation until it is at TDC (TDC = top dead centre).
- » The inlet and exhaust valves of one cylinder are closed; those of the other cylinder are at overlap.
 - » The TDC locating pin can be inserted.
 - Insert locating pin (No. 11 2 650) to lock the engine in position.

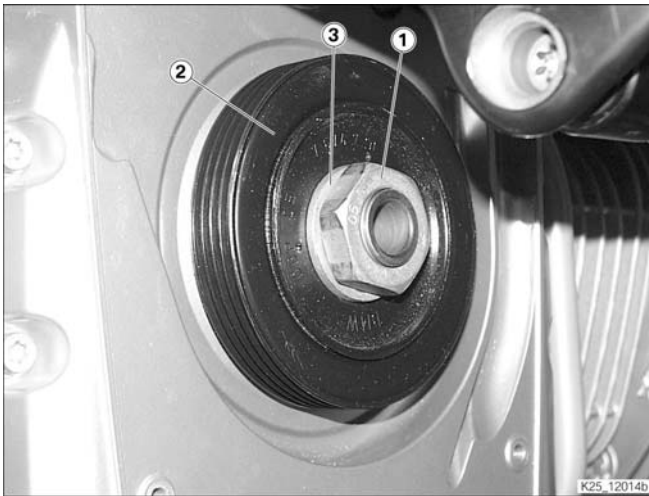
(-) Removing crankshaft belt pulley

Precondition

- Engine locked.



- Remove nut (1) and remove belt pulley (2) with washer (3) from the crankshaft.




(-) Installing crankshaft belt pulley

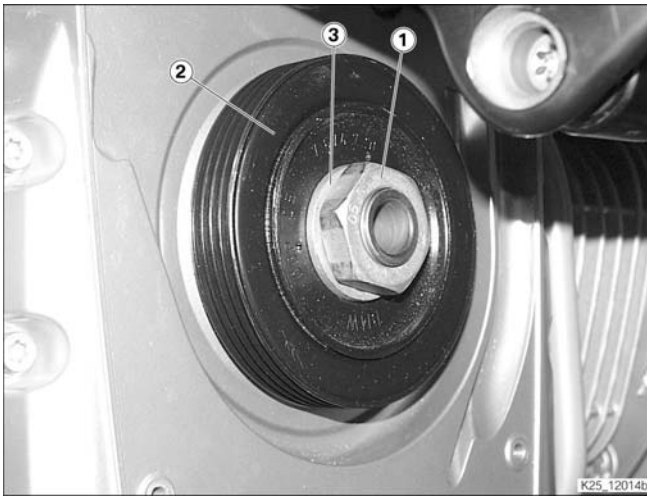
Precondition

- Engine locked.

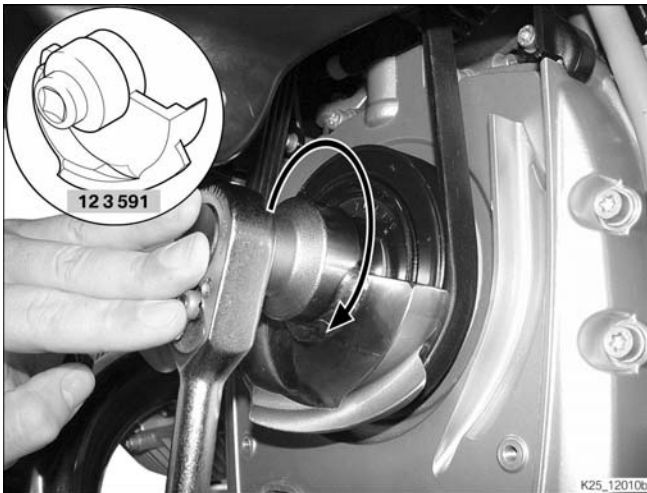


- Fit belt pulley (2) onto the crankshaft with the lettering facing outward.
- Install washer (3) and nut (1) and tighten the nut.

 Tightening torques		
Belt pulley to crankshaft, M22 x 1.5	140 Nm	



- Remove TDC locating pin (No. 11 2 650) .



(-) Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.

⚠ Attention

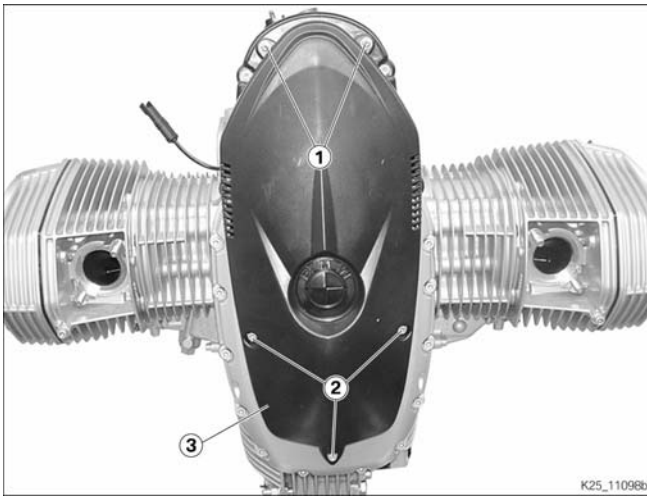
Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.

Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).



Tightening torques

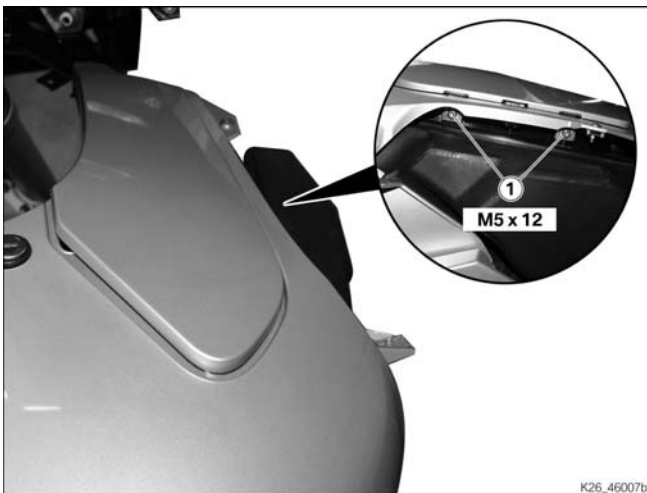
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
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(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

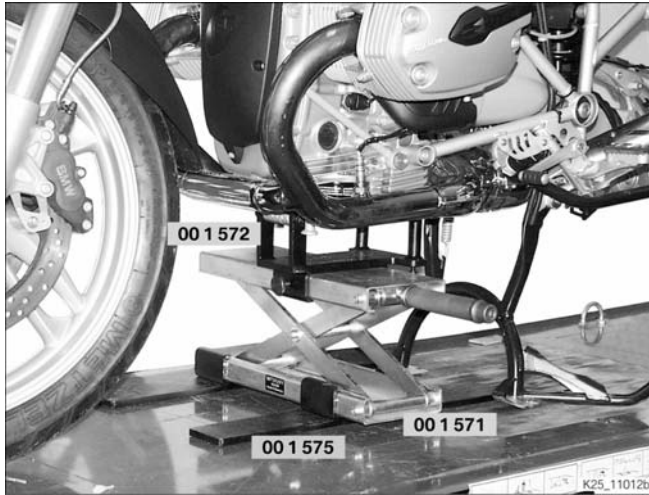


Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **12 31 230 Replace belt pulley on alternator**

(-) Installing engine stand



- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



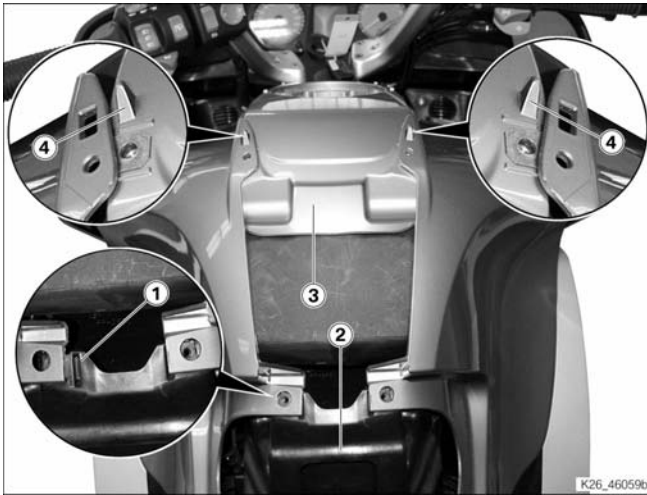
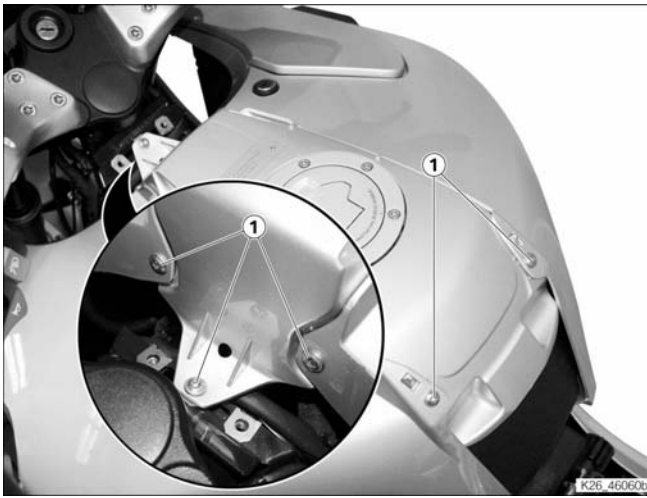
(-) Removing fuel tank cover

- Remove screws (1).
- Close off fuel filler pipe in fuel tank.
- Remove fuel tank cover.



(-) Removing centre fuel-tank cover

- Remove screws (1).



- Disengage locating lug of left-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Disengage locating lug of right-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Pull middle tank cover (3) in forward direction and remove.

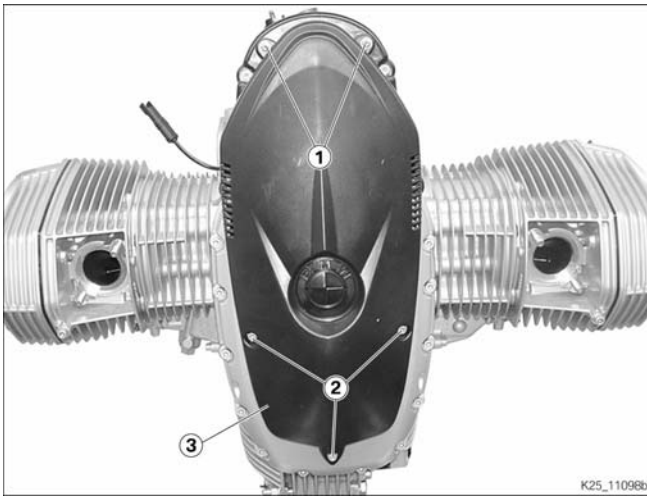
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing belt guard

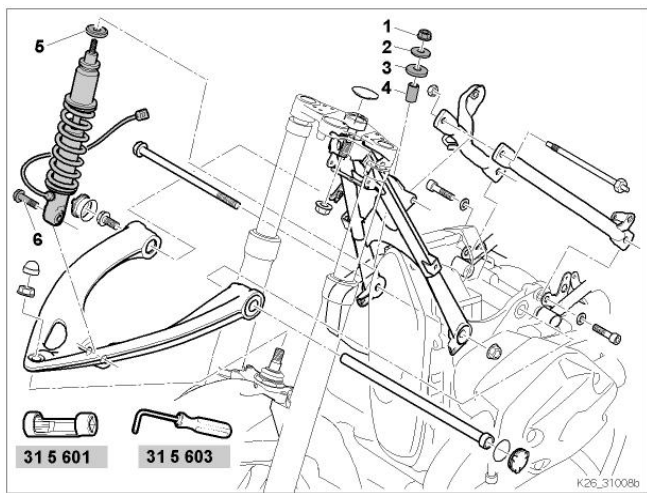
- Remove screws (1) and (2).
- Remove belt guard (3).



K25_11098b

(-) Removing spring strut

- Remove nut (1) at top.
- Remove washer (2) and rubber buffer (3).
- Remove screw (6) at bottom.
- Lower the spring strut and manoeuvre it forward to remove.
- Remove spacing sleeve (4) and rubber buffer (5).



K26_31008b

Variant, ESA

- Use cable ties to secure the spring strut to the frame.

(-) Removing alternator drive belt

Precondition

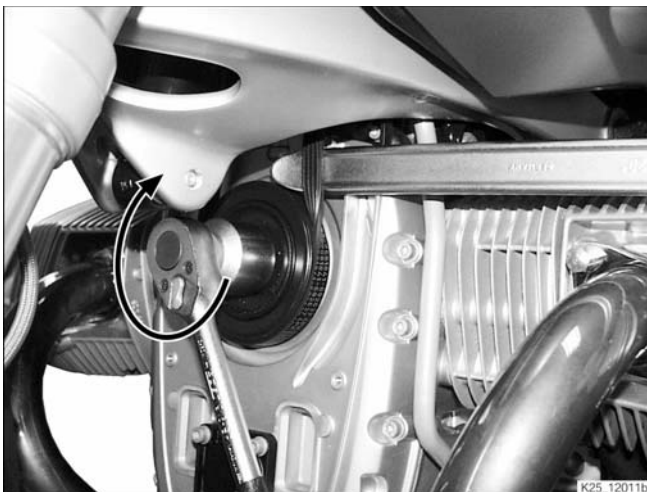
- Gearbox in neutral.



Warning

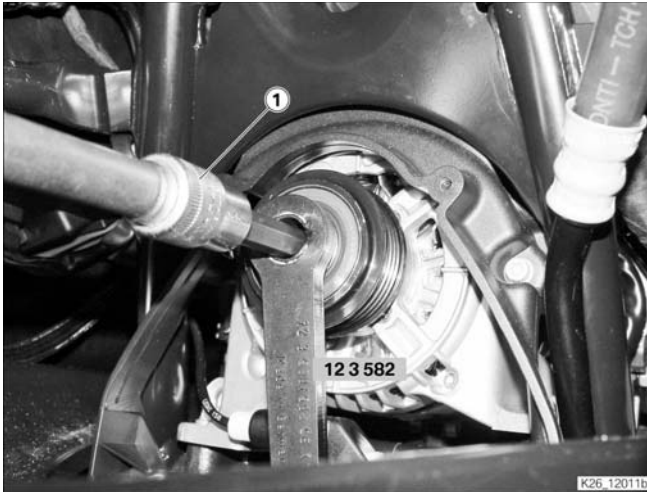
Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



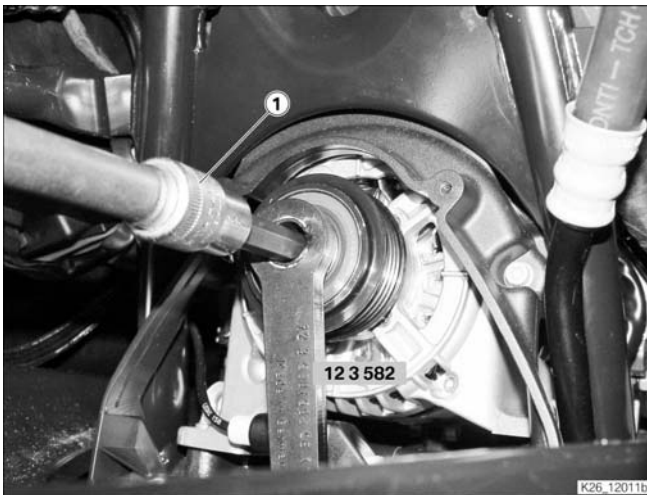
K25_12011b

(-) Removing alternator belt pulley




- Remove belt pulley with M10 multispline socket (1) and lever (No. 12 3 582) .

(-) Installing alternator belt pulley



- Install the belt pulley and secure it with M10 multispline socket (1) and lever (No. 12 3 582) .

 Tightening torques		
Belt pulley to alternator	50 Nm	

(-) Installing alternator drive belt



- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.

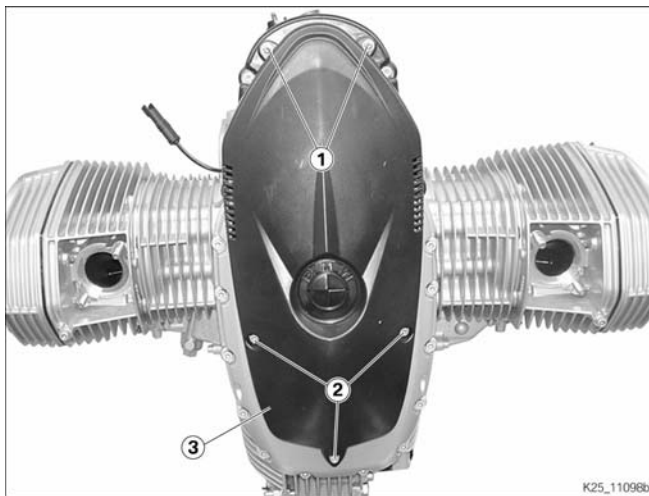
Attention

Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

(-) Installing belt guard



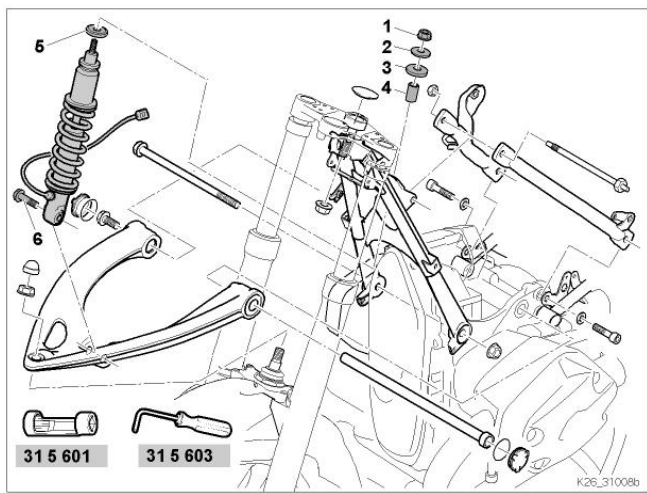
- Install belt guard (3) and secure with screws (1) and (2).


 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing spring strut


Variant, ESA

- Cut through the cable ties.
- Clean the threads in the spring strut and the leading link.
- Mount rubber buffer (5) and spacing sleeve (4) on the spring strut.
- Guide the spring strut into position from below.
- Install rubber buffer (3) and washer (2).
- Apply thread-locking compound to nut (1), install at top and tighten until hand-tight.




 Consumables/lubricants		
Loctite 243	Thread-locking compound, medium-strength	07 58 9 056 031

- Lubricate the **head and shank** of screw (6).

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slightly raise the front wheel and insert **new** screw (6) at bottom.

 Tightening torques		
Spring strut, front, to leading link, M10 x 50 10.9	40 Nm	
Micro-encapsulated ,		

Optimoly TA

- Tighten nut (1) at top.



Tightening torques

Spring strut to front frame,
Hex nut M10 x 1.25
Loctite 243

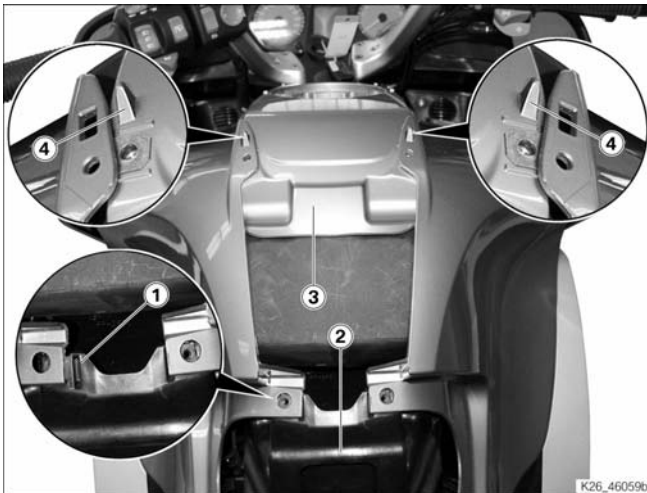
35 Nm

(-) Installing right-hand trim panel



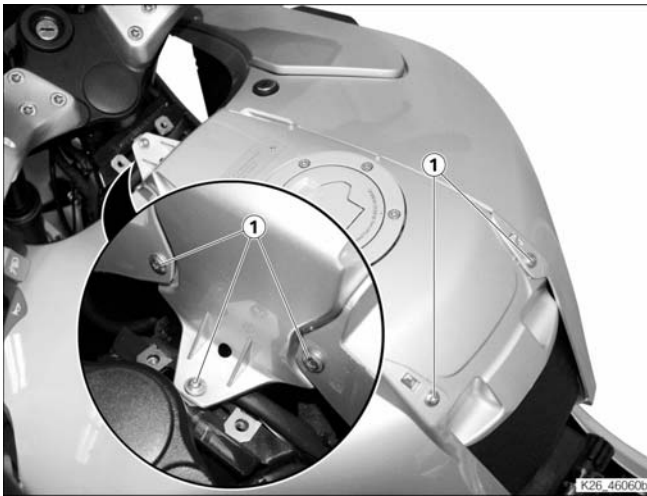
- Hold the panel in position.
- Install screws (1).

(-) Installing middle tank cover



- Fit middle tank cover (3) aligned in forward direction.
- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the right-hand tank cover in groove (1) of seat bracket (2).
- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the left-hand tank cover in groove (1) of seat bracket (2).

- Install screws (1).



(-) Installing fuel tank cover

- Remove cap from fuel filler neck.
- Make sure that the seal is seated correctly under the fuel filler neck.
- Place fuel tank cover in position, fit screw (1) and evenly tighten crosswise.



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



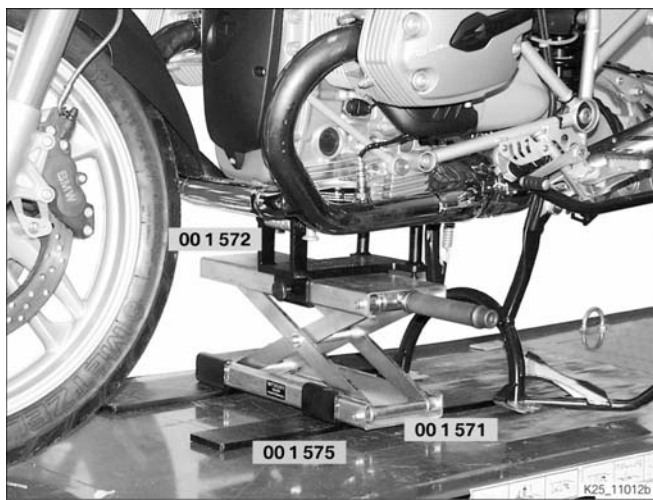
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 **12 31 250 Replacing belt for alternator**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

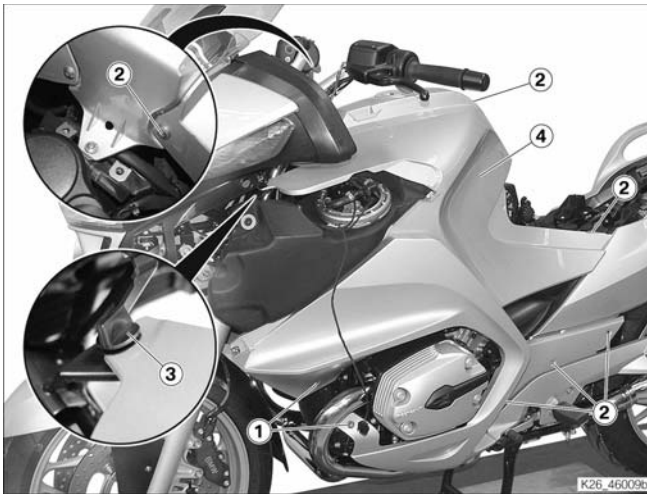


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

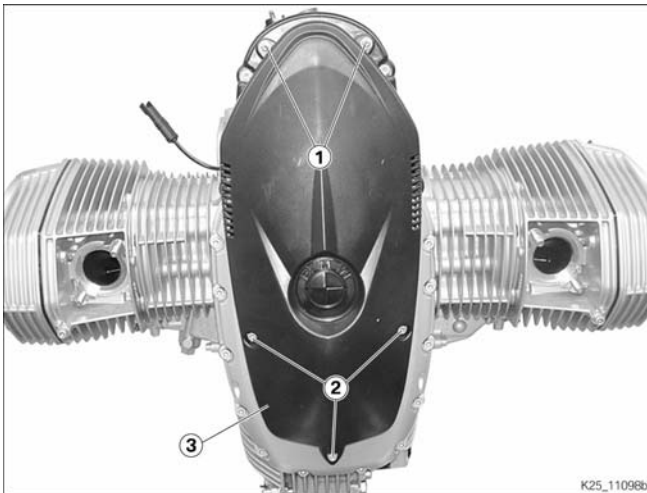


- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

(-) Removing belt guard

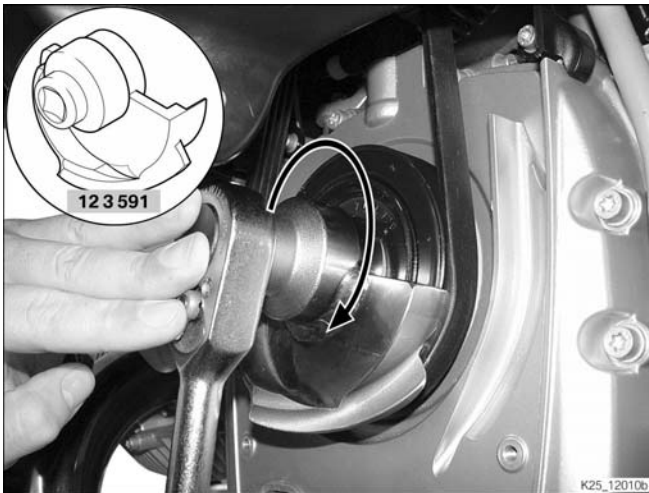
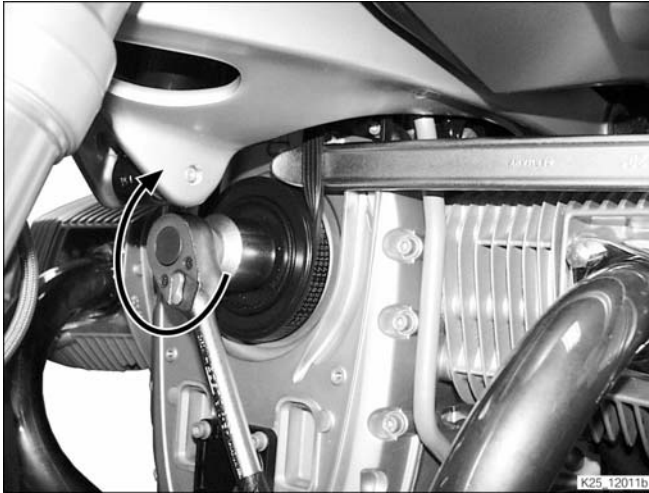


- Remove screws (1) and (2).
- Remove belt guard (3).

(-) Replacing alternator drive belt

► Removing alternator drive belt

Precondition



- Gearbox in neutral.



Warning

Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.

- Turn the engine in the normal direction of rotation (arrow) by means of the crankshaft belt pulley and, using a blunt instrument such as a tyre lever, for instance, carefully ease the drive belt forward until it slips off the pulley.



Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.



Attention

Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

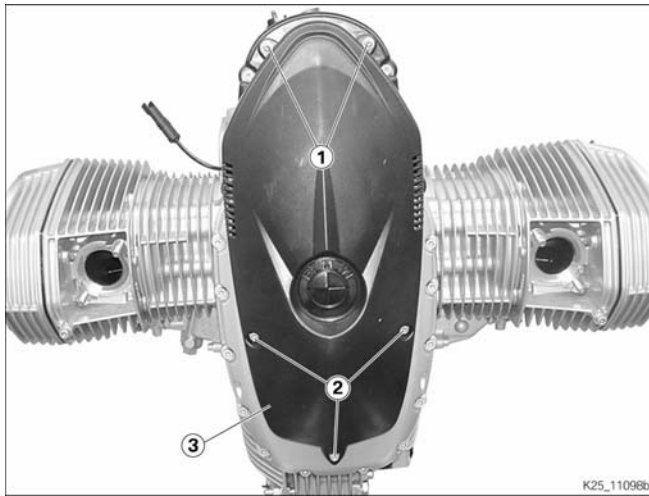
- Check that the drive belt is correctly seated on both pulleys.



(-) Installing belt guard

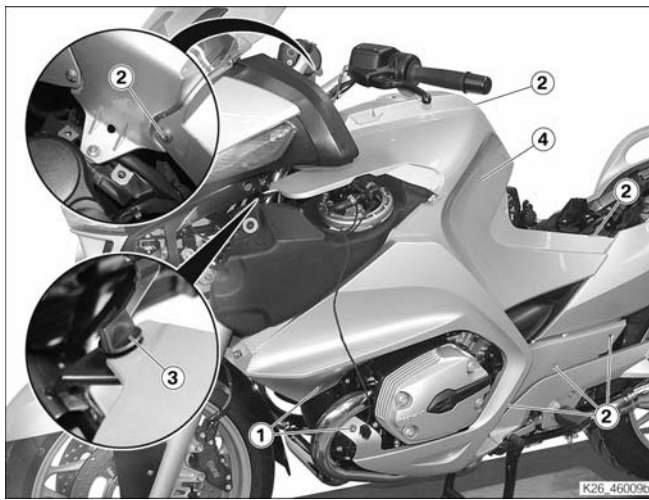
- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	



(-) Installing entire left side tank cover

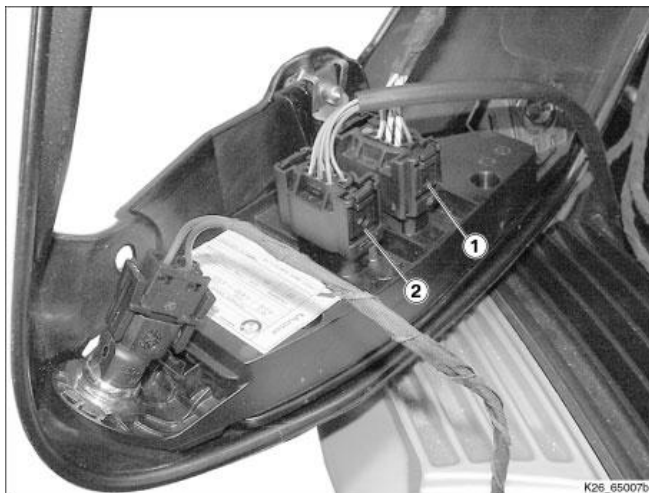
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

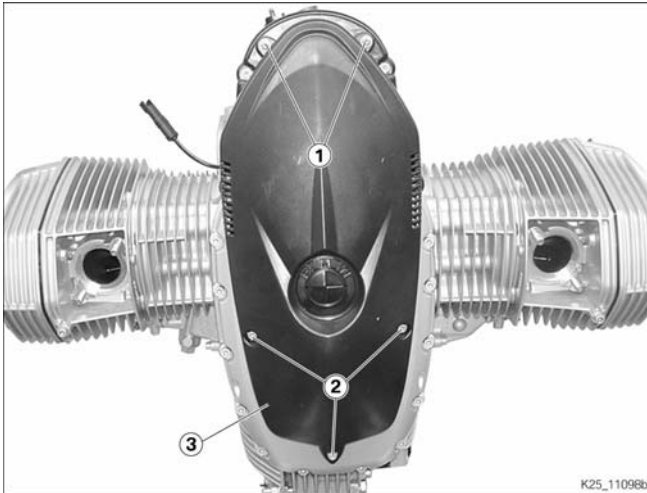
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **12 31 657 Replacing alternator belt (for maintenance)**



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).

(-) Replacing alternator drive belt

► Removing alternator drive belt

Precondition

- Gearbox in neutral.



Warning

Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.

- Turn the engine in the normal direction of rotation (**arrow**) by means of the crankshaft belt pulley and, using a blunt instrument such as a tyre lever, for instance, carefully ease the drive belt forward until it slips off the pulley.

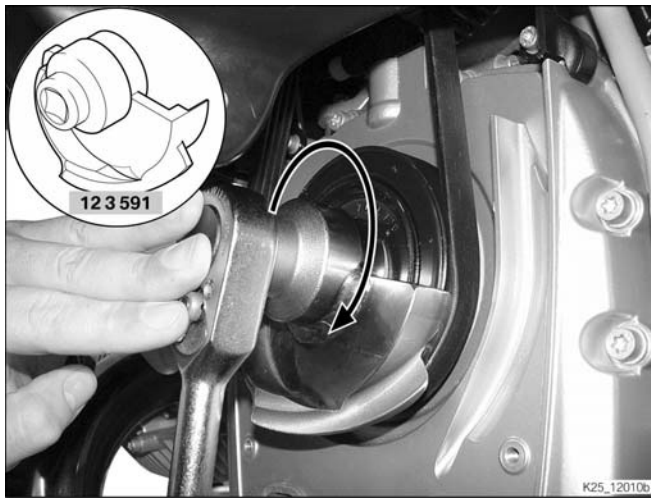


► Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (**arrow**) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.



Attention



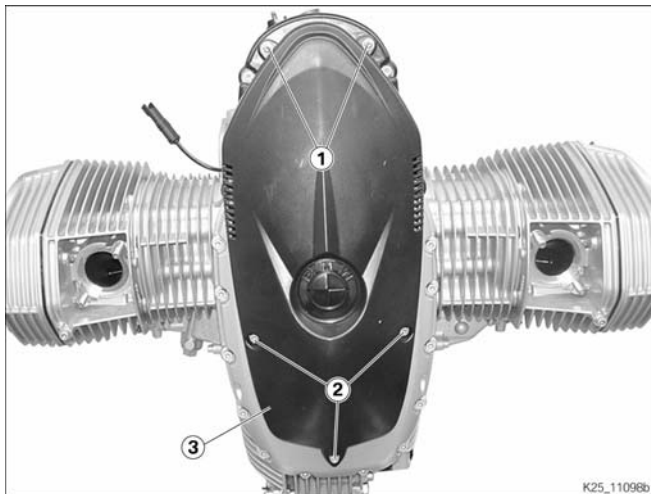
Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

◀ (-) **Installing belt guard**

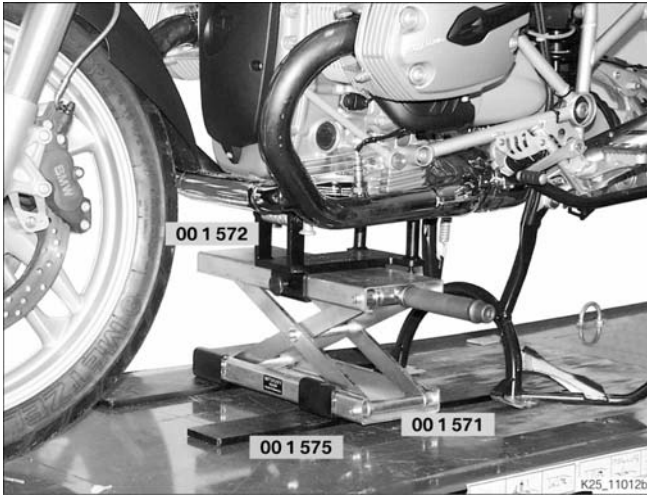
- Install belt guard (3) and secure with screws (1) and (2).



 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

 **12 32 000 Replacing control switch for alternator**

(-) Installing engine stand



- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.

Variant, Seat heating



- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



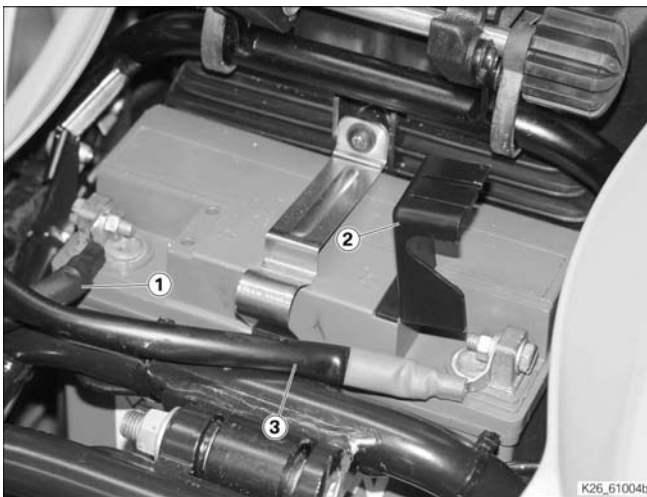
(-) Disconnecting battery

- Switch off the ignition.

! Attention

Nature: Disconnection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.



- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

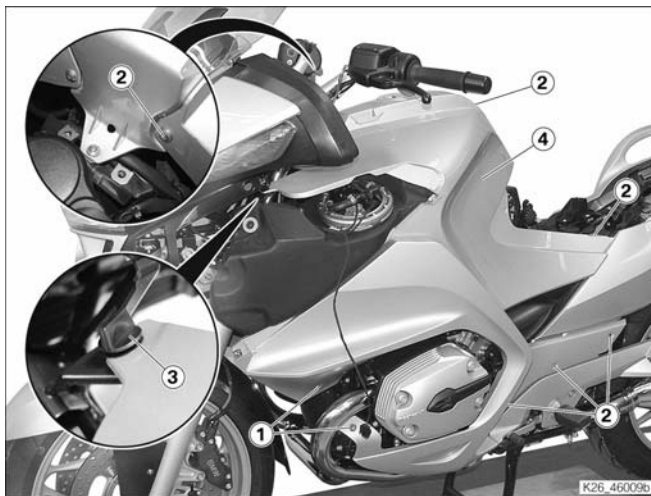
- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



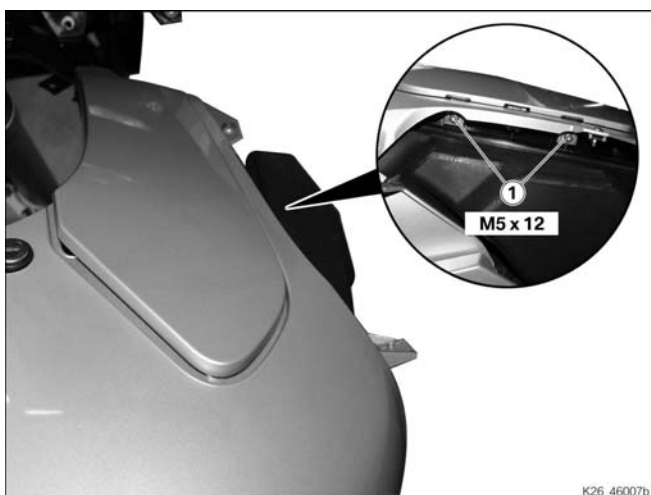
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



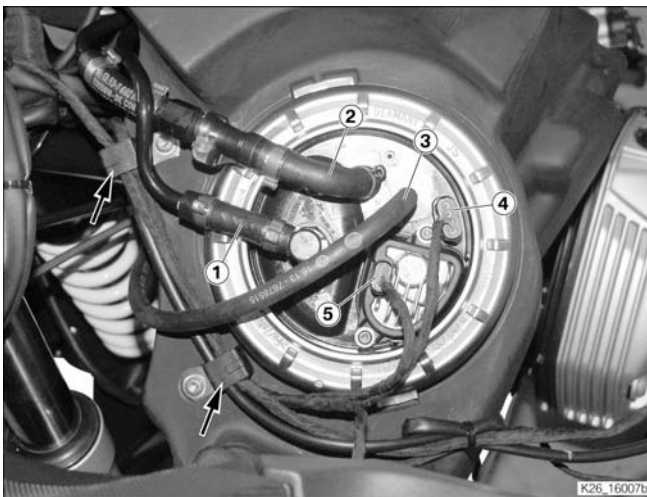
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

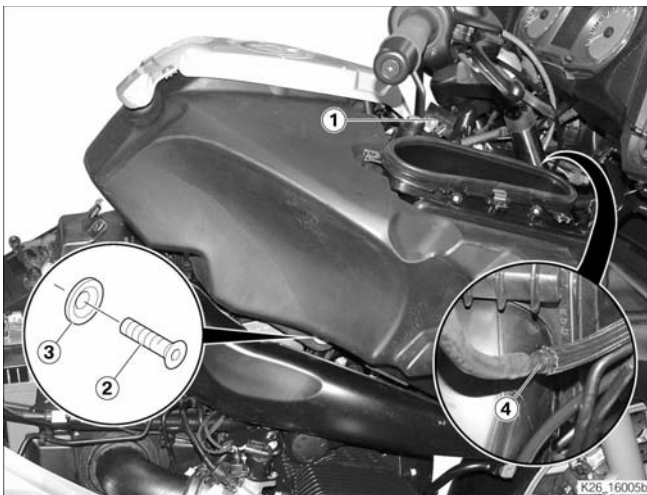


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

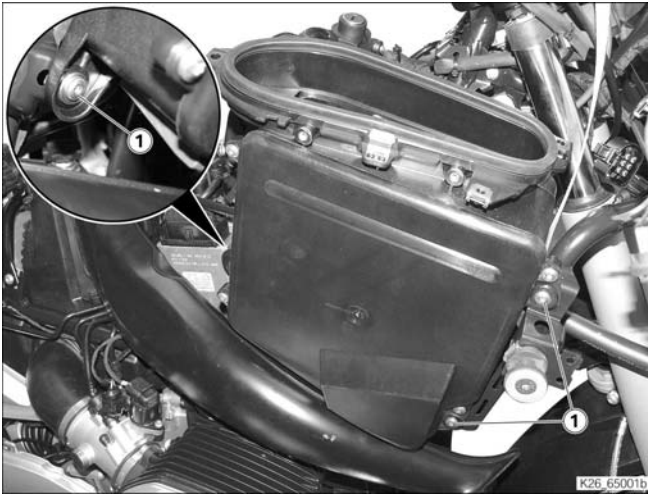


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



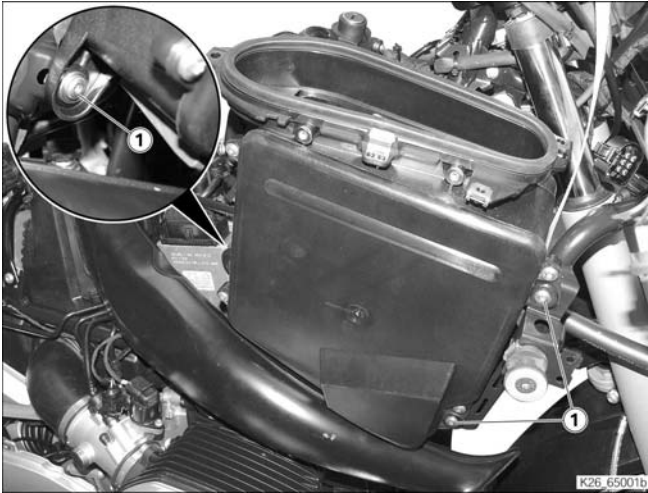
(-) Removing stowage compartment

- Remove screws (1).
- Remove the stowage compartment.



Variant, Radio with CD player

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



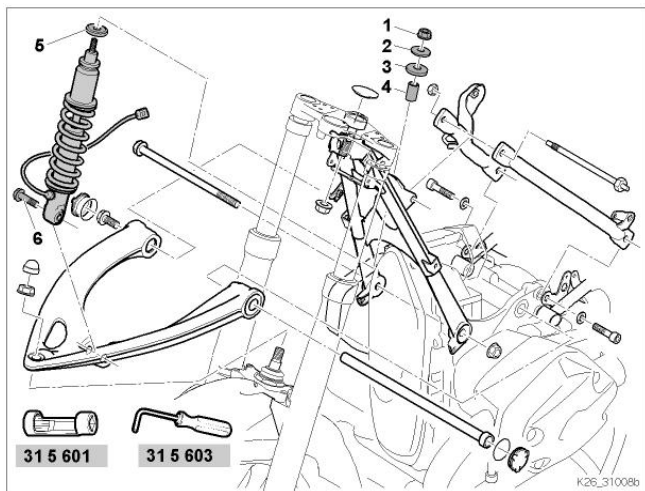
(-) Removing spring strut

Variant, ESA

- Disconnect plug (7).
- Open the cable tie (arrow).

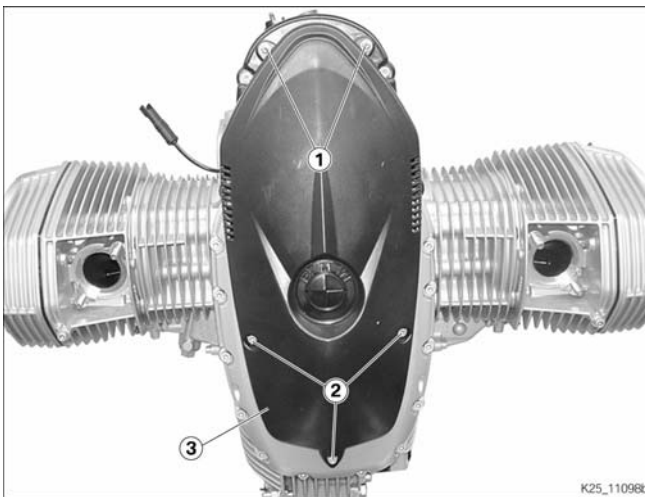


- Remove nut (1) at top.
- Remove washer (2) and rubber buffer (3).
- Remove screw (6) at bottom.
- Lower the spring strut and manoeuvre it forward to remove.
- Remove spacing sleeve (4) and rubber buffer (5).



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

- Gearbox in neutral.



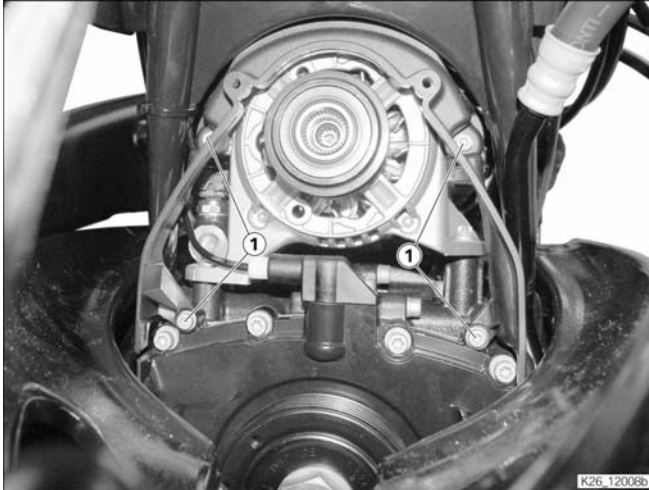
Warning

Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.



(-) Removing alternator



► **Removing belt cover, rear**

- Remove screws (1) and pull cover downward to remove.
- Remove the belt guard.

◄ **Disconnecting cables of alternator**

Precondition

- Battery is disconnected.

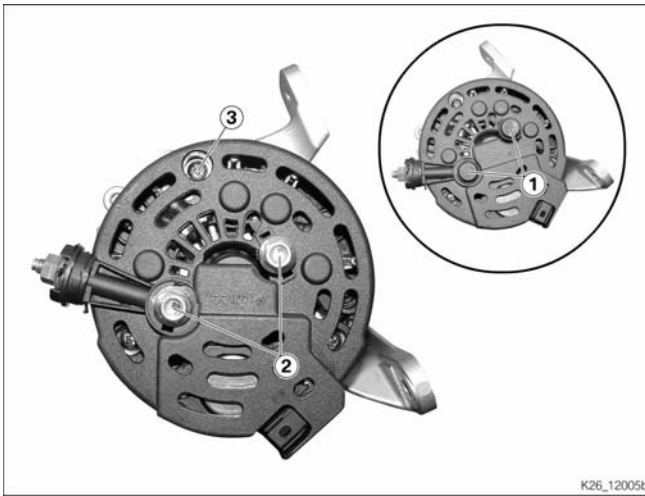


- Remove cap (1).
- Disconnect "alternator positive" cable (2).
- Disconnect plug (3).

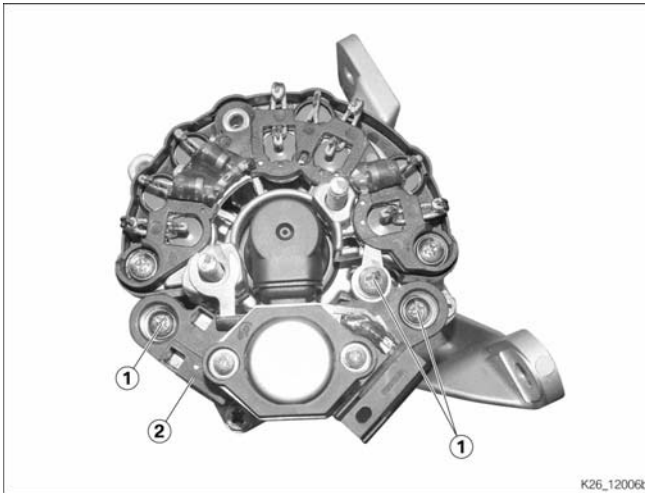


- Remove screws (1) and (2) and lift alternator from engine block.
- Pull alternator in forward direction to remove.

(-) Removing control switch for alternator



- Remove caps (1) of the cover.
- Remove nuts (2) of the cover.
- Remove screw (3).
- Remove the cover from the alternator.



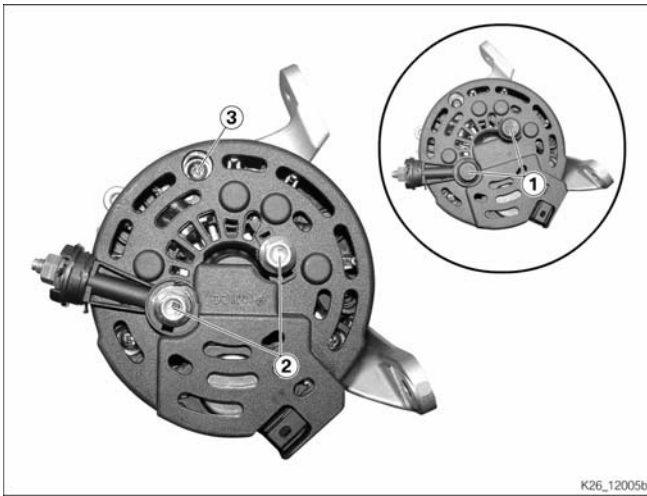
- Remove screws (1) from the control switch.
- Remove control switch (2) from the alternator.



(-) Installing control switch for alternator

- Insert control switch (2) into the alternator.
- Secure control switch (2) with screws (1).

- Secure the cover to the alternator with screw (3) and nuts (2).
- Install caps (1) on the cover.




K26_12005b

(-) Installing alternator

- Fit alternator in position from front and install screws (1) and (2).



K26_12007c


 Tightening torques		
Alternator to crankcase, M8	18 Nm	

► Connecting cables of alternator

- Connect "alternator positive" cable (2).



K26_12007b

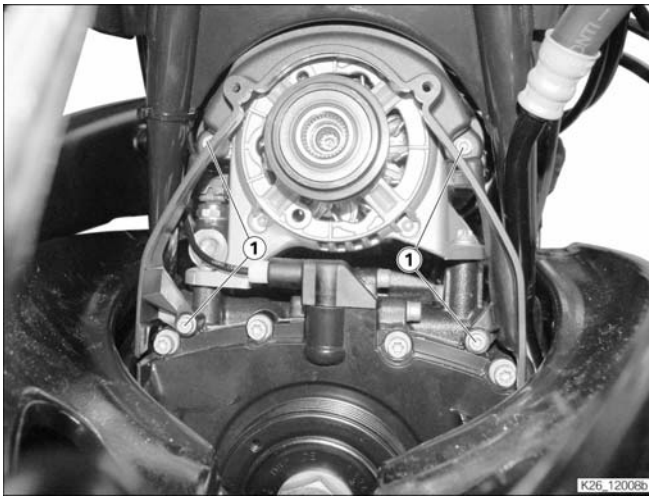
 Tightening torques		
Flange nut, M6	6 Nm	


- Install cap (1).
- Connect plug (3).

► Installing belt cover, rear

- Hold the belt cover in position.
- Install screws (1).

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 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
Belt cover to alternator, M5 x 16	5 Nm	

(-) Installing alternator drive belt



- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.

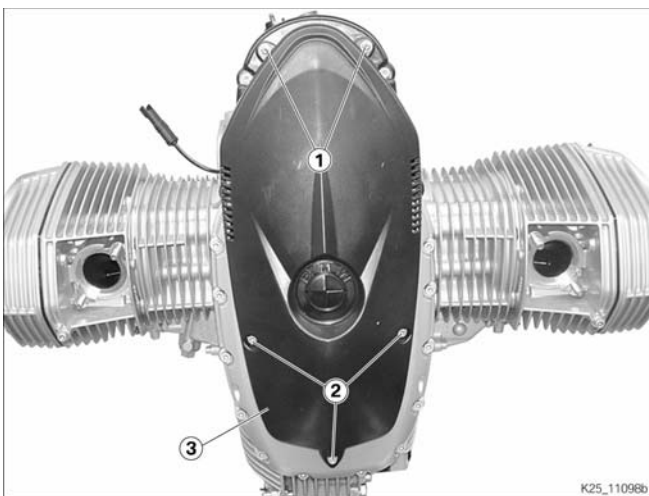
! Attention

Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.


Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

(-) Installing belt guard

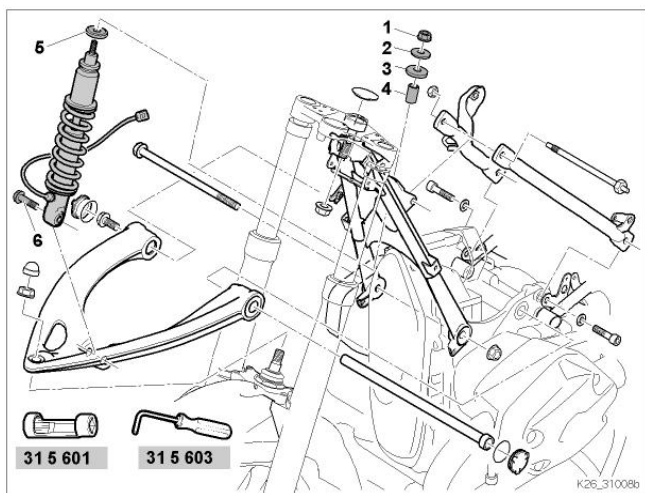


- Install belt guard (3) and secure with screws (1) and (2).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	


(-) Installing spring strut

-




Clean the threads in the spring strut and the leading link.


- Mount rubber buffer (5) and spacing sleeve (4) on the spring strut.
- Guide the spring strut into position from below.
- Install rubber buffer (3) and washer (2).
- Apply thread-locking compound to nut (1), install at top and tighten until hand-tight.

 Consumables/lubricants		
Loctite 243	Thread-locking compound, medium-strength	07 58 9 056 031


- Lubricate the **head** of screw (6).

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slightly raise the front wheel and insert **new** screw (6) at bottom.

 Tightening torques		
Spring strut, front, to leading link, M10 x 50 10.9 Micro-encapsulated , Optimoly TA	40 Nm	

- Tighten nut (1) at top.

 Tightening torques		
Spring strut to front frame, Hex nut M10 x 1.25 Loctite 243	35 Nm	

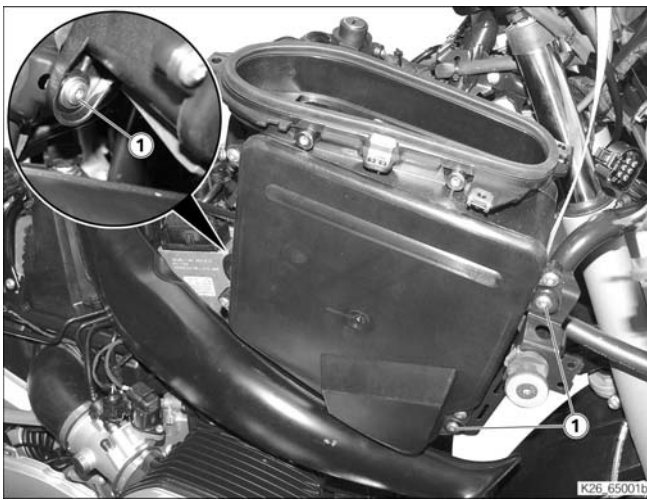
Variant, ESA

- Connect plug (7).
- Secure the cable with cable tie ([arrow](#)).



(-) Installing stowage compartment

- Place the stowage compartment in position and align it correctly.
- Install screws (1).



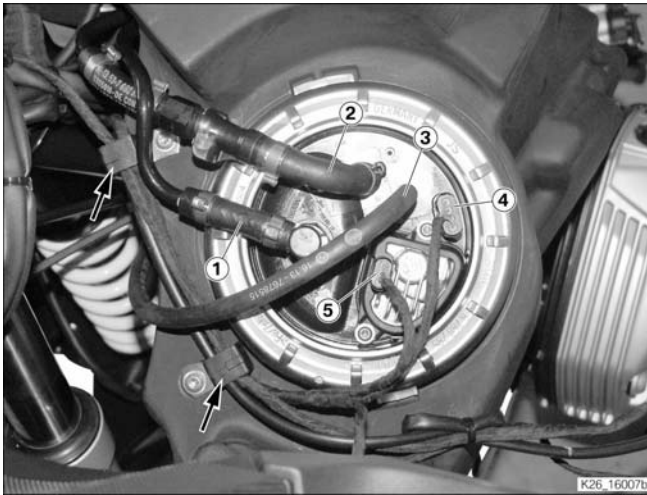
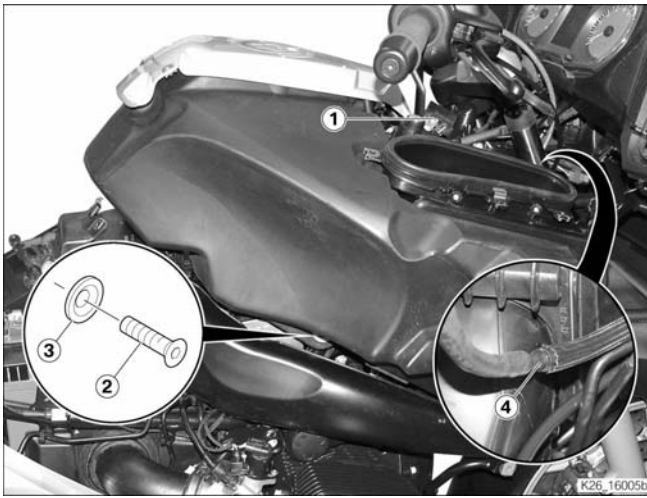
Variant, Radio with CD player

- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).




(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and



right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! **Attention**

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

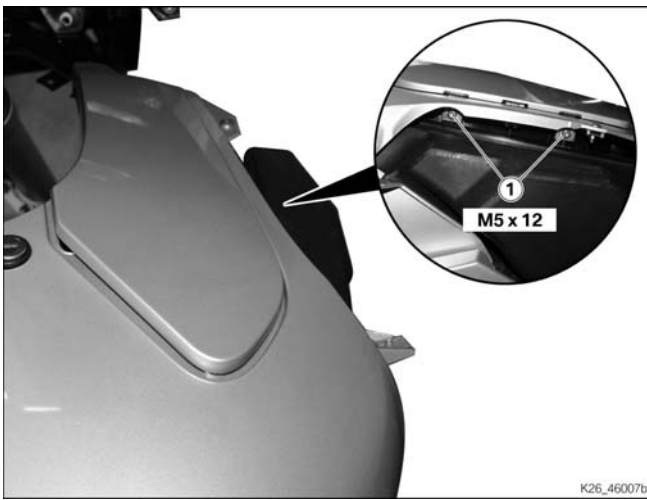
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



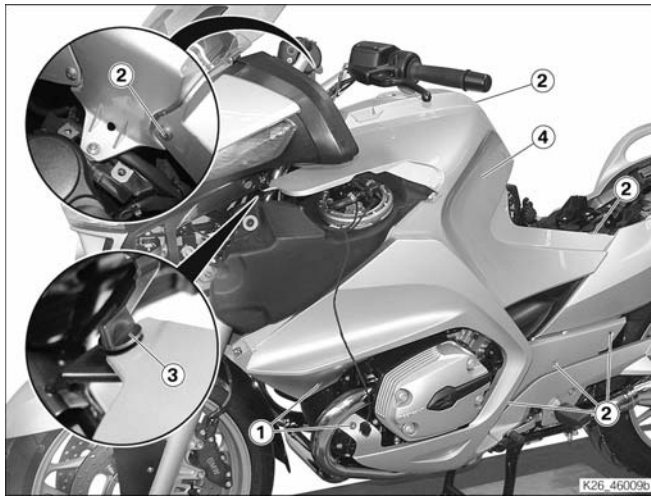
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).

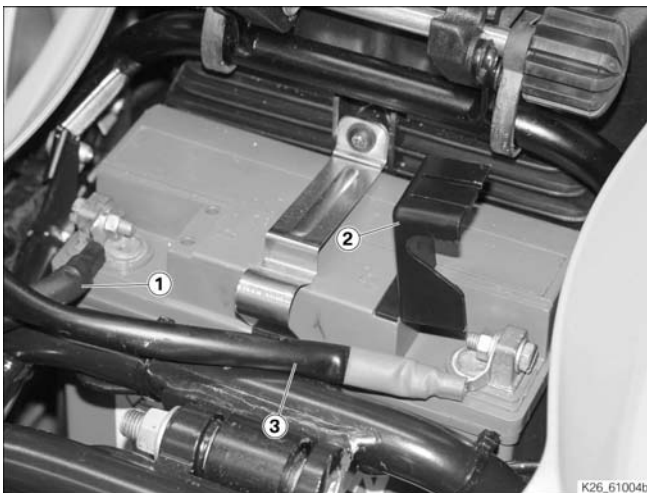


(-) Connecting battery

Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.
Never install the battery without the protective cap.



- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Installing seat

- Introduce the front seat into the front latching



mechanism.

- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

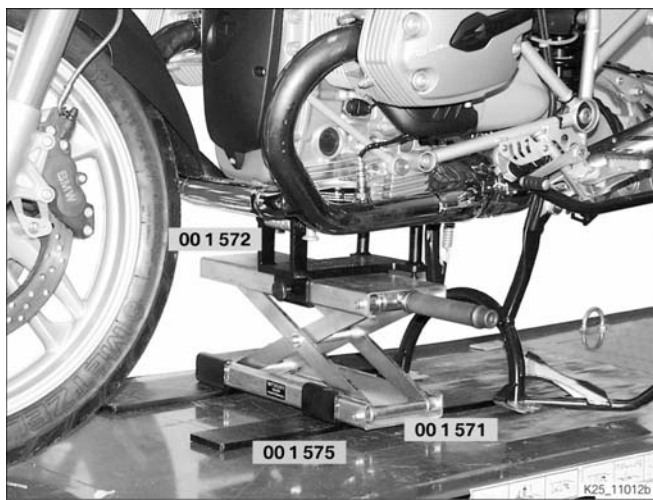


Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 **12 41 025 Replacing starter**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

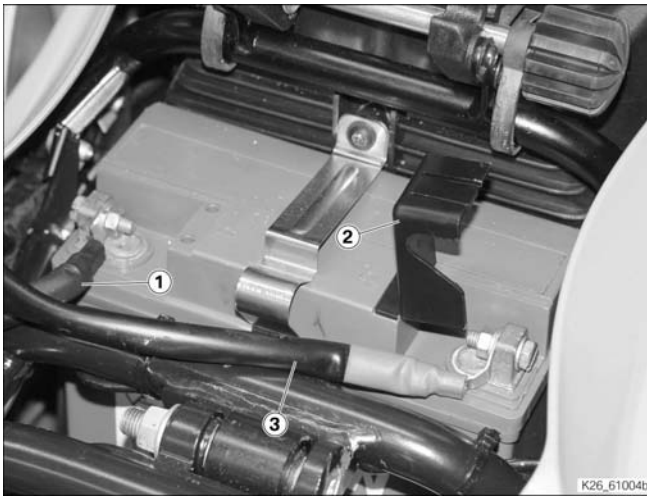
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel

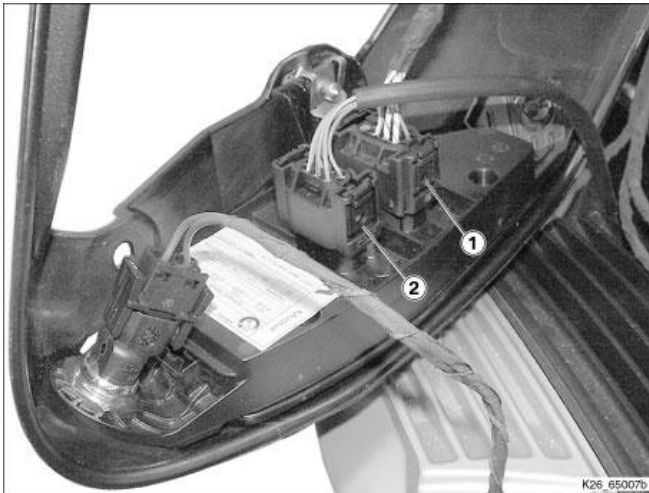


- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

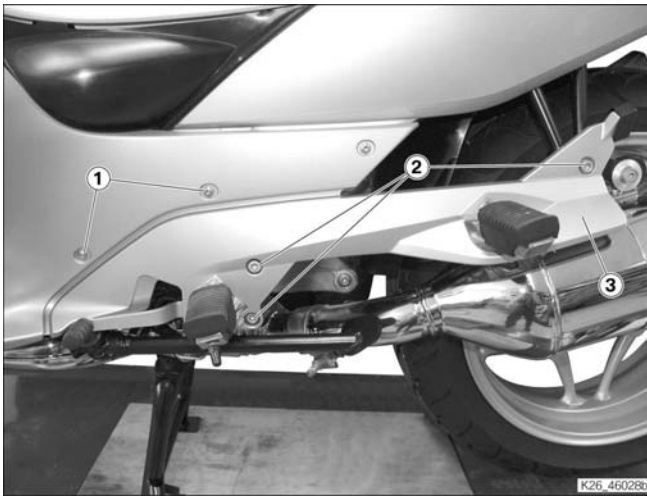
- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

(-) Removing left footrest plate

- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.



(-) Removing starter


- Disconnect "starter positive" cable (1) (terminal 30).
- Disconnect "starter start signal" plug (2) (terminal 50).
- Remove screws (3).
- Remove the starter.




(-) Installing starter

- Install the starter.
- Install screws (3).



 Tightening torques		
Starter with gearing to engine, M8 x 60	19 Nm	

- Connect "starter positive" cable (1) (terminal 30).

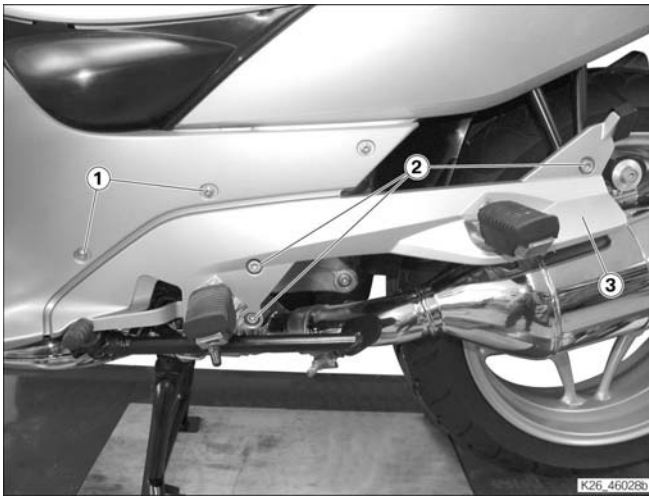
 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).

(-) Installing left footrest plate

- Install footrest plate (3).
- Install screws (2).

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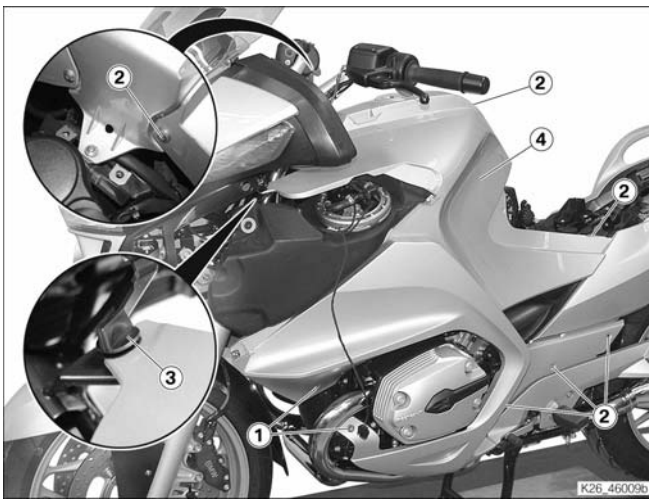


Tightening torques

Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

- Install screws (1).

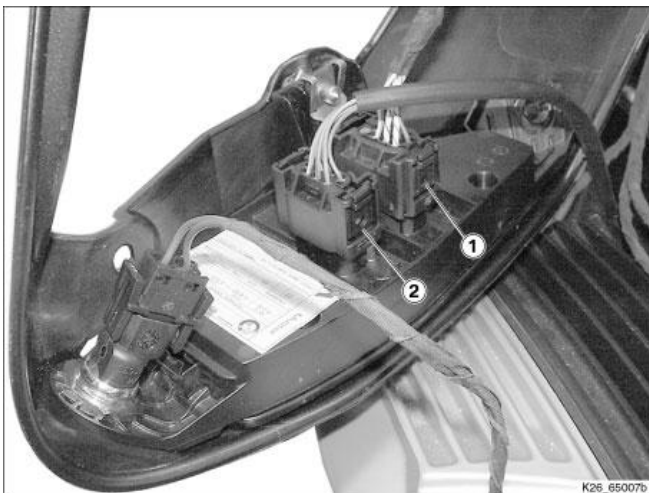
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Connecting battery

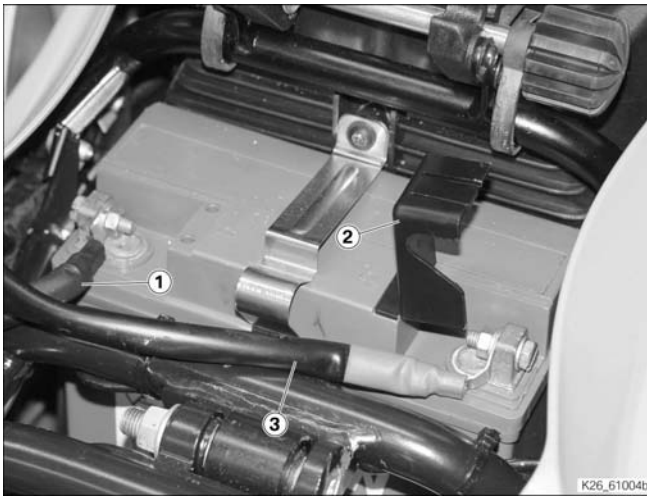


Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

Never install the battery without the



protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Installing seat



- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.

Variant, Seat heating



- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **12 61 010 Replacing oil-pressure sensor**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



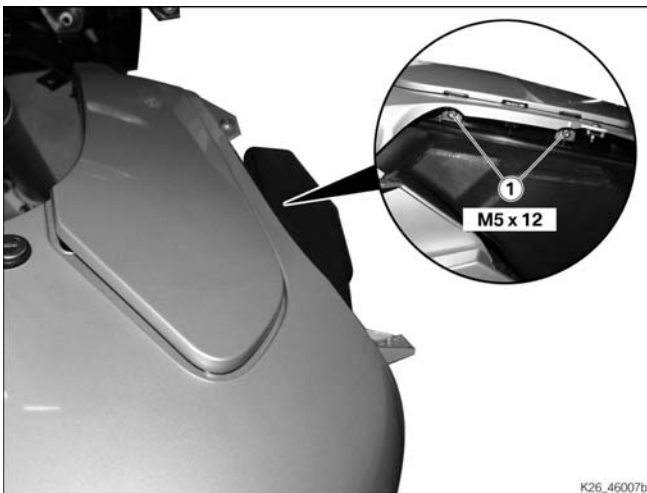
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing stowage compartment

- Remove screws (1).
- Remove the stowage compartment.



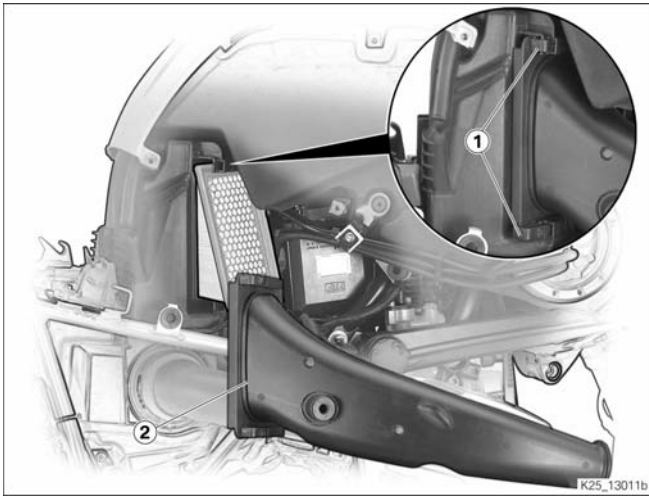
Variant, Radio with CD player

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.




(-) Removing oil temperature sensor

- Disconnect plug (1) from the oil temperature sensor.
- Remove oil temperature sensor (2).



(-) Installing oil temperature sensor

- Install oil temperature sensor (2).

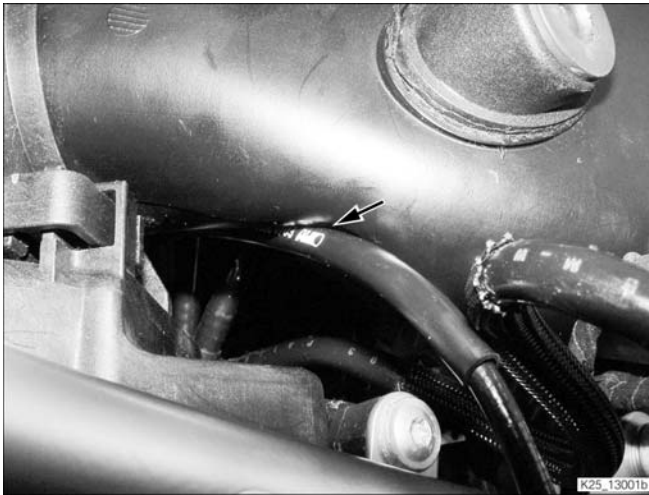
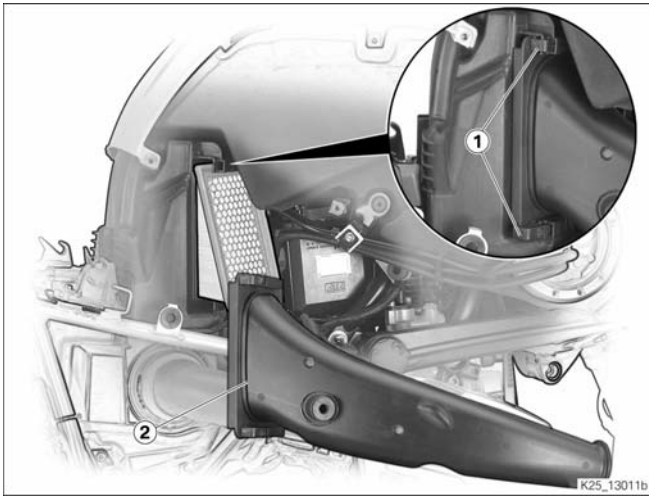
 Tightening torques		
Oil temperature sensor, M14 x 1.5	30 Nm	

- Secure plug (1) to the oil temperature sensor.



(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

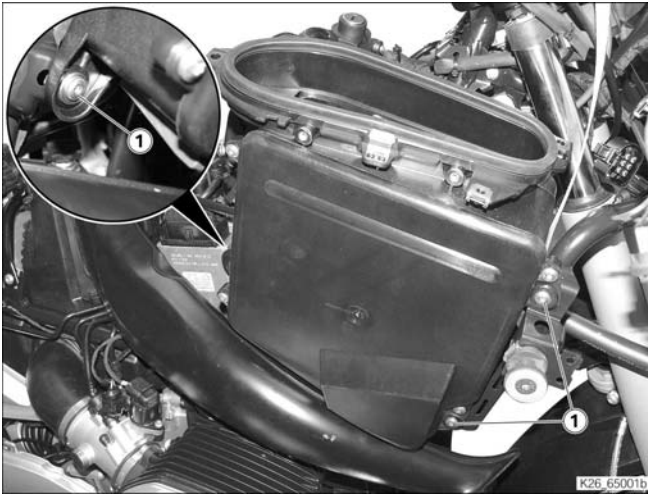
(-) Installing stowage compartment



- Place the stowage compartment in position and align it correctly.
- Install screws (1).

Variant, Radio with CD player

- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).



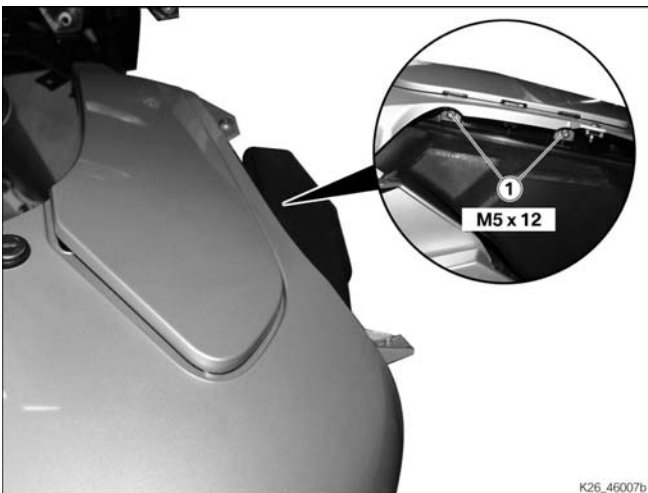
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **12 61 066 Replacing oil level sensor**

Variant, Oil level warner (only in connection with SA 0519 on-board computer)

(-) Removing oil-level sensor

- Remove screw (1).

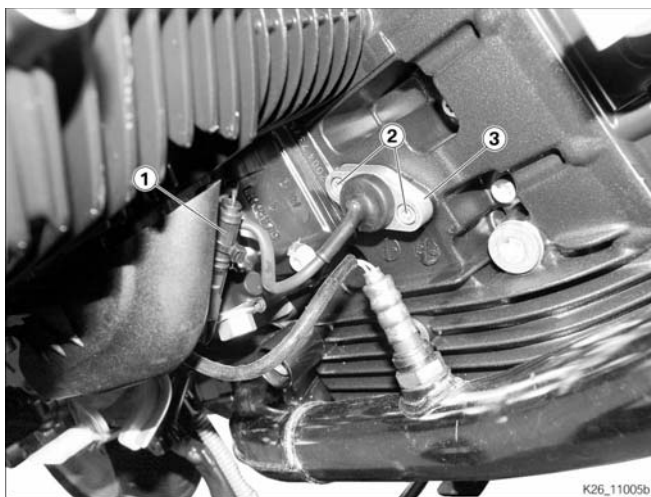


- Disconnect plug (1).
- Remove screws (2).
- Remove oil-level sensor (3).



(-) Installing oil-level sensor

- Install oil-level sensor (3).
- Install screws (2).
- Connect plug (1).



- Install screw (1).



 **12 72 001 Replacing sensor for crankshaft**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing left-hand trim panel

- Remove screws (1).

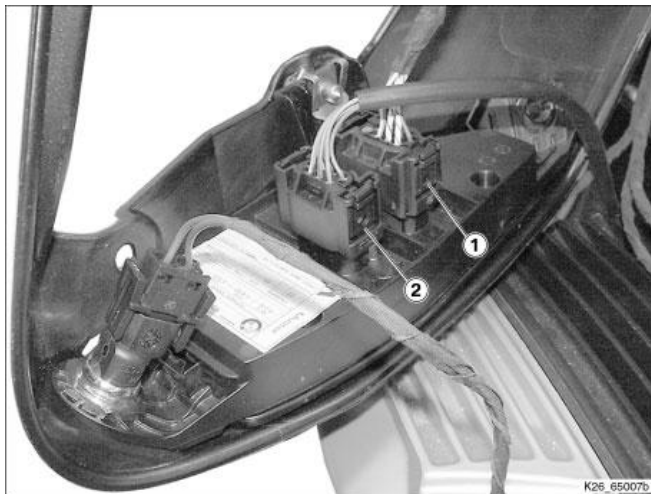


- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

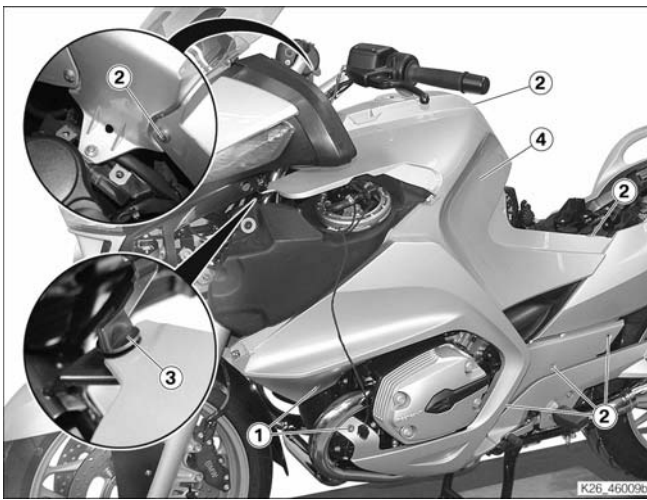
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



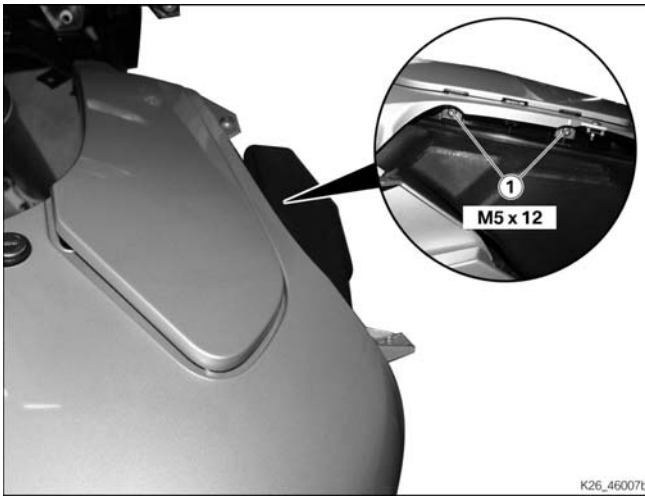
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



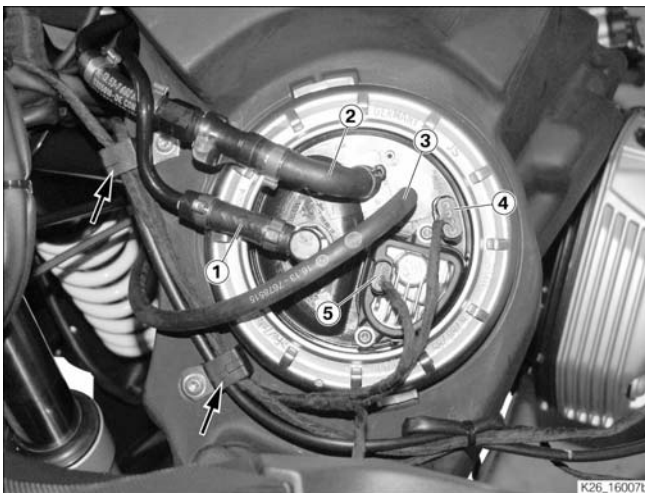
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

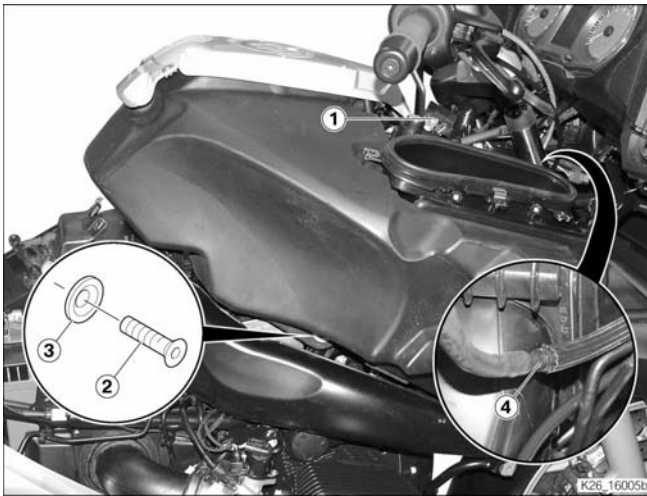


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

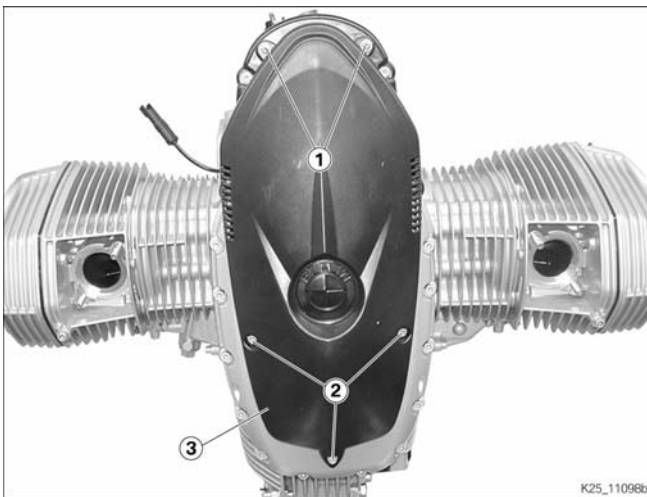


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing alternator drive belt

Precondition

- Gearbox in neutral.



Warning

Nature: Take care not to trap your fingers between the belt and the pulley.

Avoidance: Always use the correct tools to remove and install the drive belt.

- Turn the engine in the normal direction of rotation (arrow) by means of the crankshaft belt pulley and, using a blunt instrument such as a tyre lever, for instance, carefully ease the drive belt forward until it slips off the pulley.



(-) Removing belt cover, rear

- Remove screws (1) and pull cover downward to



- remove.
- Remove the belt guard.

(-) Removing alternator



- Remove screws (1) and (2) and lift alternator from engine block.


(-) Removing crankshaft sensor



- Remove cable tie (arrow) and disconnect plug (3).
- Remove screw (1) and remove crankshaft sensor (2).

(-) Installing crankshaft sensor

- Install crankshaft sensor (2) with screw (1).

 Tightening torques		




Inductive crankshaft sensor to timing case cover, M 6 x 16	8 Nm	
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- Connect plug (3) and secure with cable tie (arrow).

(-) Securing alternator




- Fit alternator in position from front and install screws (1) and (2).

 Tightening torques		
Alternator to crankcase, M8	18 Nm	

(-) Installing belt cover, rear



- Hold the belt cover in position.
- Install screws (1).

 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
Belt cover to alternator, M5 x 16	5 Nm	

(-) Installing alternator drive belt

- Seat the drive belt on the alternator pulley.
- Mount installation tool (No. 12 3 591) on the crankshaft pulley and loop the belt over the tool.
- Firmly press the installation tool against the pulley.
- Using installation tool (No. 12 3 591) turn the engine in



the normal direction of travel (arrow) by rotating the crankshaft belt pulley until the drive belt is correctly seated on the pulley.

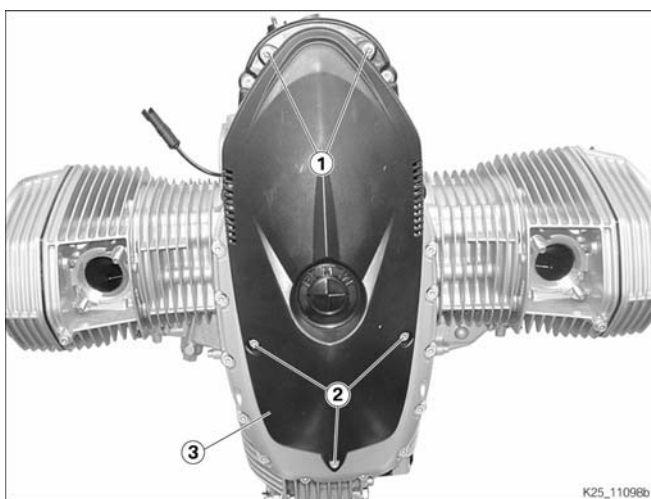
! Attention

Nature: If it is not correctly installed on the pulleys, the belt will suffer irreparable damage within a very short space of time.

Avoidance: Make sure the belt is installed right way round.

- Check that the drive belt is correctly seated on both pulleys.

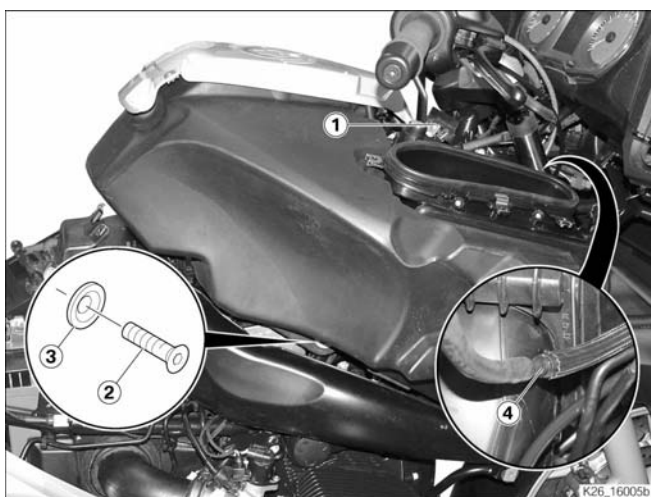
(-) Installing belt guard



- Install belt guard (3) and secure with screws (1) and (2).

Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

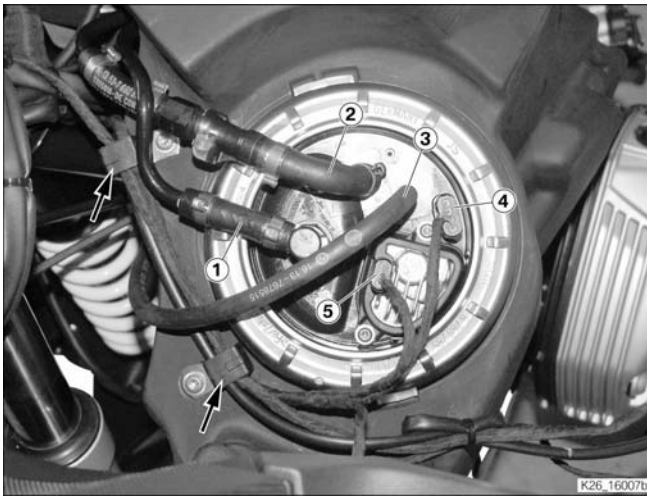
(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).



- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

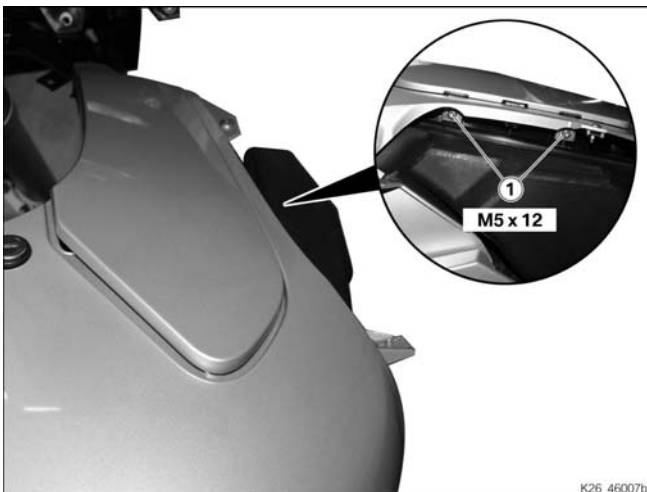
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



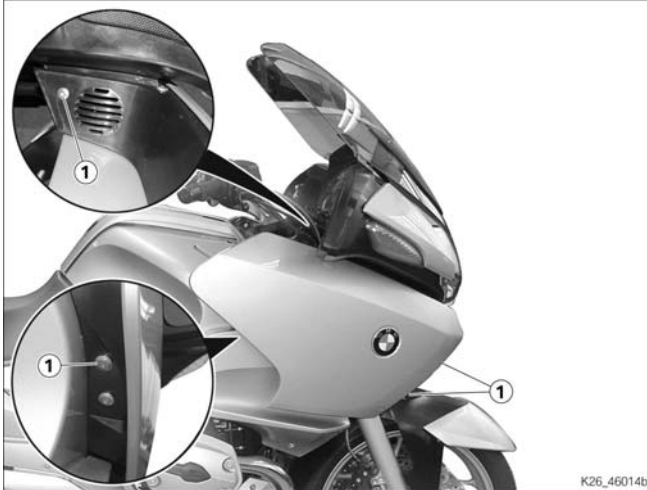
- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



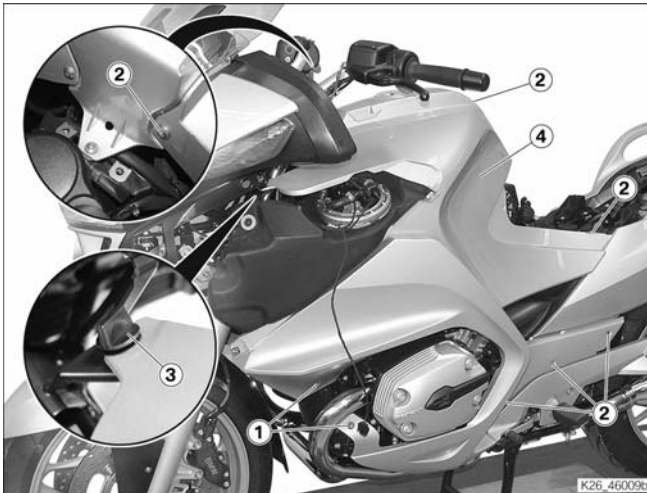
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing tank rail

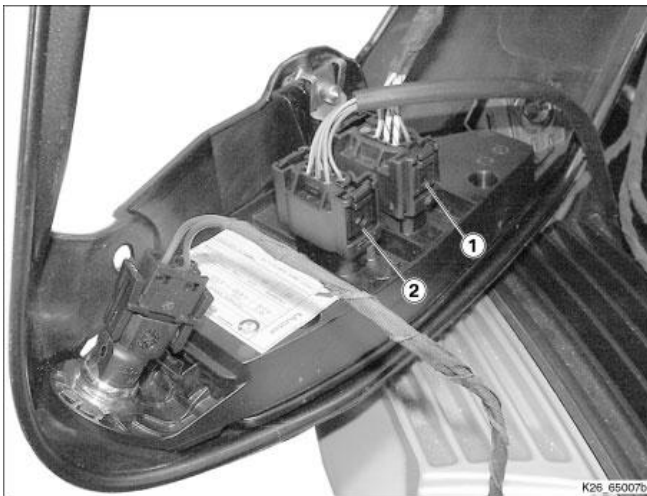


- Fit tank rail.
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



K26_65007b

- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **12 72 020 Replacing sensor for camshaft**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



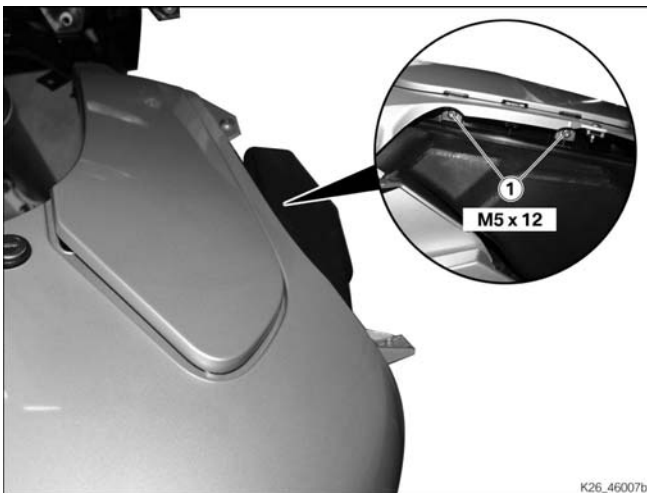
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



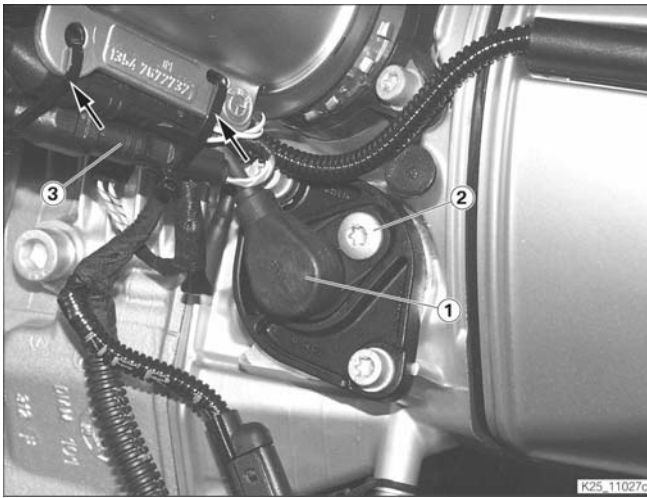
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.




(-) Removing camshaft sensor

- Remove cable ties (arrows) and disconnect plug (3).
- Remove screw (2) and remove camshaft sensor (1).

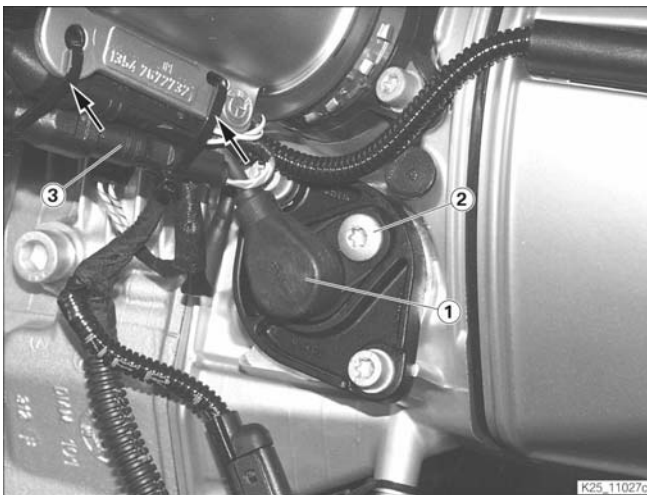


(-) Installing camshaft sensor

- Install camshaft sensor (1) with screw (2).

 Tightening torques		
Speed sensor, camshaft, to cylinder head, M6 x 20	8 Nm	

- Connect plug (3) and secure with cable ties (arrows).



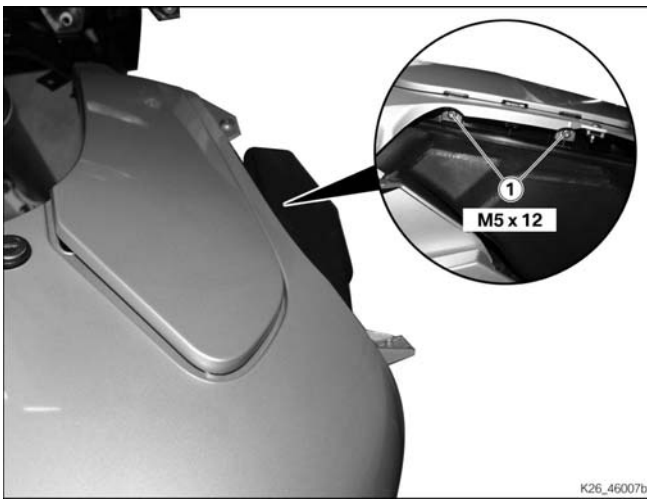
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **13 31 010 Replacing fuel supply quick-action coupling, feed line**

(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

(-) Removing quick-release coupling



Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

! **Attention**

Nature: If a hose is clamped twice at the same point with non-reusable hose clips, there is no guarantee that the connection will remain leaktight.

Avoidance: Always replace hoses secured with non-reusable hose clips.

-
- Open quick-release coupling (2).

! **Attention**

Nature: Fuel feed lines are pressurised. Fuel escapes when a connection is opened.

Avoidance: Catch escaping fuel in a suitable container.

-
- Use end-cutting nippers to cut open hose clip (1).

! **Attention**

Nature: Quick-release coupling parts in components (e.g. pump flange) are bonded to prevent leaks and both components are damaged if removal is necessary.

Avoidance: Do not attempt to remove permanently installed quick-release coupling parts. Replace the entire component instead.

-
- Pull the male/female parts of the coupling off the hose.

(-) Installing quick-release coupling

⚠ **Warning**

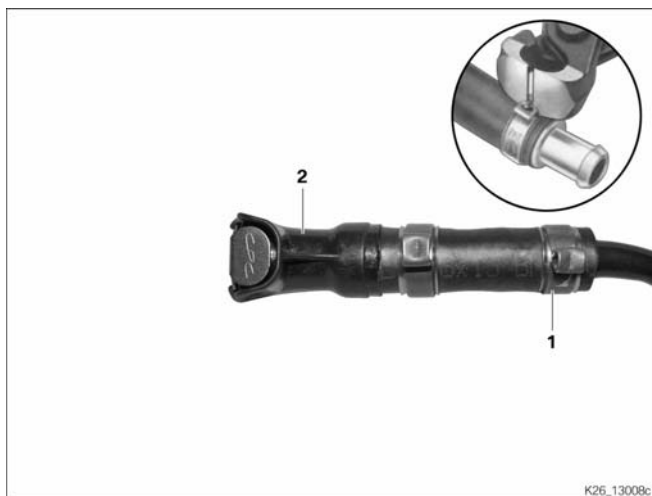
Nature: Fuel is flammable and a hazard to health.

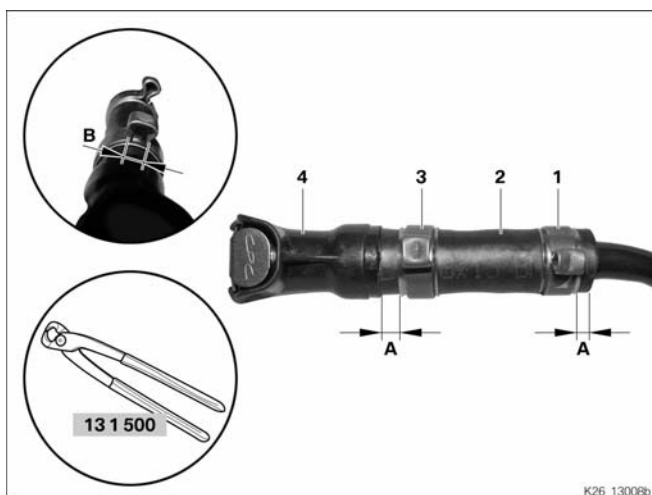
Avoidance: Observe all applicable safety regulations.

! **Attention**

Nature: Quick-release coupling parts in components (e.g. pump flange) are bonded to prevent leaks and both components are damaged if removal is necessary.

Avoidance: Do not attempt to remove permanently installed quick-release coupling parts. Replace the entire component instead.






Attention


Nature: If a hose is clamped twice at the same point with non-reusable hose clips, there is no guarantee that the connection will remain leaktight.

Avoidance: Always replace hoses secured with non-reusable hose clips.

- Push length of hose (2) onto female part of coupling (4) and the length of hose onto the male part of the coupling.
- Slip clip (3) onto the hose until distance (A) is correct and use pliers (No. 13 1 500) to squeeze the clip to size (B).

 Technical data			
Distance A (distance from end of hose to hose clamp)		3 mm	
Distance B (specified closed size for single-eye clamp on quick-action coupling)		4 mm	

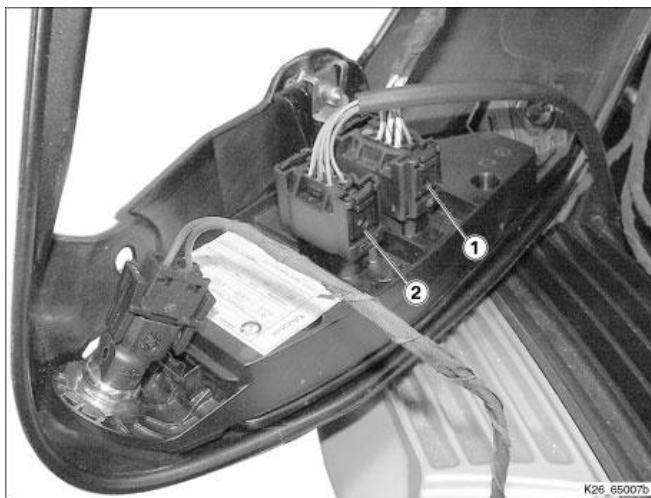
- Slip clip (1) onto the quick-release coupling with hose.
- Push the quick-release coupling with hose onto the pipe.
- Align clip (1) at distance (A) and use pliers (No. 13 1 500) to fully squeeze it closed.

 Technical data			
Distance A (distance from end of hose to hose clamp)		3 mm	

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



K26_65007b

- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

 **13 53 050 Replacing fuel distributor**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

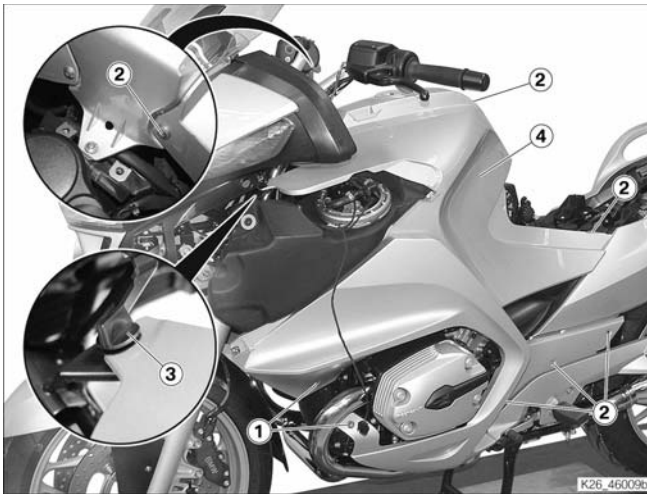


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

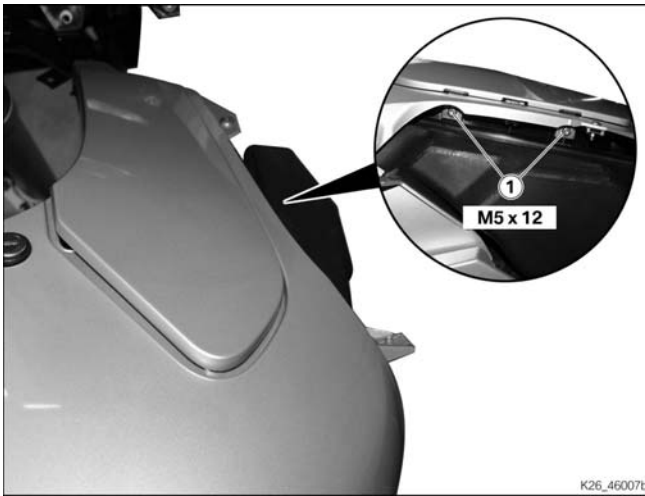
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



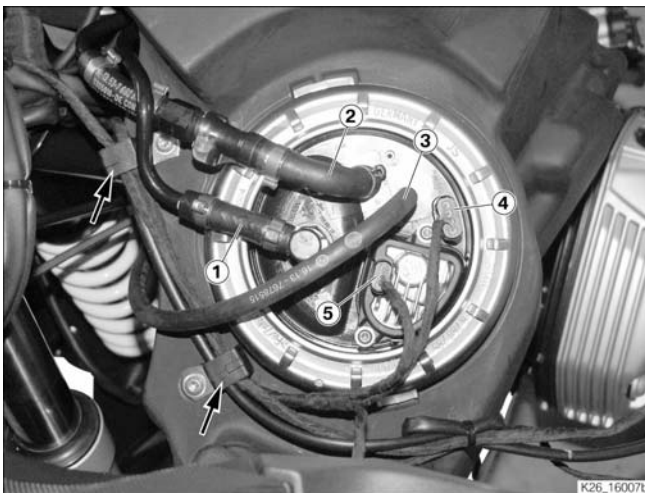
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

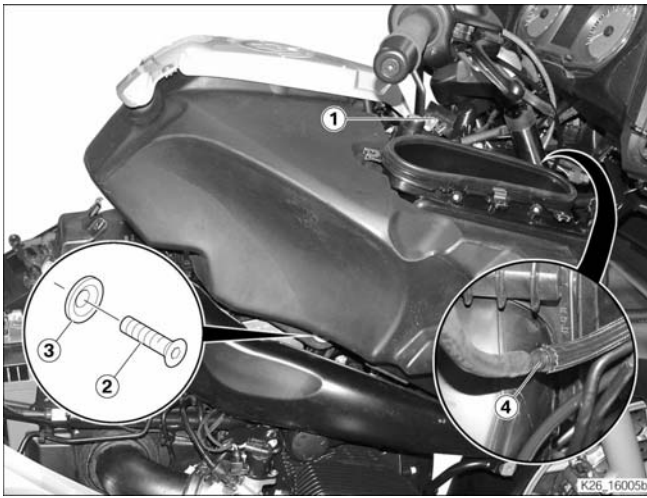


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

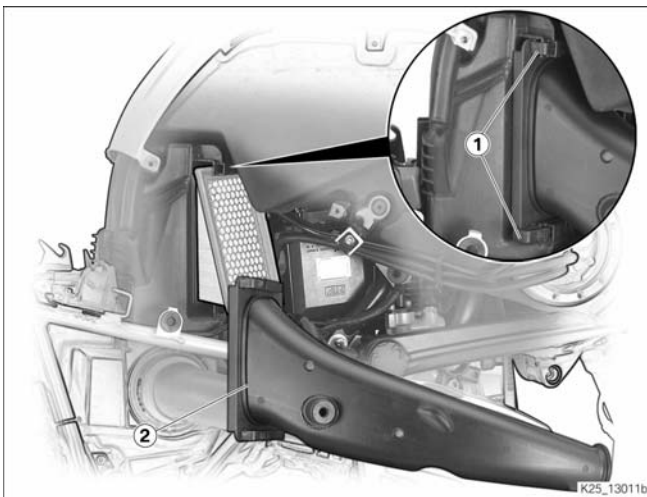


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



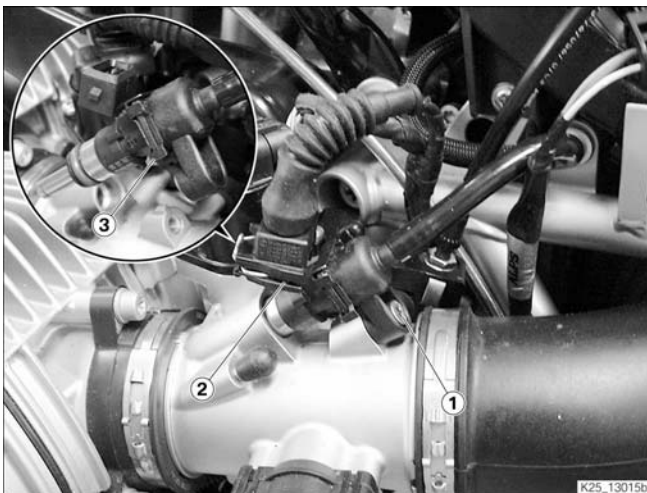
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Removing injection valve

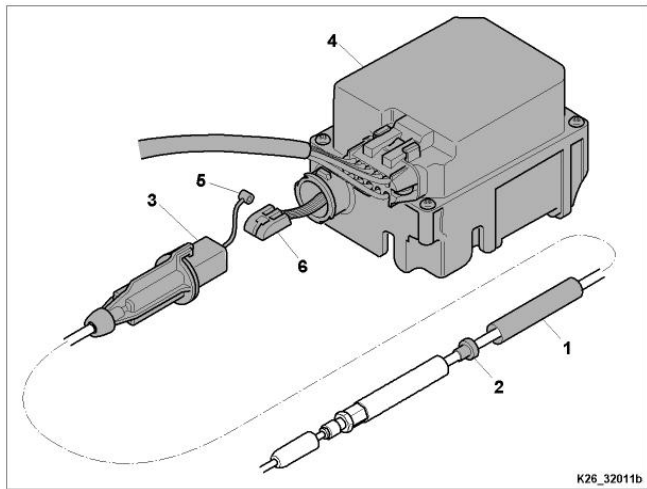
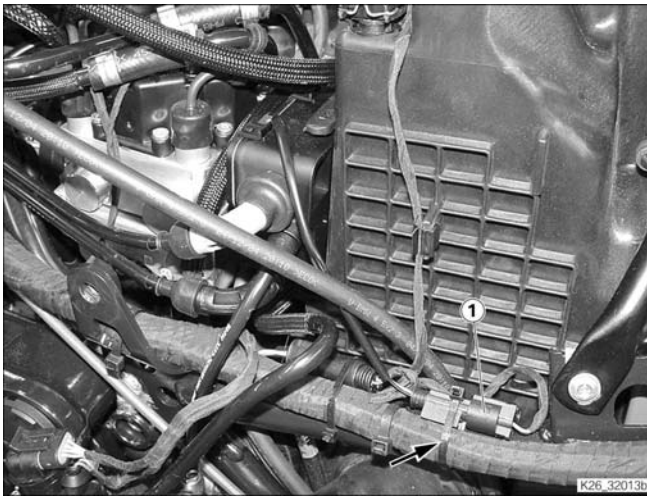
- Remove screw (1).
- Disconnect plug (2).
- Pull out the injection valve with holder from the throttle-valve stub.
- Remove clip (3).
- Remove the injection valve from its holder, noting the O-ring.



(-) Releasing cable divider

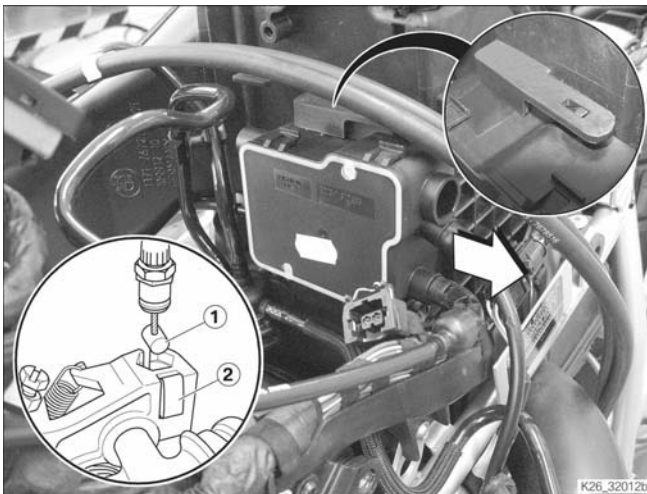
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).



Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).
- Thread through Bowden cable (5) towards the rear.



- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

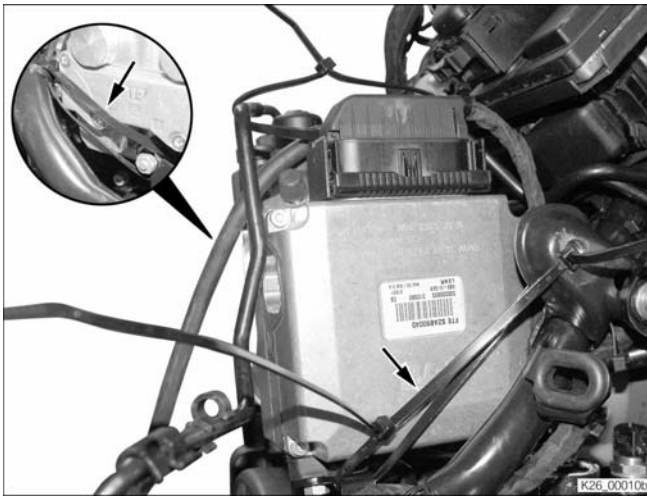
(-) Releasing pressure modulator

⚠ Attention

Nature: Bent or badly routed brake lines can chafe and leak.

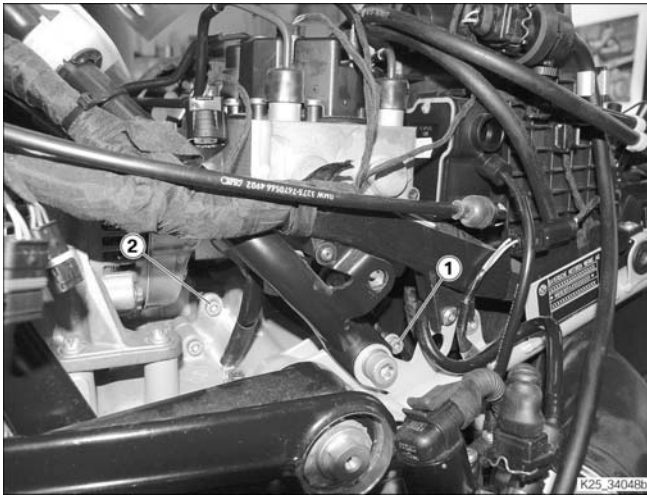
Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines



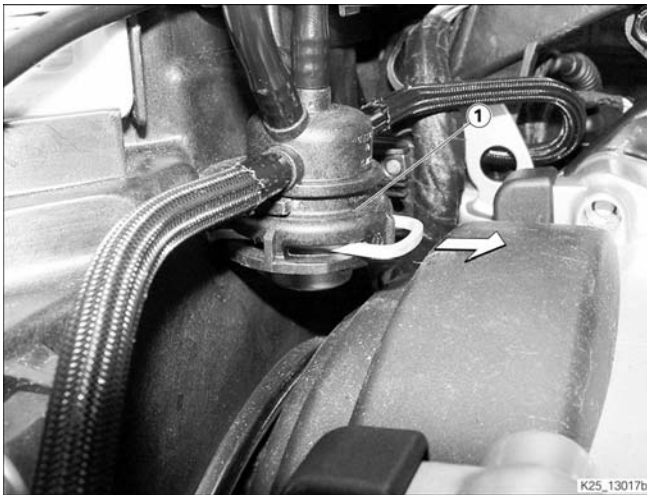
are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Use cable ties (arrows) to attach the pressure modulator to the frame in such a way that the brake lines are not bent and that the pressure modulator is secure.



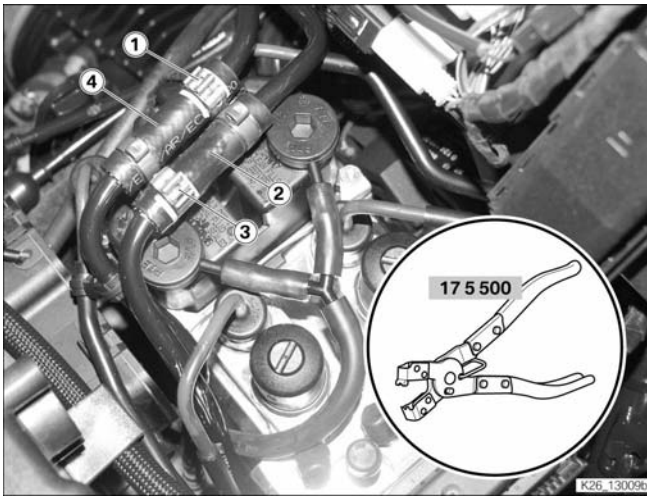
- Remove screws (1) on left and right.
- Remove screw (2).
- Check the security of the pressure modulator; tighten the cable ties if necessary.

(-) Removing fuel distributor

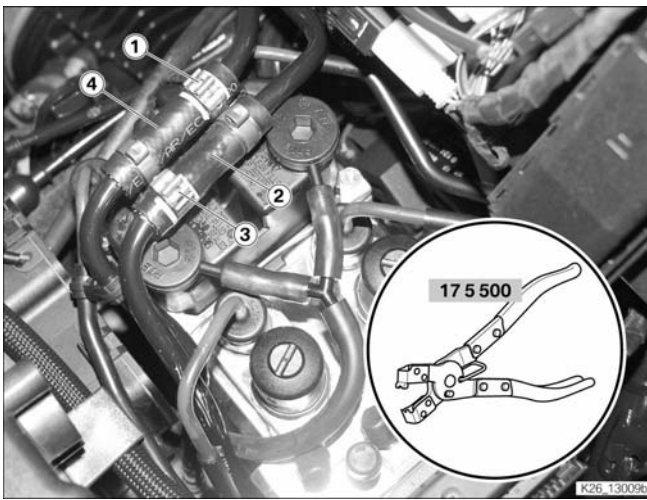


- Pull fuel distributor (1) out of the holder on the intake air silencer

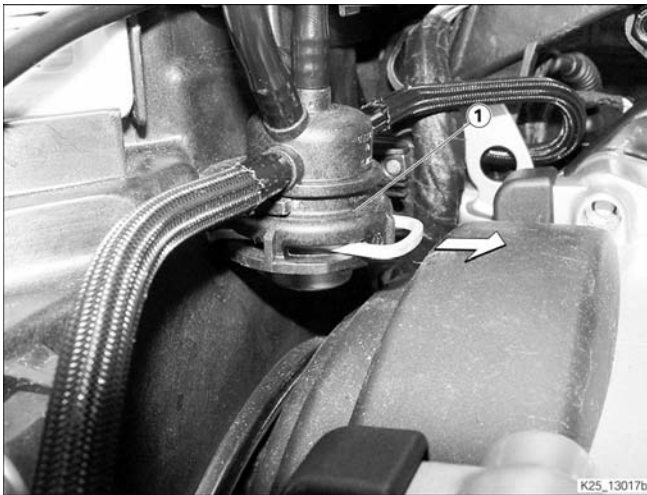
- Release clips (1) and (3) with pliers (No. 17 5 500) .
- Remove hoses (2) and (4).
- Manoeuvre the fuel lines to the left and below the brake pipe.
- Manoeuvre the fuel distributor out to the left and remove it.



(-) Installing fuel distributor



- Manoeuvre the fuel distributor into position from the left.
- Guide the fuel lines into position to the right, underneath the brake pipe, taking care not to damage the pipe.
- Secure hoses (2) and (4) to the fuel lines with clips (1) and (3), using pliers (No. 17 5 500) to close the clips.



- Seat fuel distributor (1) in the holder of the intake air silencer.

(-) Securing pressure modulator

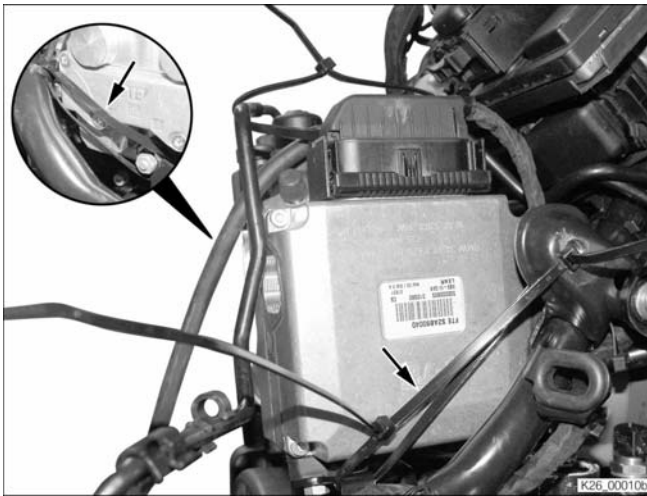


Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance:

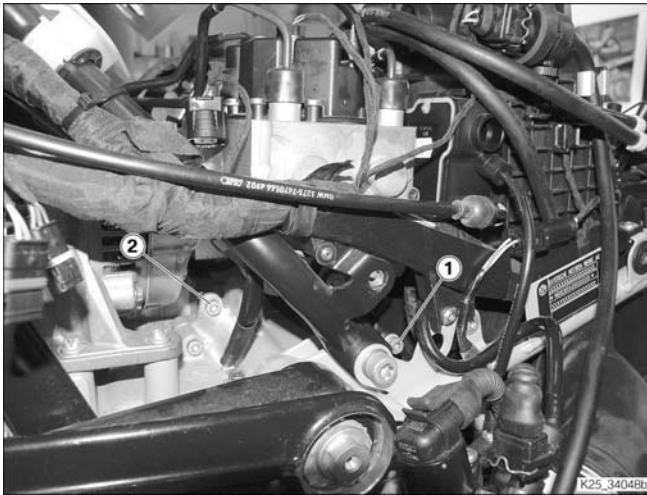
Take care not to bend, kink or trap the brake lines during removal and




installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.


- Open cable ties (arrows).

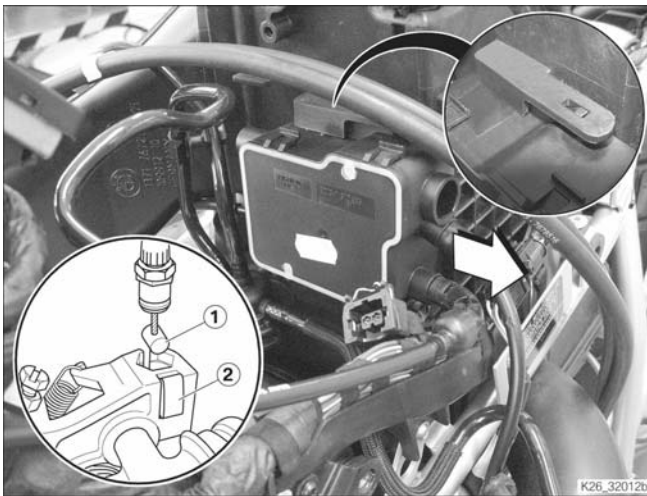


- Install screws (1).

 Tightening torques		
ABS pressure modulator with bracket and clutch cover to engine, M6 x 20	8 Nm	

- Install screw (2).

 Tightening torques		
ABS pressure modulator with bracket to engine, M6 x 16	8 Nm	

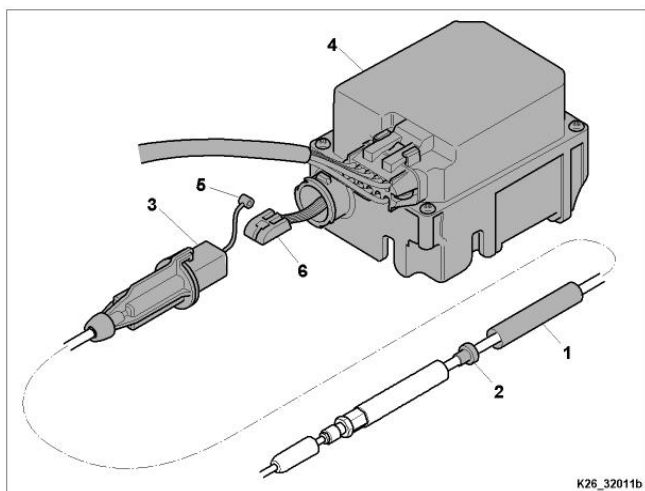


(-) Securing cable divider

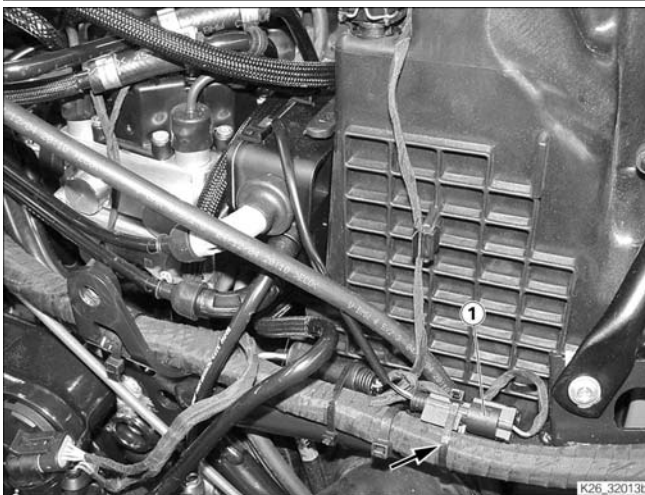
- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.

Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).



K26_32011b



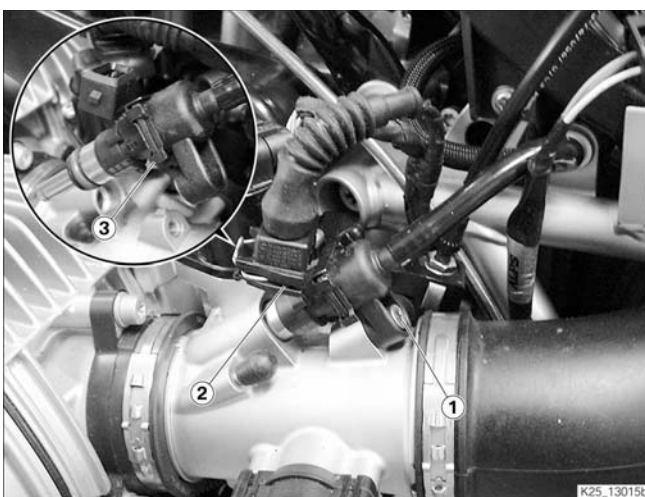
K26_32013b

Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).


- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

(-) Installing injection valve



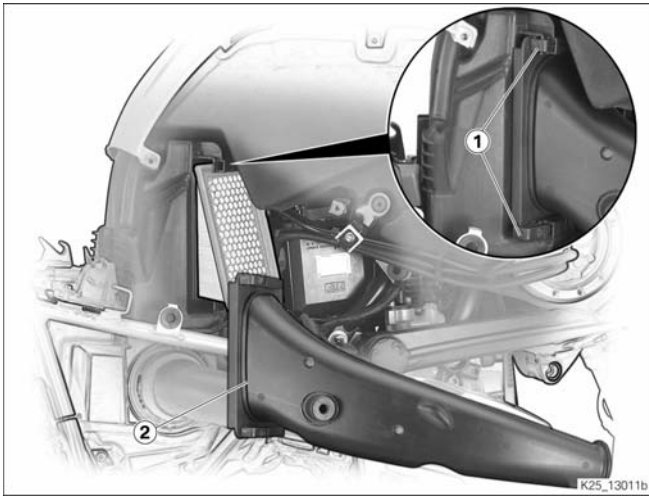
K25_13015b

- Check the sealing ring of the injector valve for damage. Replace the sealing ring if it is swollen or damaged.
- Install the injection valve in its holder, noting the O-ring.
- Install clip (3).
- Slip the injection valve with holder into the throttle-valve stub.
- Connect plug (2).
- Install screw (1) and tighten.

 Tightening torques	
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm

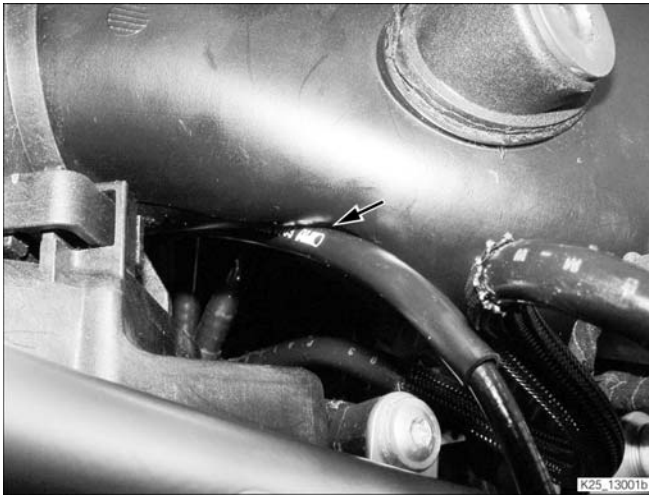
(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage

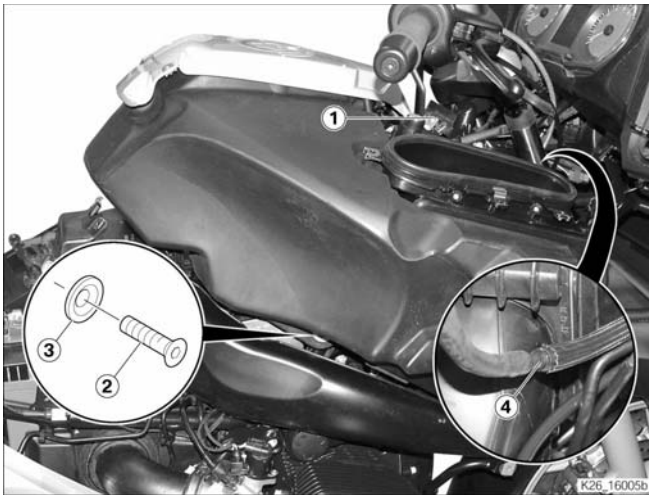


with an audible click.

- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.




- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

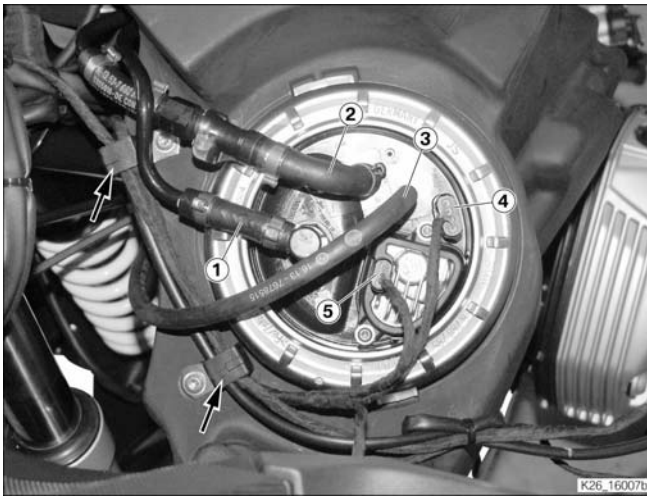


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).



- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

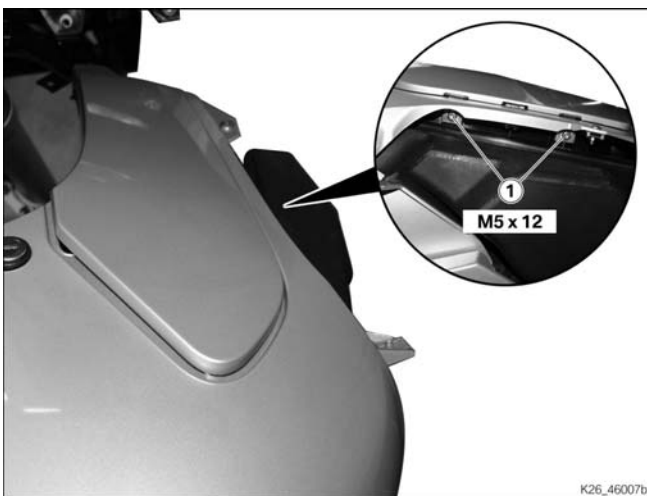
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

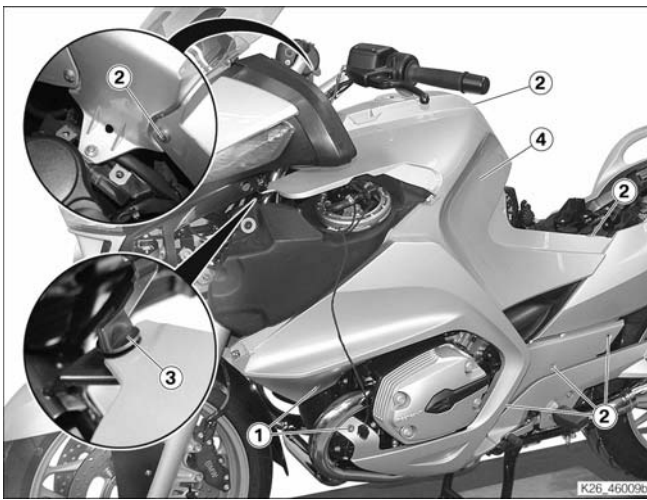
(-) Installing right-hand trim panel

-



- Hold the panel in position.
- Install screws (1).

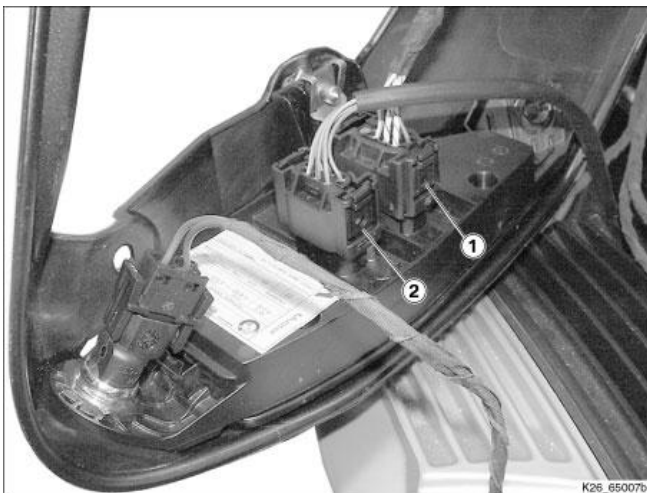
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



K26_46012b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **13 53 100 Replacing pressure regulator**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

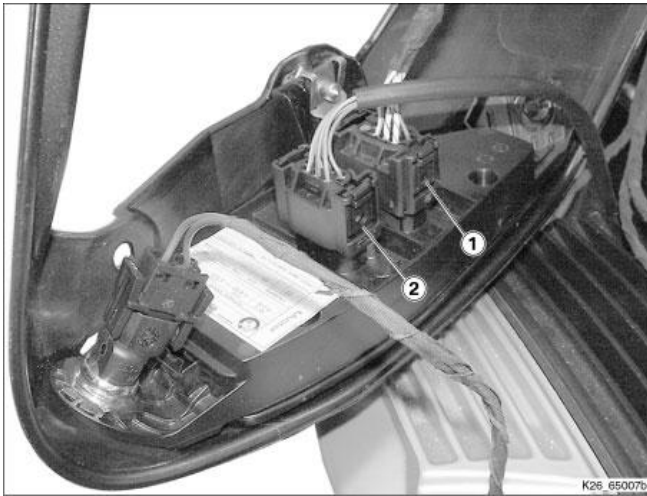


- Disconnect plug (1) from socket.

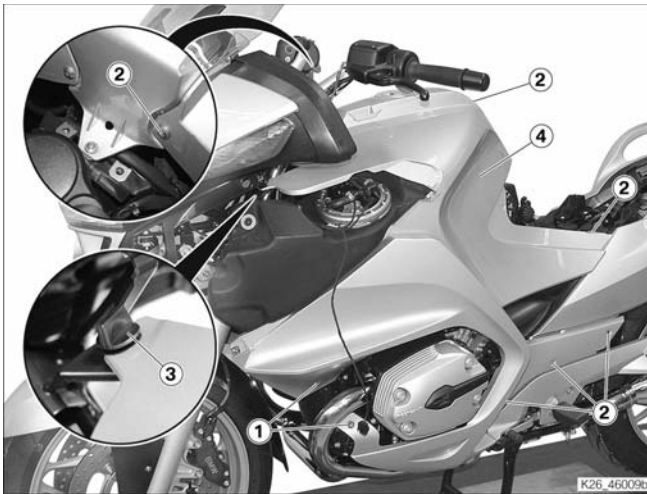


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

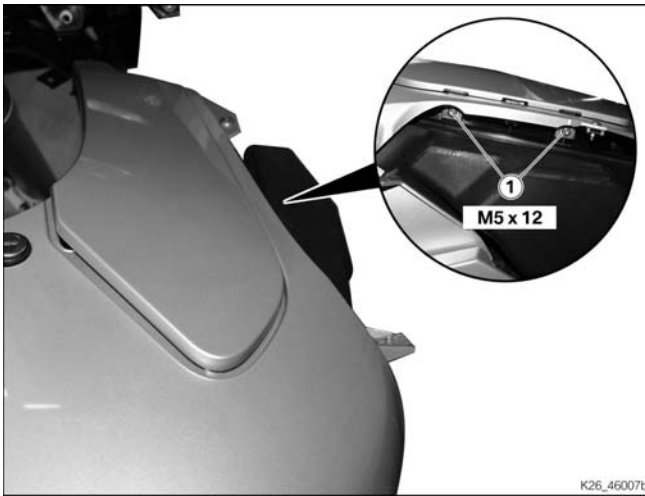
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



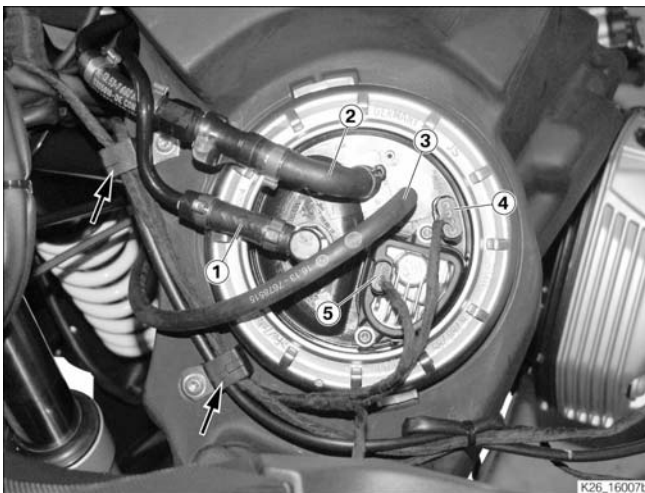
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

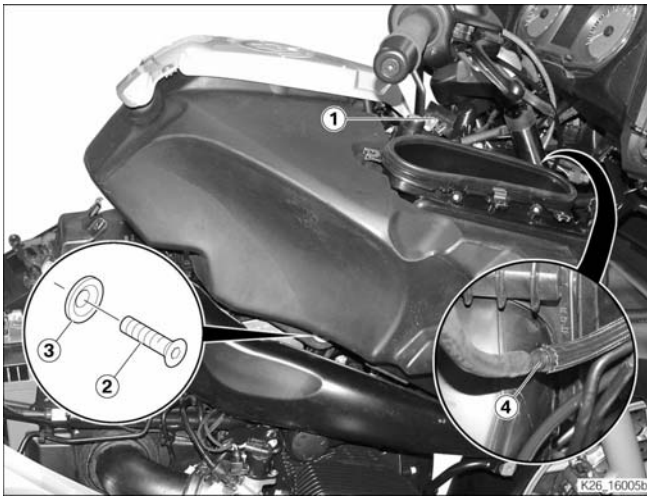


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

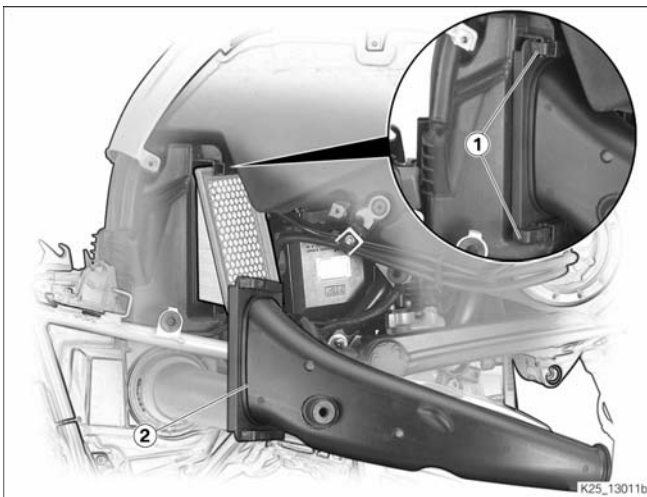


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



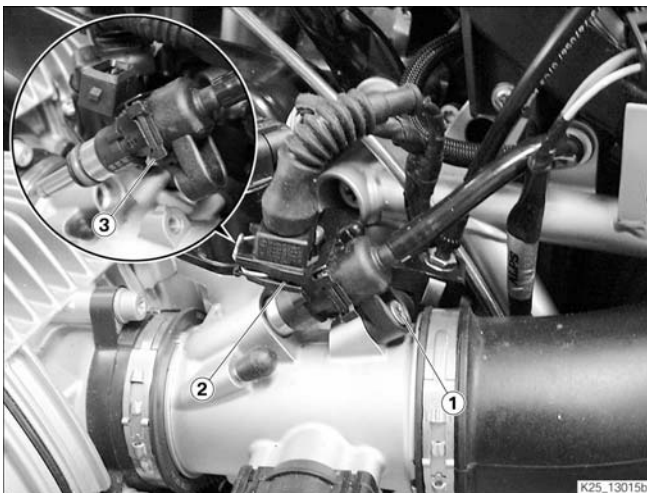
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Removing injection valve

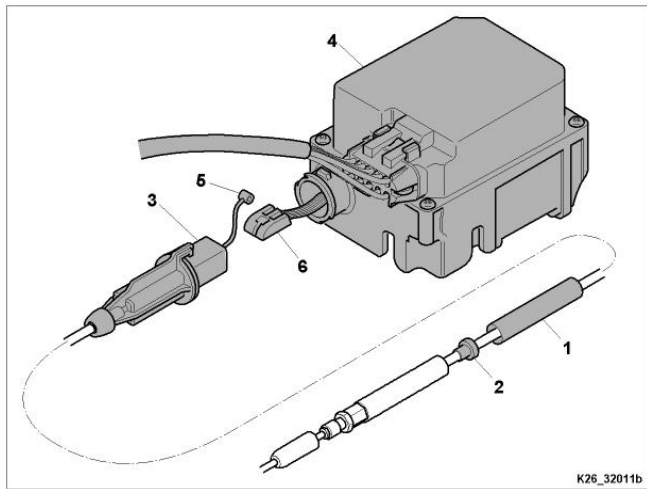
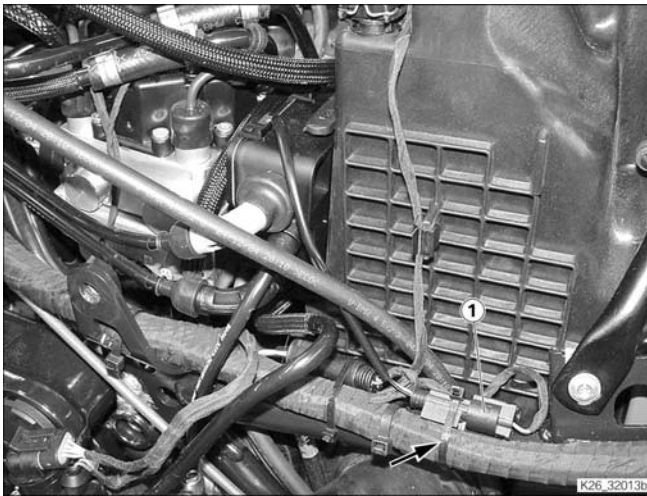
- Remove screw (1).
- Disconnect plug (2).
- Pull out the injection valve with holder from the throttle-valve stub.
- Remove clip (3).
- Remove the injection valve from its holder, noting the O-ring.



(-) Releasing cable divider

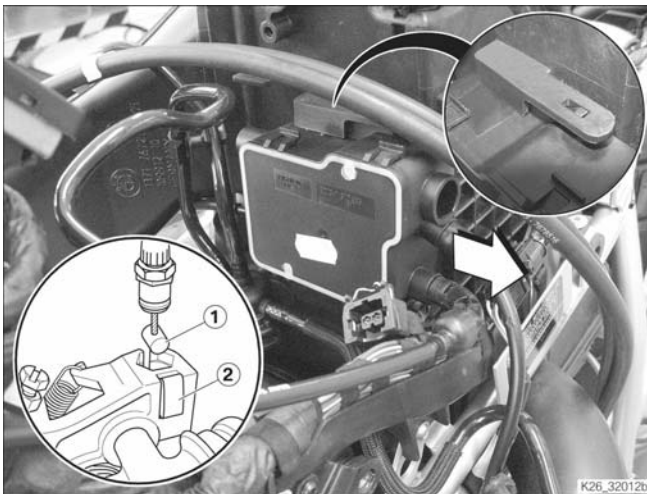
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).



Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).
- Thread through Bowden cable (5) towards the rear.



- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

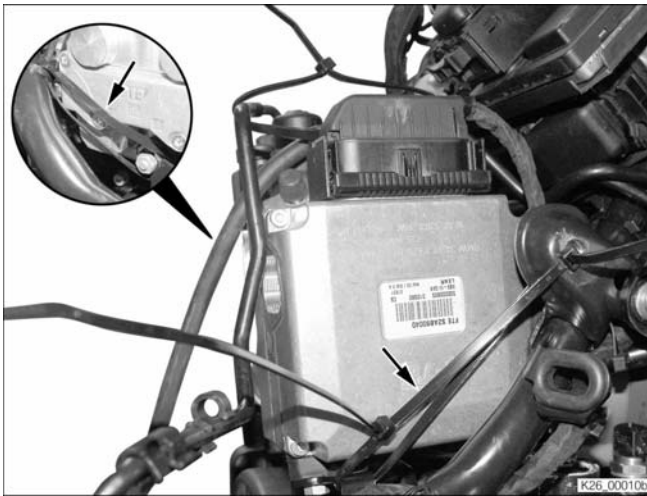
(-) Releasing pressure modulator

⚠ Attention

Nature: Bent or badly routed brake lines can chafe and leak.

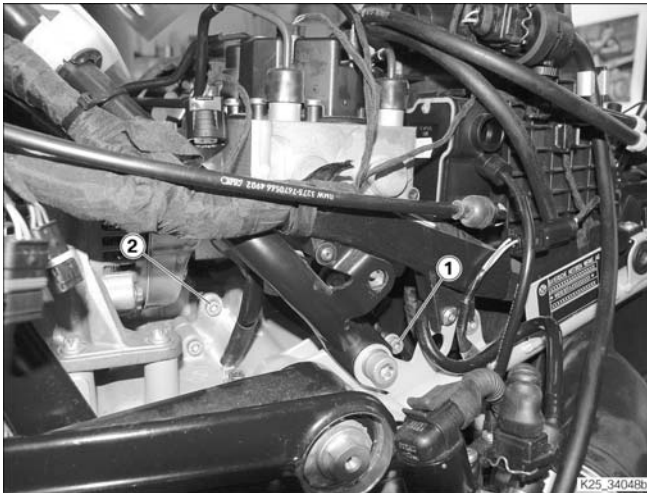
Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines



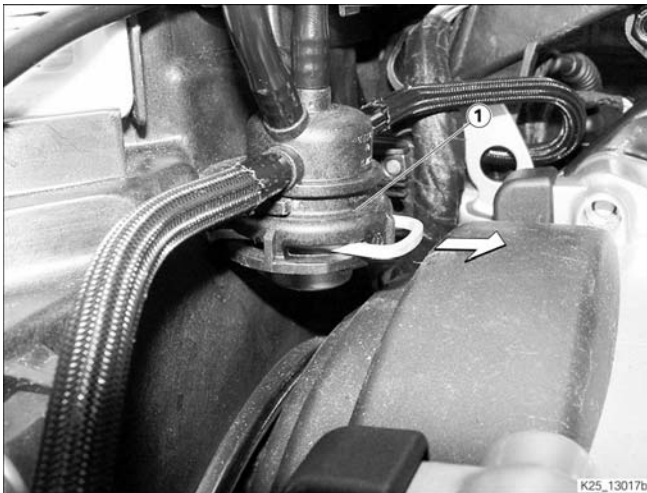
are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Use cable ties (arrows) to attach the pressure modulator to the frame in such a way that the brake lines are not bent and that the pressure modulator is secure.



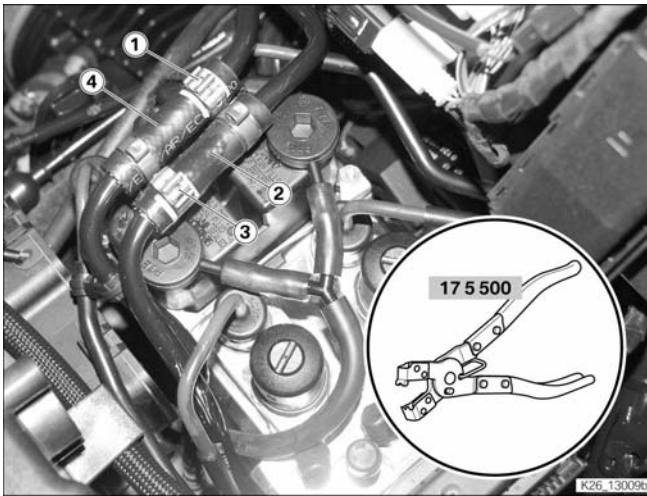
- Remove screws (1) on left and right.
- Remove screw (2).
- Check the security of the pressure modulator; tighten the cable ties if necessary.

(-) Removing fuel distributor



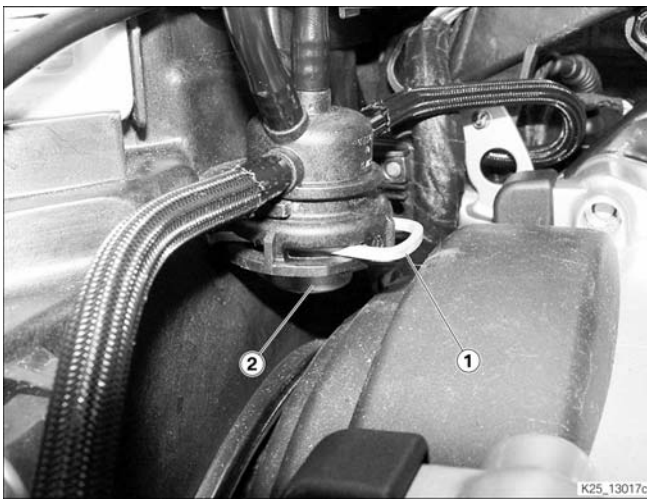
- Pull fuel distributor (1) out of the holder on the intake air silencer

- Release clips (1) and (3) with pliers (No. 17 5 500) .
- Remove hoses (2) and (4).
- Manoeuvre the fuel lines to the left and below the brake pipe.
- Manoeuvre the fuel distributor out to the left and remove it.



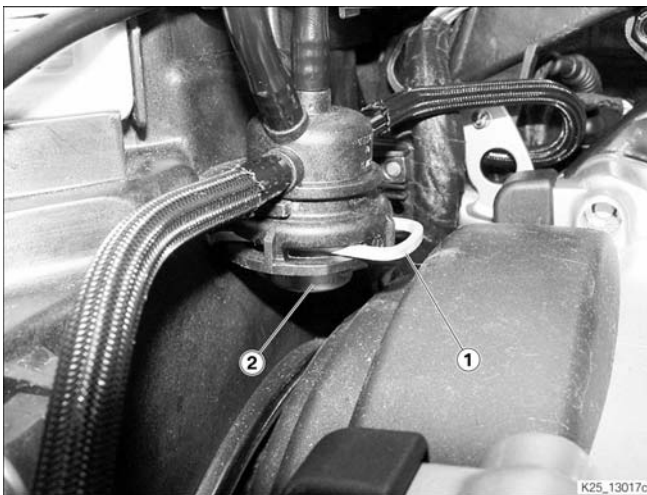
(-) Removing pressure regulator

- Remove tensioning spring (1).
- Remove pressure regulator (2).



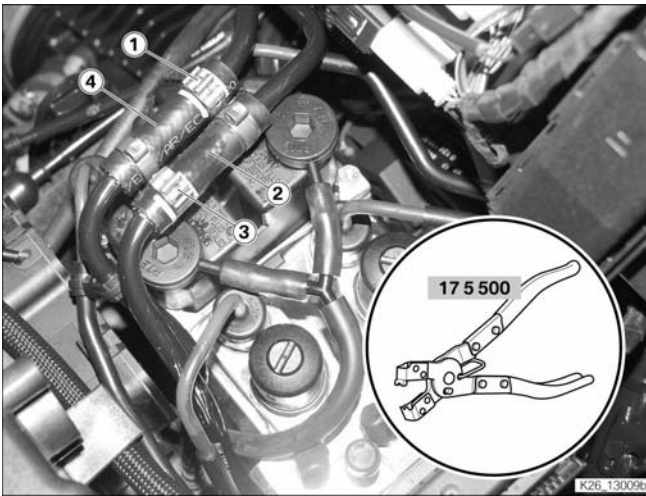
(-) Installing pressure regulator

- Install pressure regulator (2), noting the O-rings.
- Install tensioning spring (1).

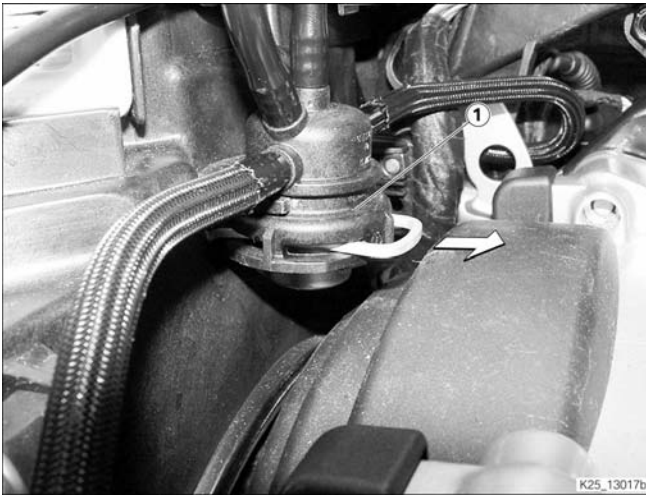


(-) Installing fuel distributor

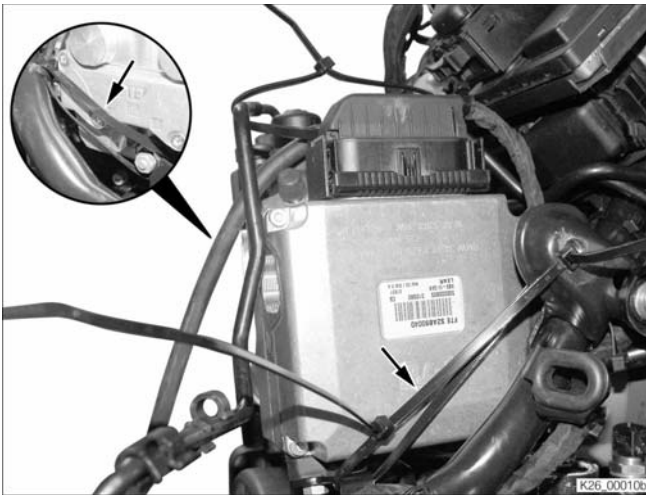
- Manoeuvre the fuel distributor into position from the left.
- Guide the fuel lines into position to the right, underneath the brake pipe, taking care not to damage the pipe.



- Secure hoses (2) and (4) to the fuel lines with clips (1) and (3), using pliers (No. 17 5 500) to close the clips.



- Seat fuel distributor (1) in the holder of the intake air silencer.



(-) Securing pressure modulator


⚠ Attention

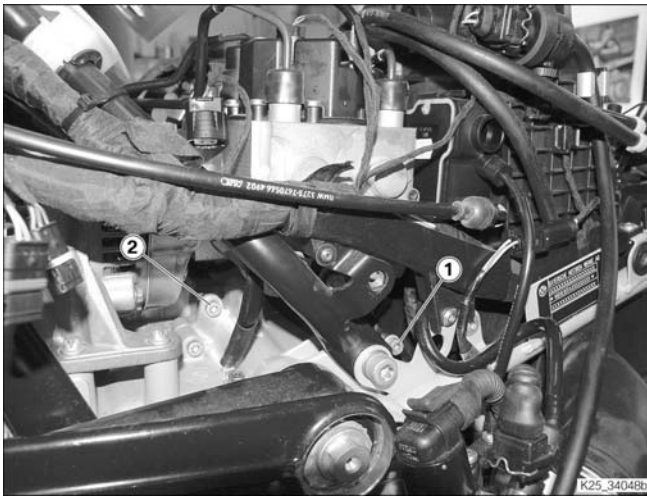
Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.


When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Open cable ties (arrows).
- Install screws (1).

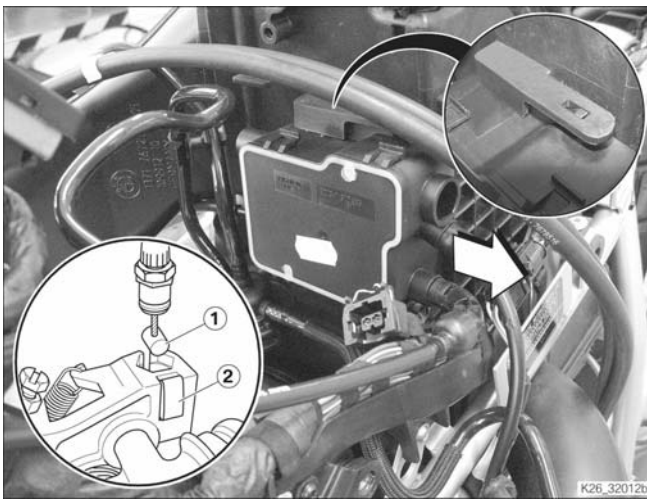
 Tightening torques		
ABS pressure modulator with bracket and clutch cover to engine, M6 x 20	8 Nm	



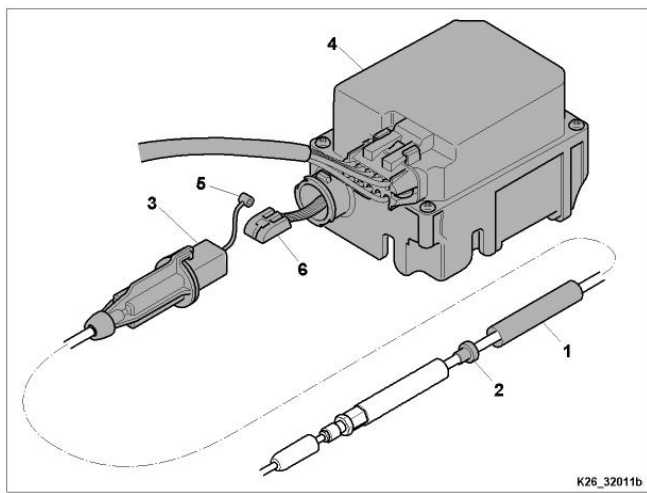
- Install screw (2).

 Tightening torques		
ABS pressure modulator with bracket to engine, M6 x 16	8 Nm	

(-) Securing cable divider



- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.

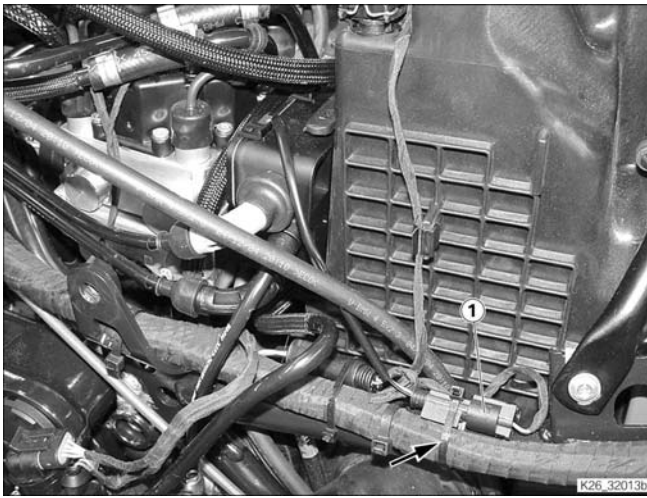


Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).

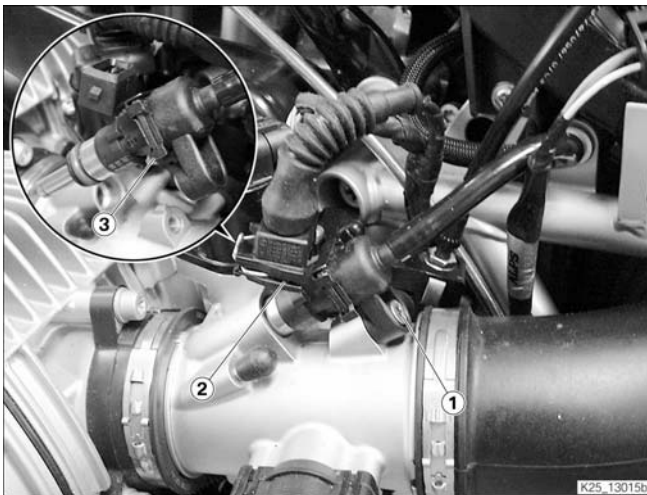
Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).




- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

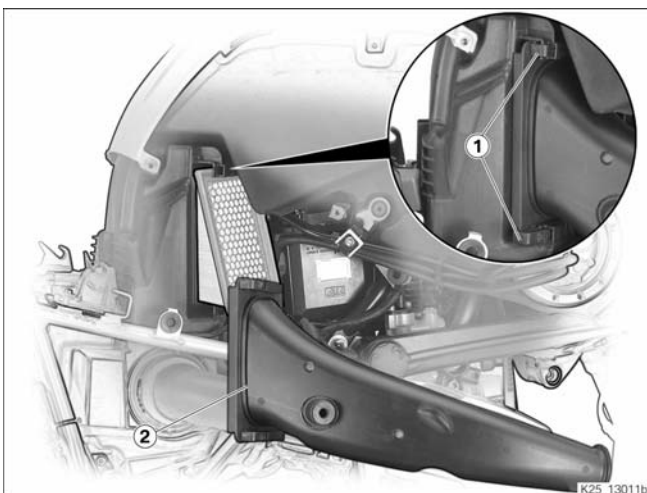
(-) Installing injection valve



- Check the sealing ring of the injector valve for damage. Replace the sealing ring if it is swollen or damaged.
- Install the injection valve in its holder, noting the O-ring.
- Install clip (3).
- Slip the injection valve with holder into the throttle-valve stub.
- Connect plug (2).
- Install screw (1) and tighten.

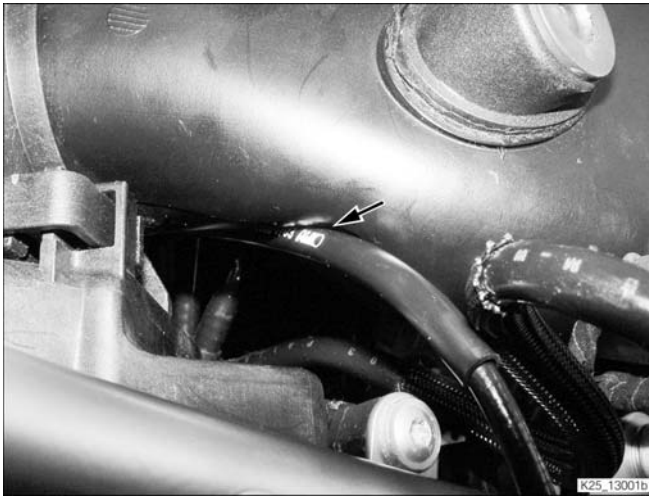
 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

(-) Installing intake air pipe



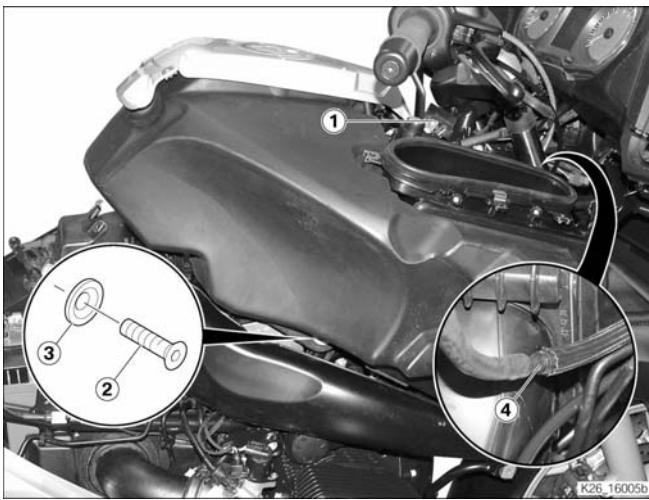
- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is




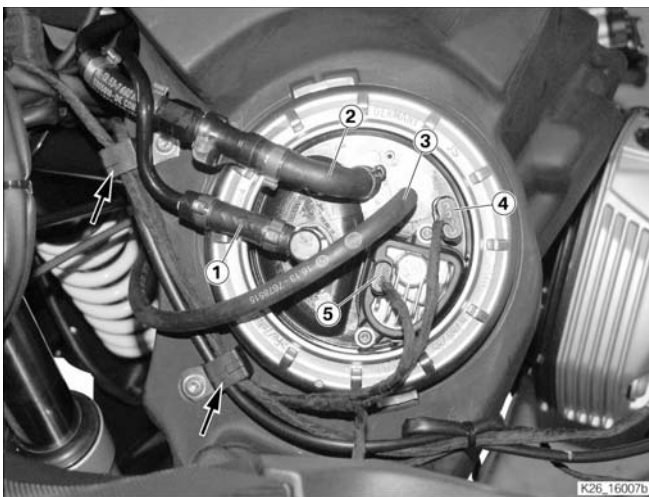
seated against the stop.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

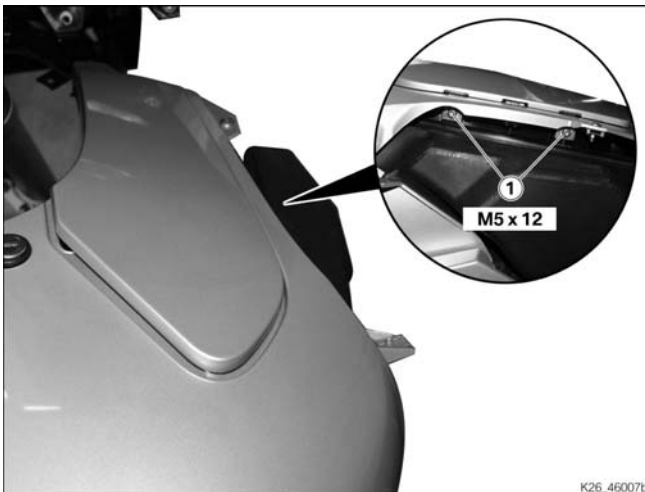
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



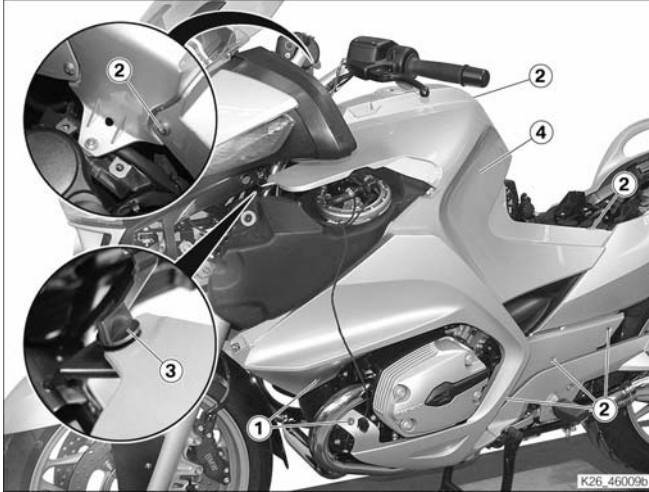
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **13 54 050 Replacing all throttle-valve stubs**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

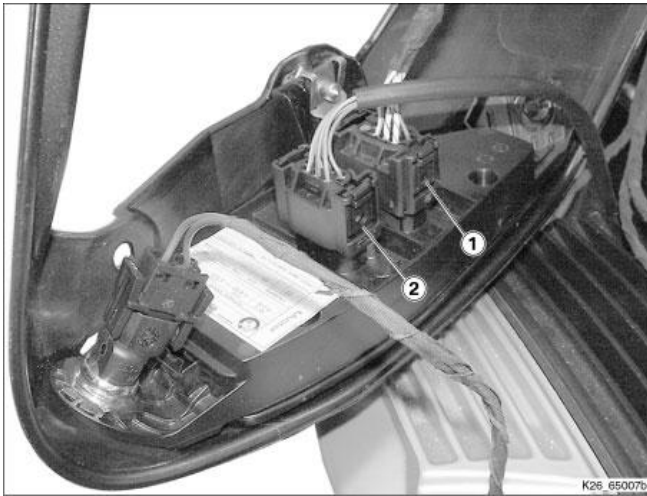


- Disconnect plug (1) from socket.

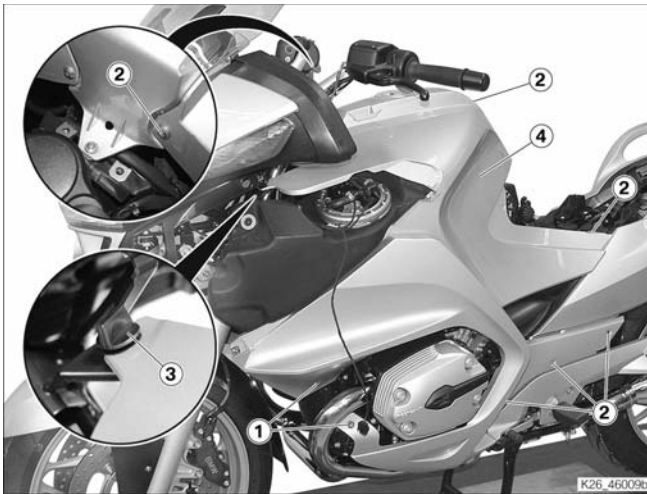


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

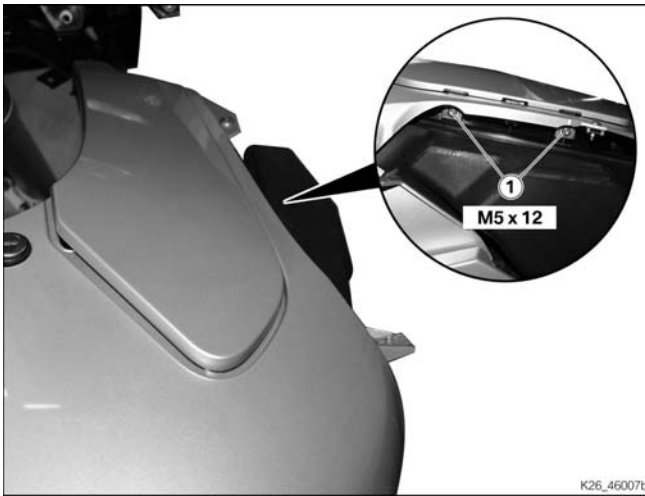
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



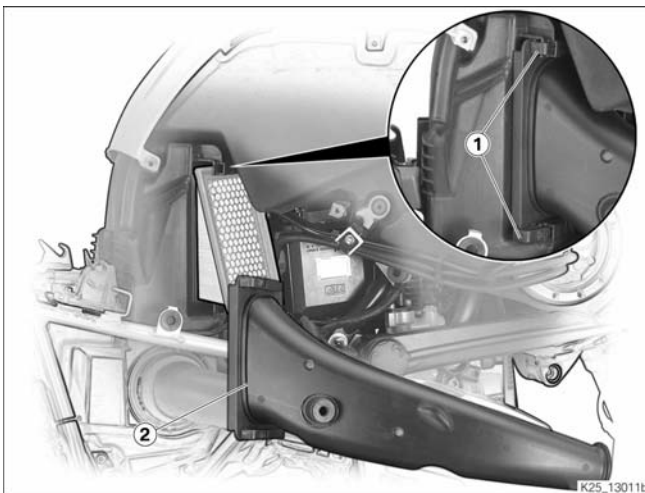
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



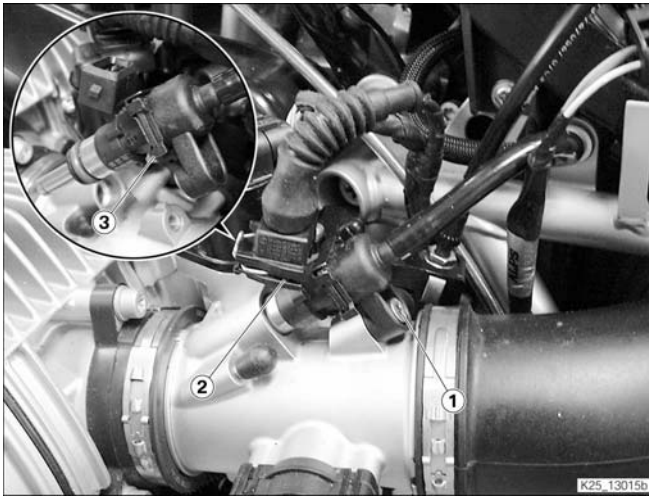
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Removing injection valve

- Remove screw (1).
- Disconnect plug (2).
- Pull out the injection valve with holder from the throttle-valve stub.
- Remove clip (3).



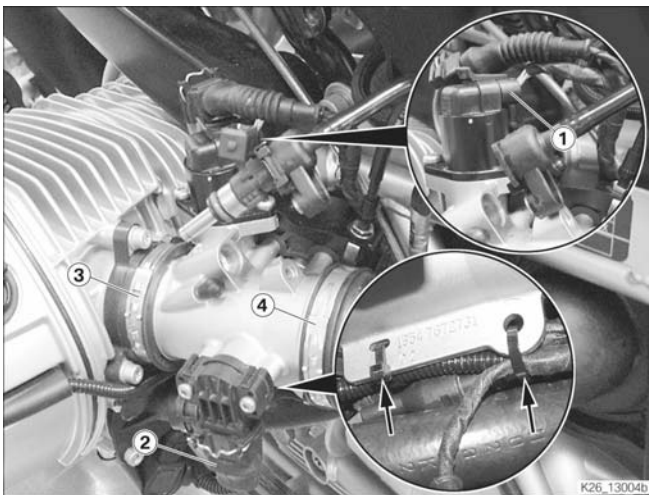
- Remove the injection valve from its holder, noting the O-ring.

(-) Removing air intake pipe



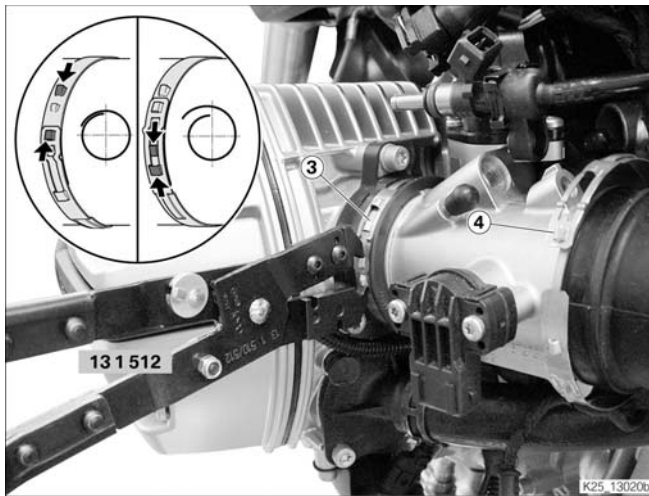
- Use pliers (No. 13 1 512) to open the clips on the intake air silencer and the throttle-valve stub.
- Pull the intake pipe off the intake air silencer and the throttle-valve stub and remove.

(-) Removing left throttle-valve stub



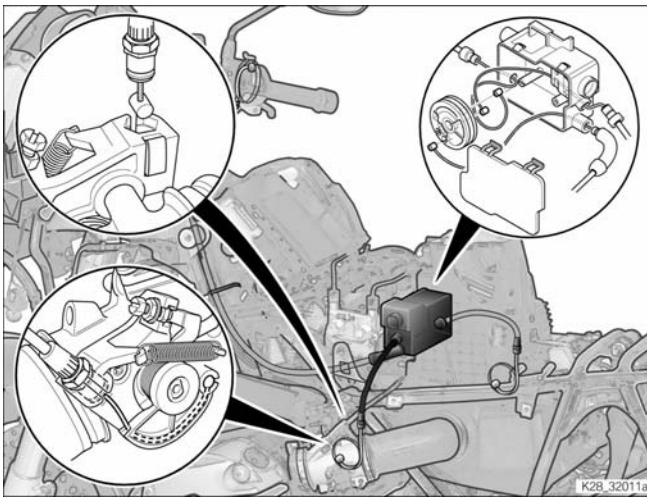
- Disconnect plug (1).
- Disconnect plug (2).
- Open cable ties (arrows).

- Release clips (3) and (4) with pliers (No. 13 1 512) .
- Remove the throttle-valve stub.
- Seal the intake duct at the engine.



► **Disengaging throttle cable from left throttle valve**

- Disengage the throttle cable from the left throttle valve.
- Using a suitable tool, press back the retaining plate from above just far enough to allow the throttle cable to be pulled up and removed.
- Pull out the throttle cable.



◄ **(-) Replacing left throttle-valve stub**

► **Disassembling left throttle-valve stub**

- Remove screws (1).
- Remove idle actuator (2).
- Remove screws (3).
- Remove throttle-valve potentiometer (4).



- ◄
- Remove reusable small items and install them on the new throttle-valve stub.

► **Assembling left throttle-valve stub**



- Install throttle-valve potentiometer (4).



Note

It is not necessary to adjust the throttle-valve potentiometer after installation (self-teaching system).

- Install and tighten screws (3).
- Install idle actuator (2).
- Install and tighten screws (1).



(-) Installing left throttle-valve stub

► Engaging throttle cable in left throttle valve

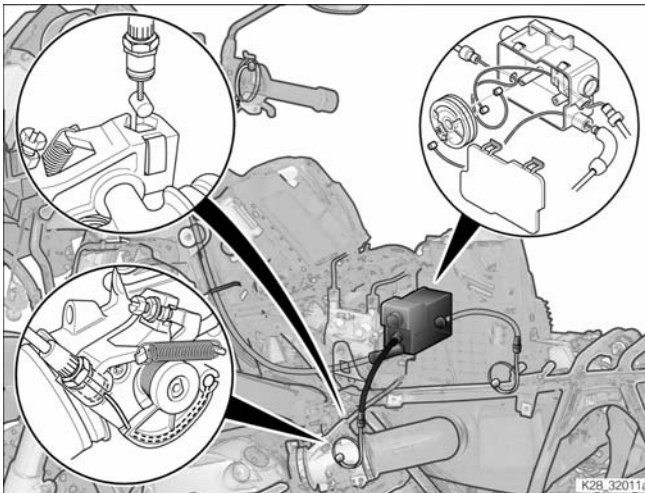


Attention

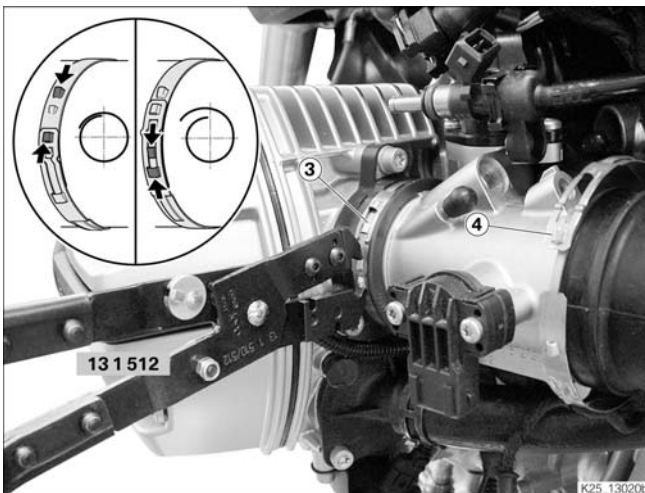
Nature: Incorrect routing of lines and Bowden cables can result in them becoming kinked or chafed and this can cause malfunctions.

Avoidance: Make sure that all lines and Bowden cables are correctly routed and secured.

- Push the throttle cable into the holder on the throttle-valve stub until the retainer engages.
- Engage the throttle cable in the throttle-valve stub.



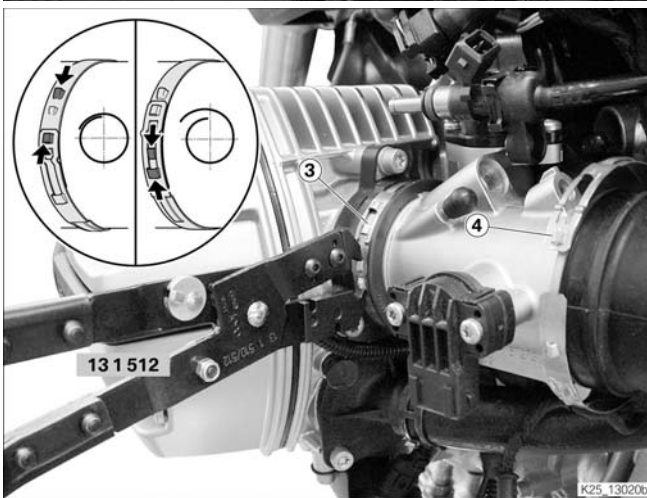
- Remove the cover from the intake port.
- Install the throttle-valve stub.
- Secure clips (3) and (4) with pliers (No. 13 1 512) .



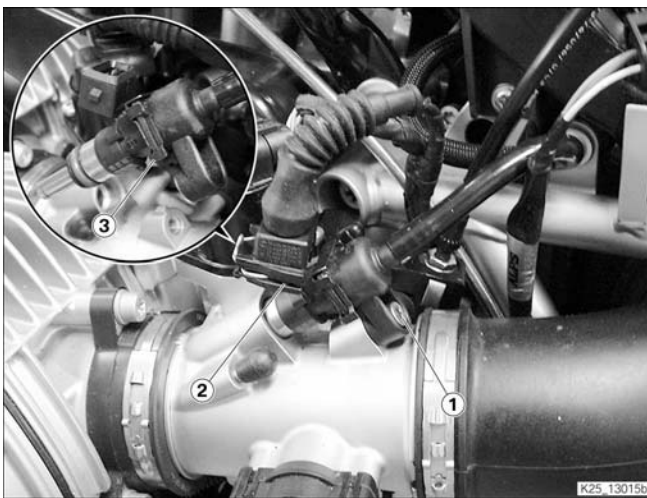


► **Installing air intake pipe**

- Install the intake pipe between the intake air silencer and the throttle-valve stub.




- Secure hose clips (4) on the throttle-valve stubs.
- Close hose clips with pliers (No. 13 1 512) .

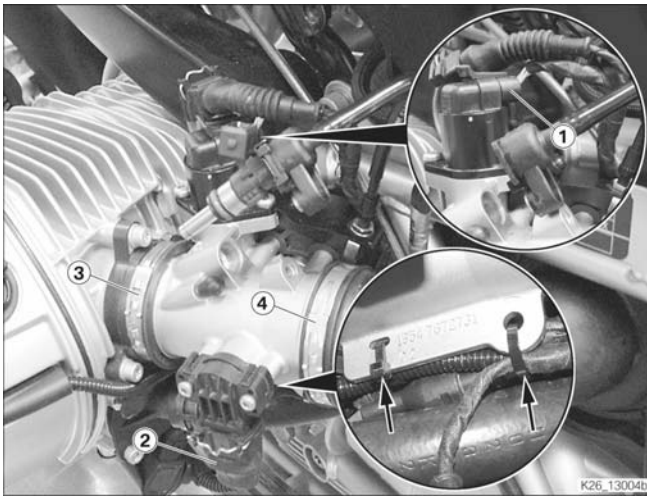


► **Installing injection valve**

- Check the sealing ring of the injector valve for damage. Replace the sealing ring if it is swollen or damaged.
- Install the injection valve in its holder, noting the O-ring.
- Install clip (3).
- Slip the injection valve with holder into the throttle-valve stub.
- Connect plug (2).
- Install screw (1) and tighten.

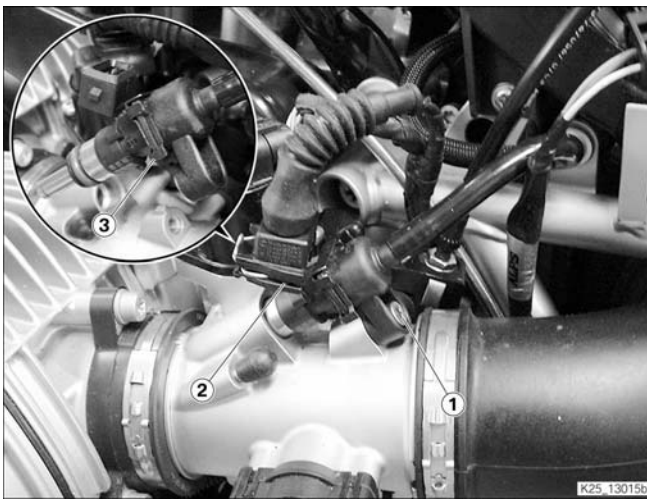
 Tightening torques	
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm

- Close the cable ties (arrows).
- Connect plug (2).



- Connect plug (1).

(-) Removing injection valve



- Remove screw (1).
- Disconnect plug (2).
- Pull out the injection valve with holder from the throttle-valve stub.
- Remove clip (3).
- Remove the injection valve from its holder, noting the O-ring.

(-) Removing right throttle-valve stub



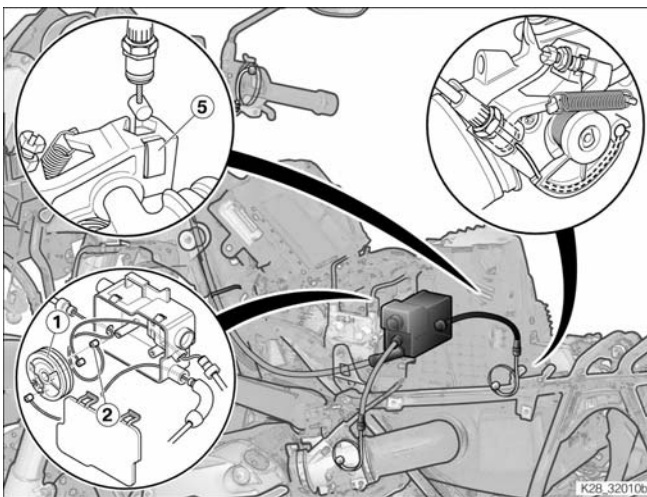
- Disconnect plug (1).
- Open cable ties (arrows).

- Open the clips with pliers (No. 13 1 512) .
- Remove the throttle-valve stub.
- Seal the intake duct at the engine.



► **Disengaging throttle cable from right throttle valve**

- Disengage the throttle cable from the right throttle valve.
- Using a suitable tool, press back retaining plate (5) from above just far enough to allow the throttle cable to be pulled up and removed.
- Pull out the throttle cable.



◄ **(-) Replacing right throttle-valve stub**

► **Disassembling right throttle-valve stub**

- Remove screws (1).
- Remove the idle actuator.



- ◄
- Remove reusable small items and install them on the new throttle-valve stub.

► **Assembling right throttle-valve stub**



- Install the idle actuator.
- Install and tighten screws (1).

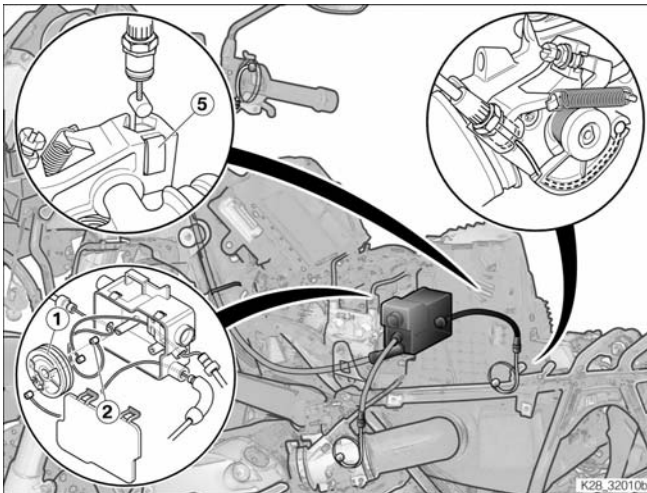
◀ (-) Installing right throttle-valve stub

▶ Engaging throttle cable in right throttle valve

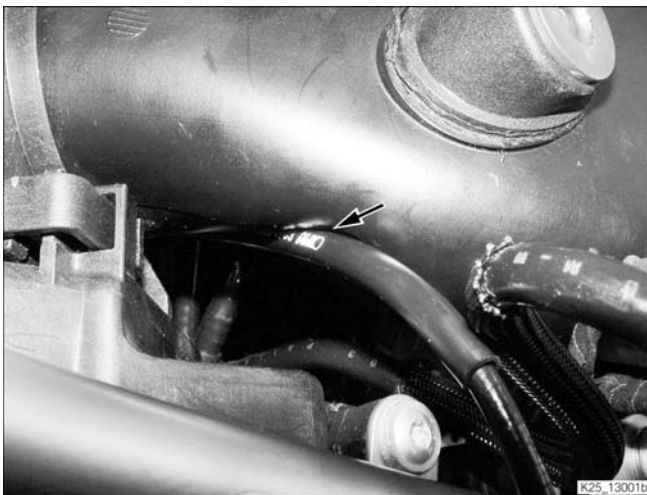
⚠ Attention

Nature: Incorrect routing of lines and Bowden cables can result in them becoming kinked or chafed and this can cause malfunctions.

Avoidance: Make sure that all lines and Bowden cables are correctly routed and secured.

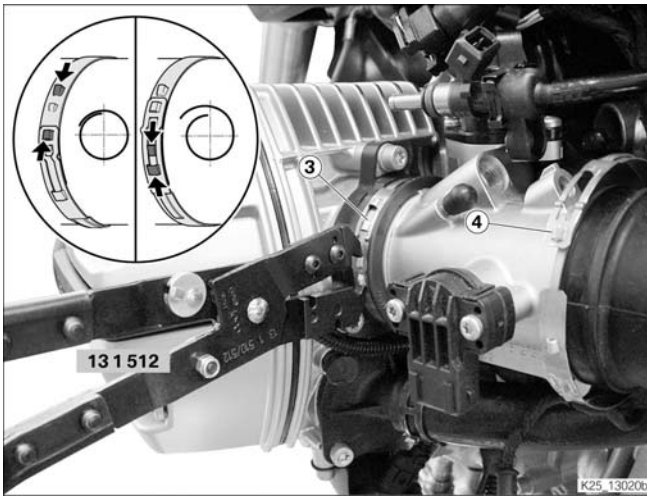


- Push the throttle cable into the holder on the throttle-valve stub until retainer (5) engages.
- Engage the throttle cable in the right throttle valve.



- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

- ◀
- Remove the cover from the intake port.
 - Install the throttle-valve stub.
 - Secure clips (3) and (4) with pliers (No. 13 1 512) .

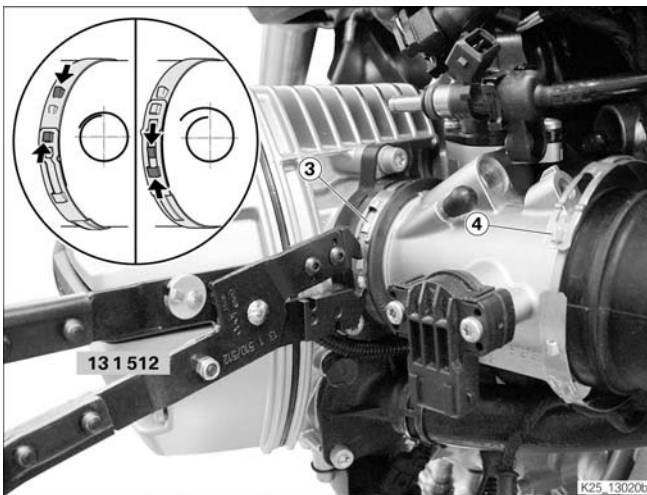


► **Installing air intake pipe**

- Install the intake pipe between the intake air silencer and the throttle-valve stub.

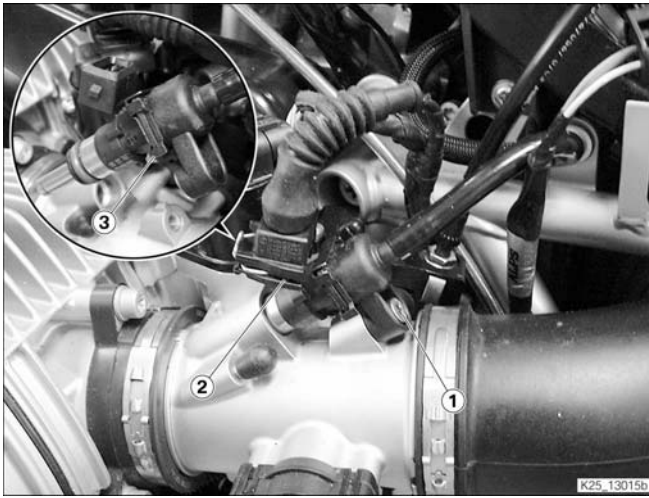


- Secure hose clips (4) on the throttle-valve stubs.
- Close hose clips with pliers (No. 13 1 512) .




► **Installing injection valve**

- Check the sealing ring of the injector valve for damage. Replace the sealing ring if it is swollen or damaged.
- Install the injection valve in its holder, noting the O-

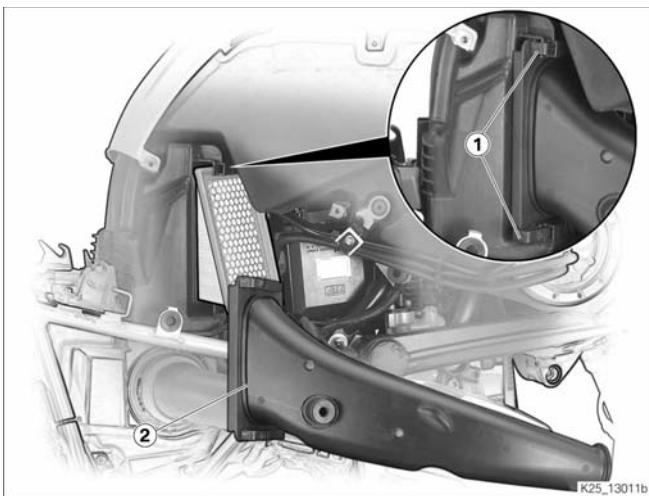


- ring.
- Install clip (3).
- Slip the injection valve with holder into the throttle-valve stub.
- Connect plug (2).
- Install screw (1) and tighten.

 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	



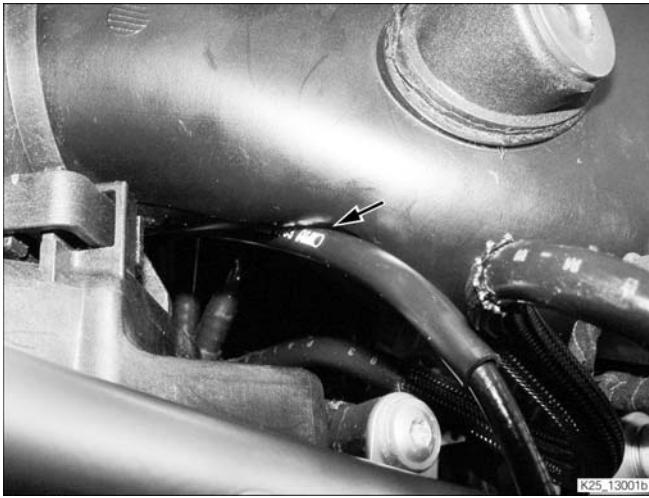
- ◀
- Close the cable ties (arrows).
- Connect plug (1).



(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

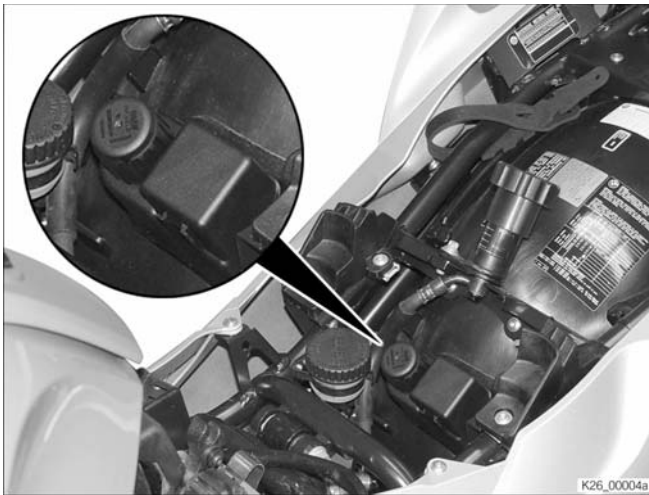


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.

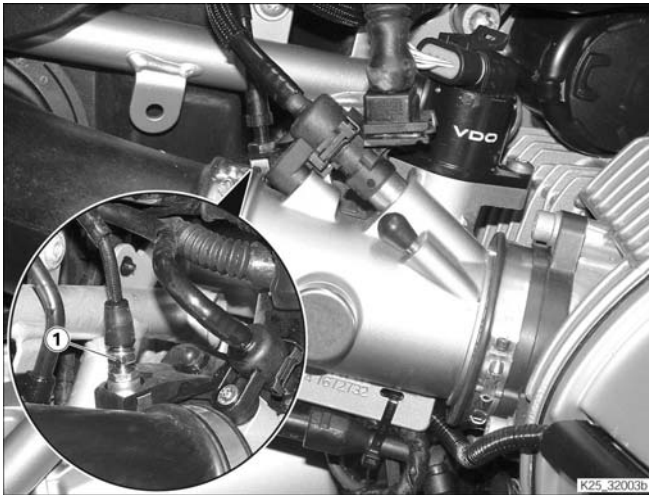


Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

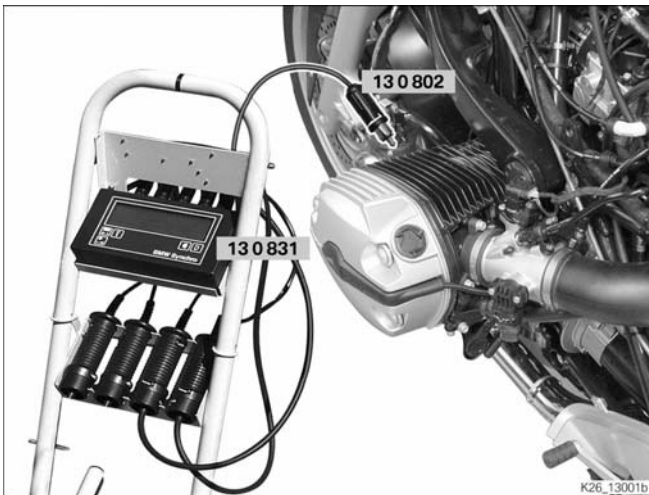
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

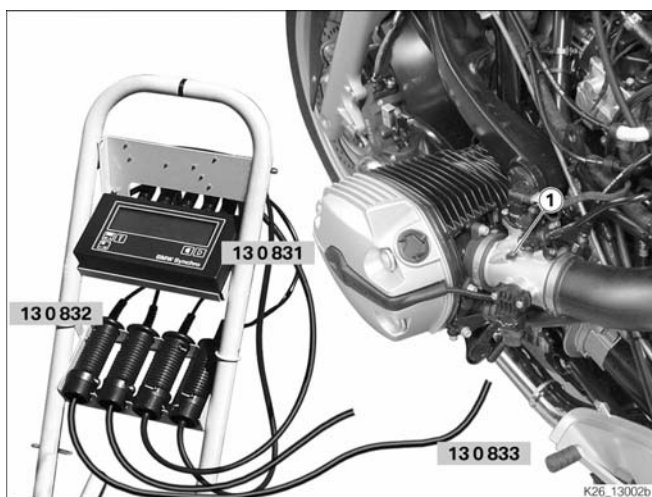


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- » The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



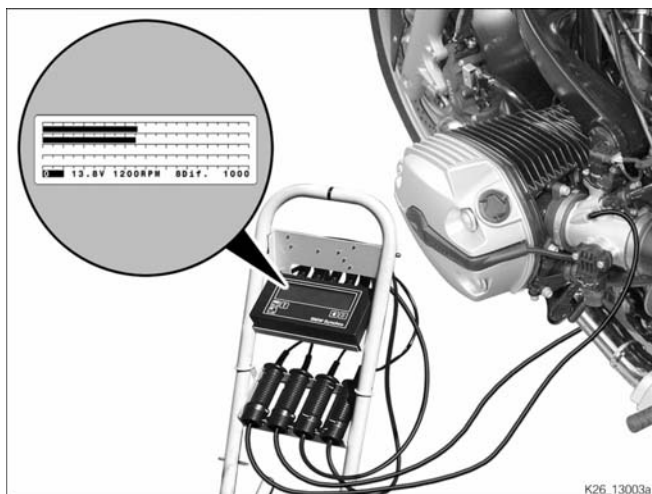
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

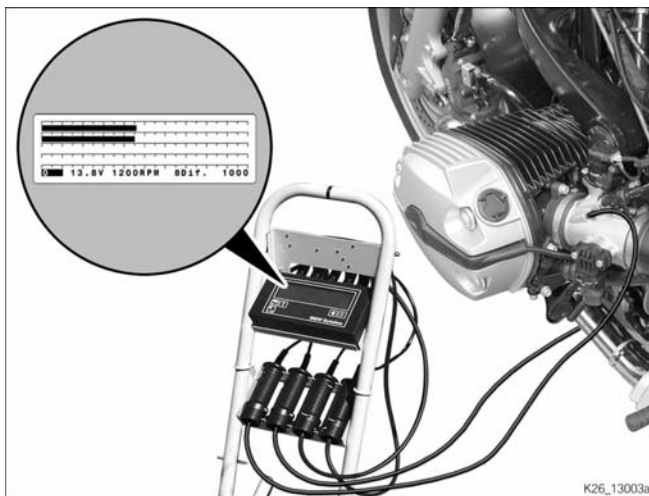
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

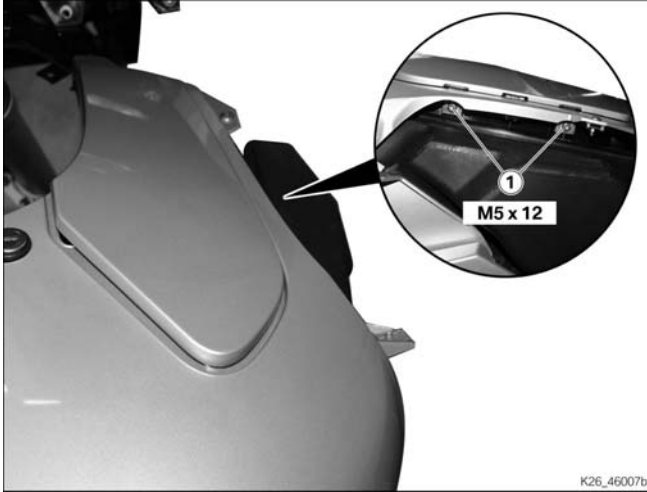
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).





(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



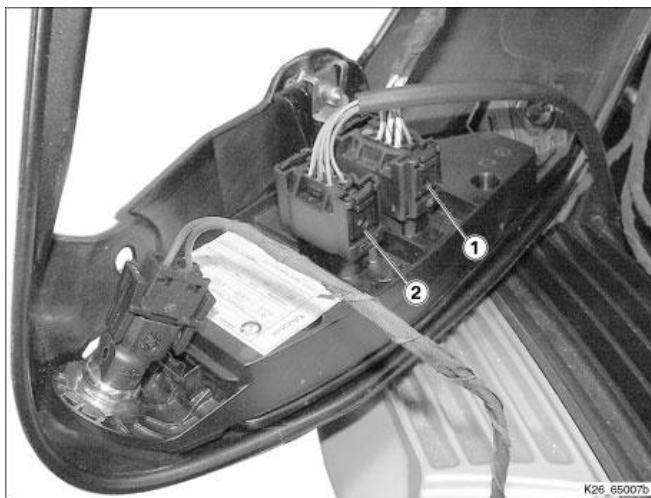
(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **13 60 110 Adjusting engine synchronisation**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

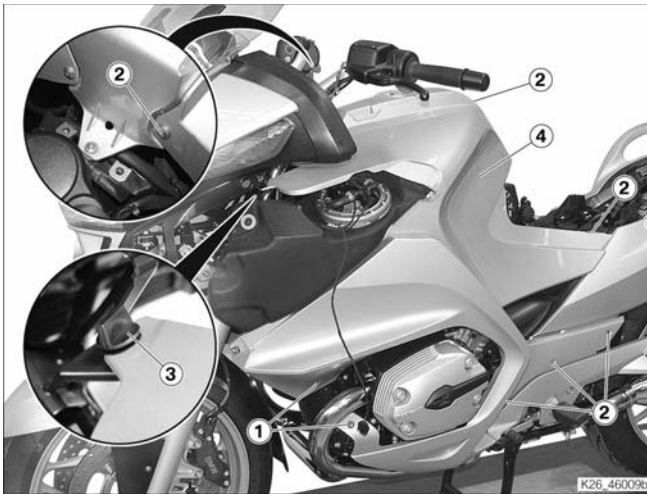


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

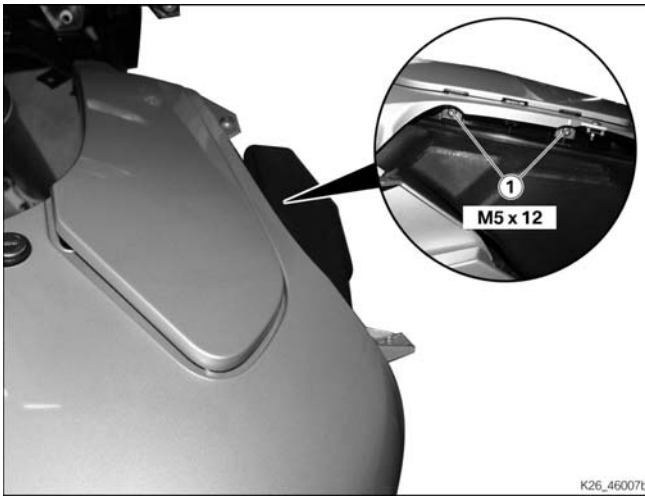
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



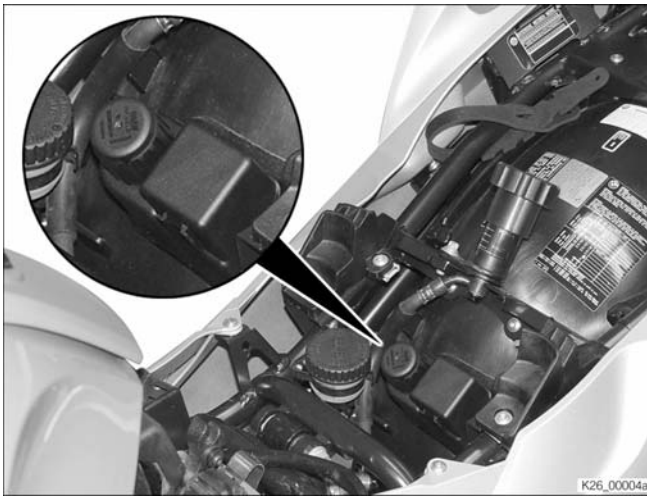
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the

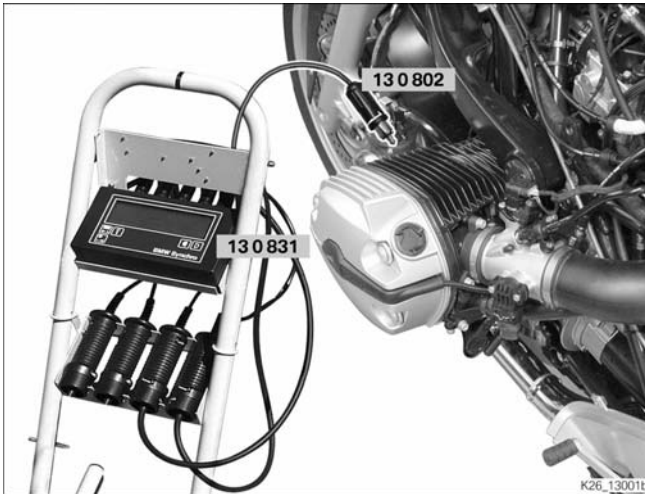
throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



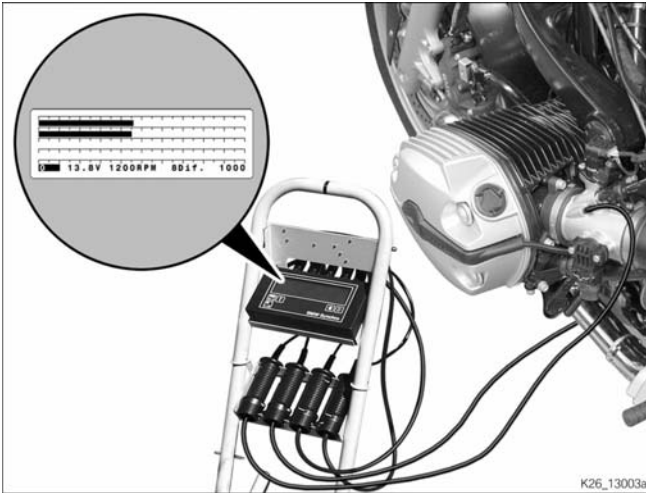
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to

synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

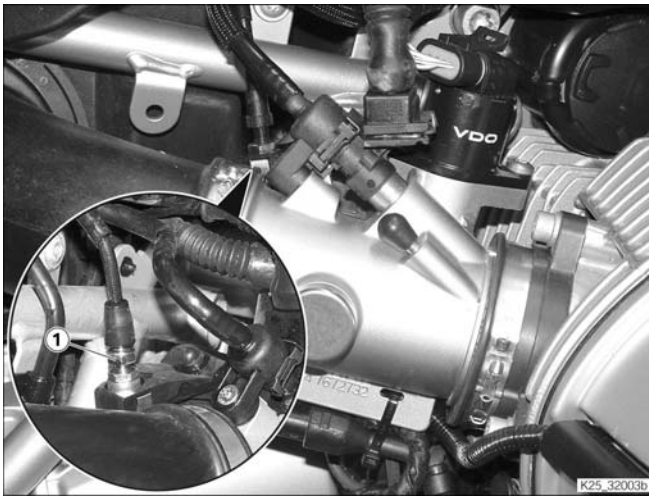
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change



- **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

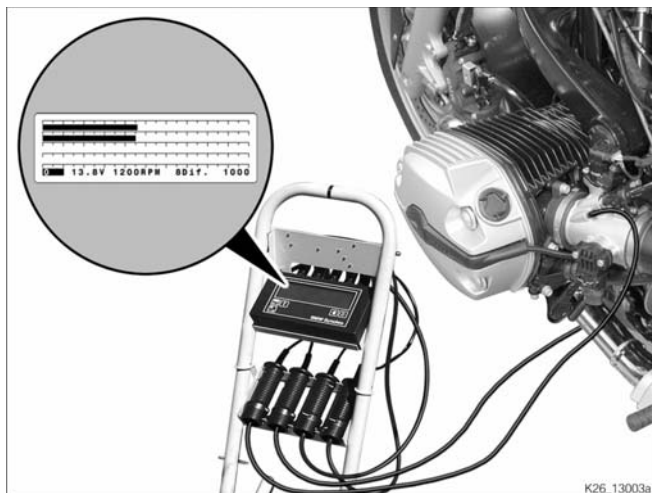
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic

system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

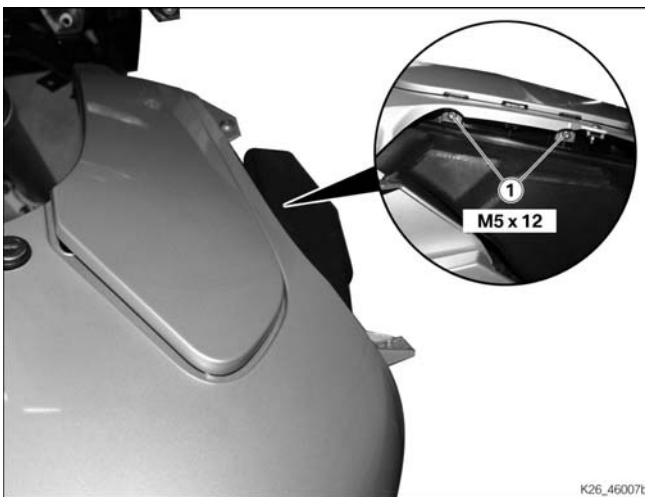
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



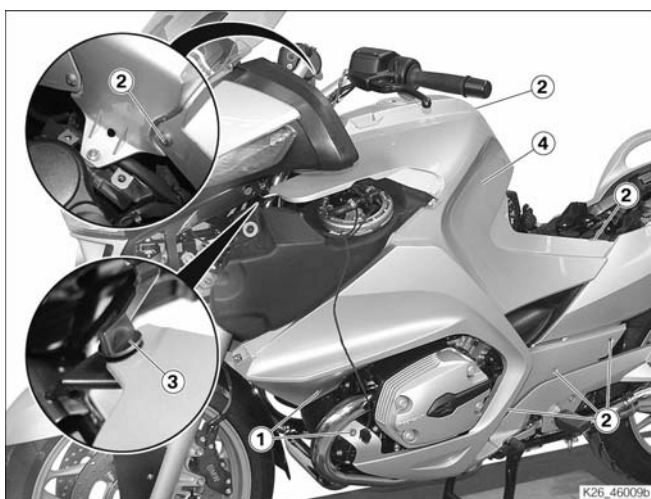
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

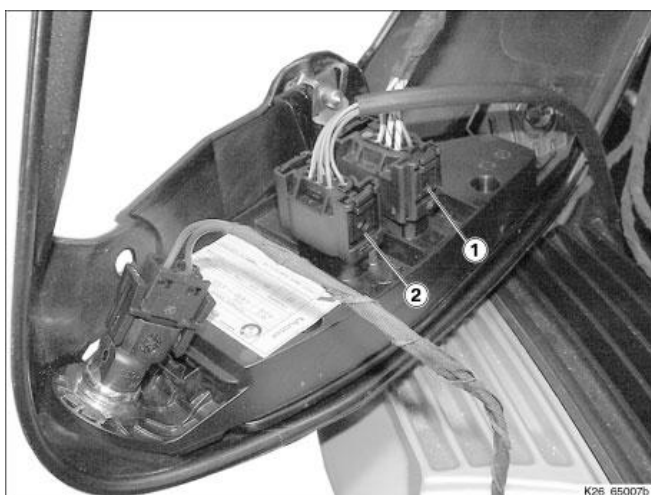
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **13 61 015 Replacing control units for engine management system**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

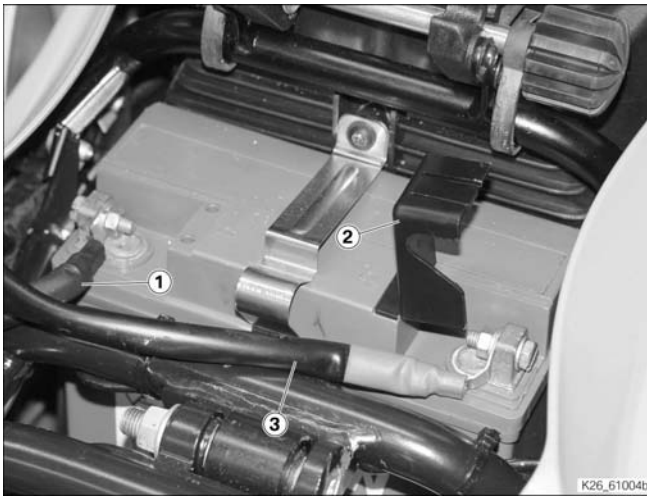
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

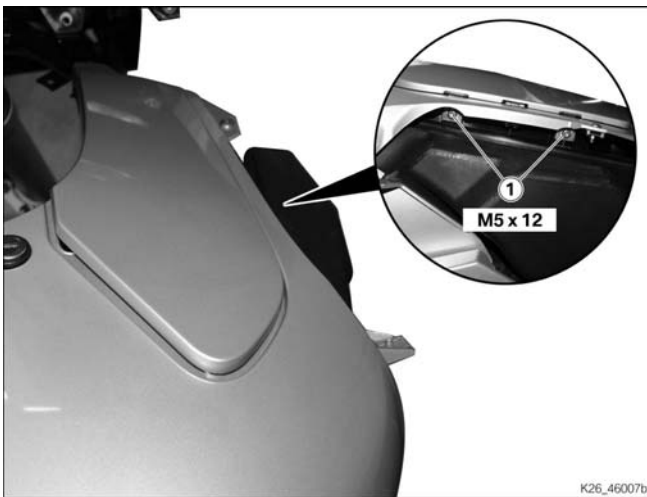
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



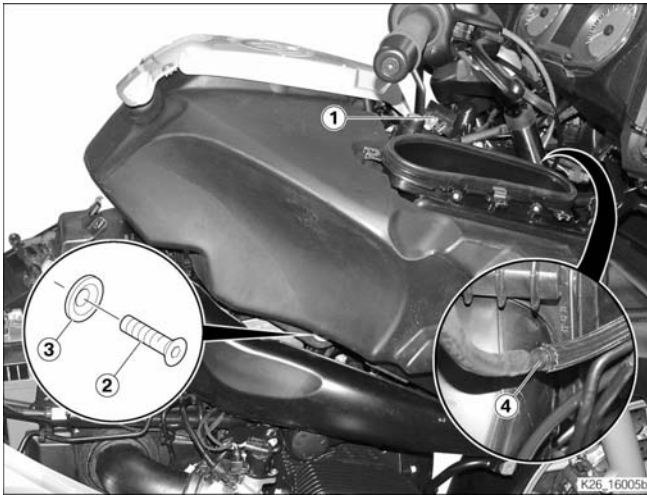
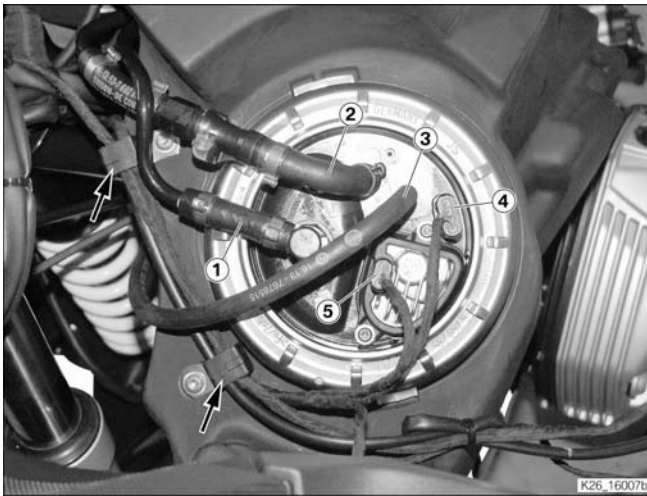
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



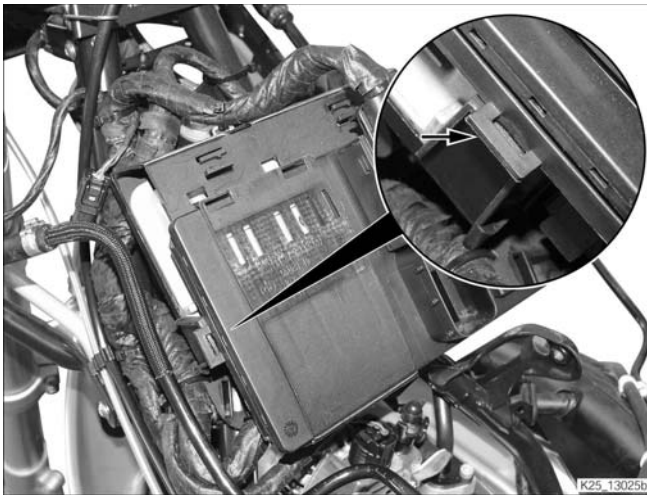
(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



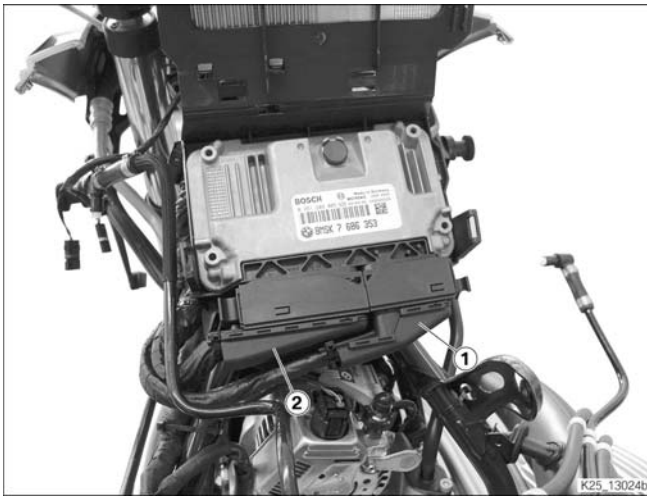
- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

(-) Removing control unit for engine electronics



- Open clips (arrow) on left and right and swing up the cover with the control unit for the central vehicle electronics.

- Disconnect plugs (1) and (2).
- Remove the control unit for the engine electronics.



(-) Installing control unit for engine electronics



Note

Do not, **under any circumstances** temporarily install control units from other vehicles by way of testing. The possible consequences include:

Coding data could be overwritten.

The control units could malfunction.



Note

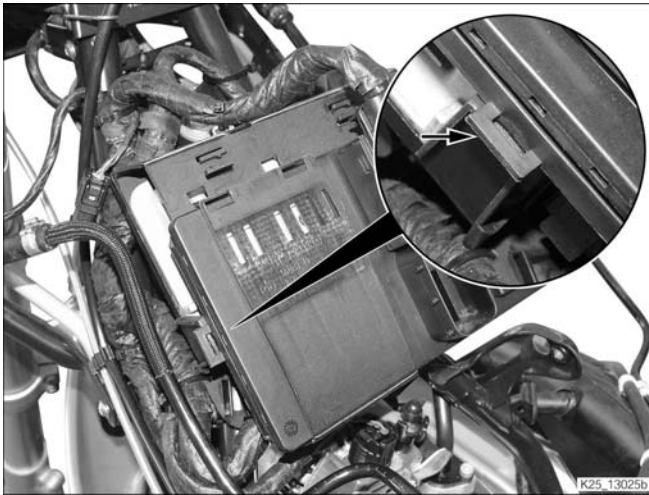
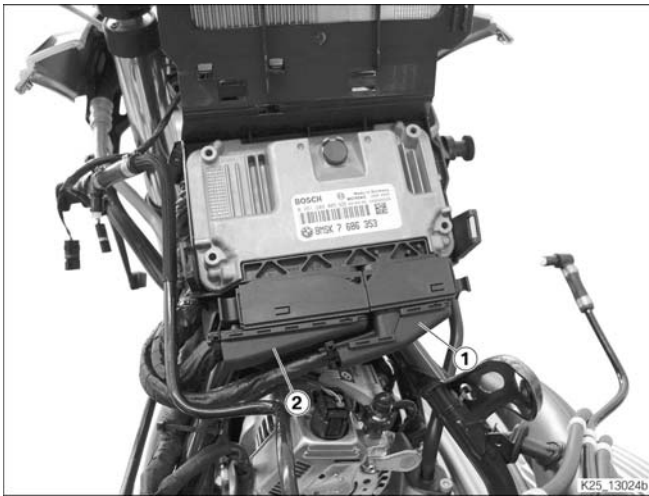
Always check the relevant personal details (vehicle registration papers, ID card/passport) before ordering and delivering components that are associated with the electronic immobiliser (e.g. ignition key).

Add the customer data to all requests for parts associated with the electronic immobiliser and file these requests in records.

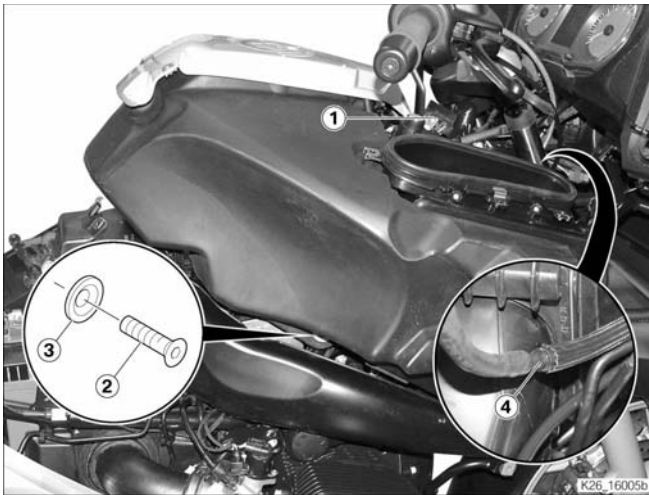
When replacement ignition keys arrive, try them out immediately on the motorcycle in question.

Use the BMW Motorrad diagnostic system to bar ignitions keys reported lost by customers. Bear in mind that the customer must bring in all the remaining ignition keys for this process.

- Seat the control unit for the engine electronics in its holder.
- Connect plugs (1) and (2).




- Close the cover and engage the clips (arrow) at left and right.

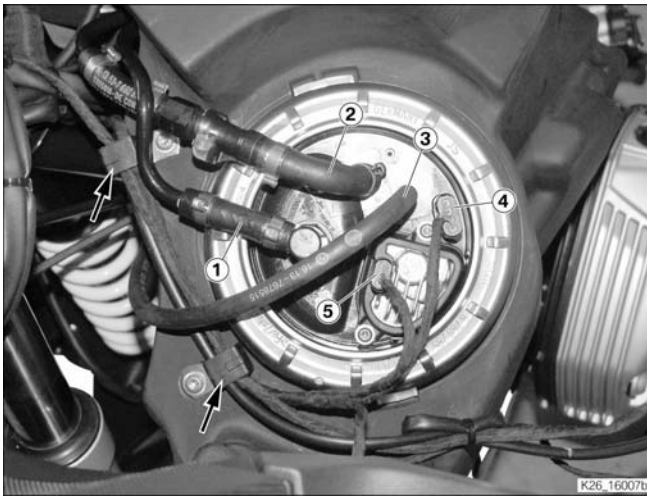


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).



- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

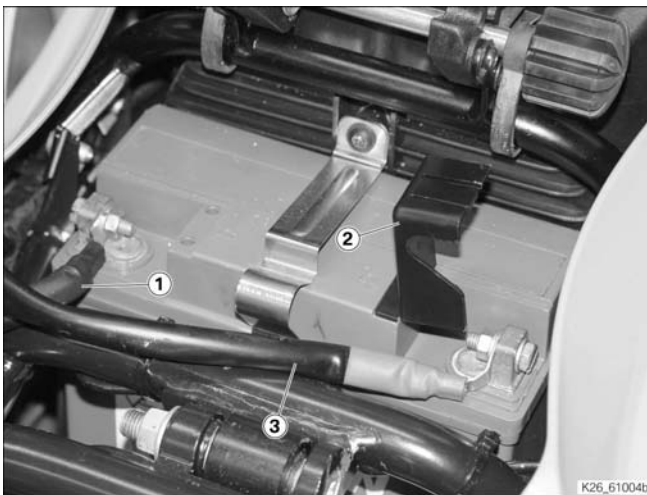
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Connecting battery

⚠ Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.



- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Preparing the motorcycle for CIP (coding, individualisation and programming)

Precondition

- Engine switched off.
- Prop the motorcycle in such a way that it cannot move while programming/coding is in progress.
- Motorcycle's battery is fully charged.



Note

Do not attempt to perform work of any other kind on the motorcycle while programming/coding are in progress.

- Switch off all electrical consumers.



Attention

Nature: Programming/coding is aborted if the voltage in the on-board system drops below 12.6 volts.

Avoidance: Connect the charger to the battery.

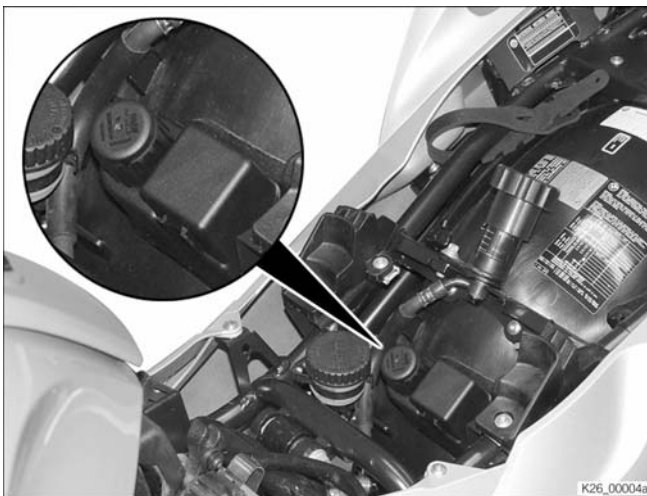
- Connect charger (No. 61 1 581) with cables (No. 61 1 582) to the battery. While programming/coding is in progress, **do not** connect or disconnect the charger.

► Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



- Perform diagnosis. Rectify faults, if found, **before** starting programming/coding.
- Start programming/coding with the CIP program and follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

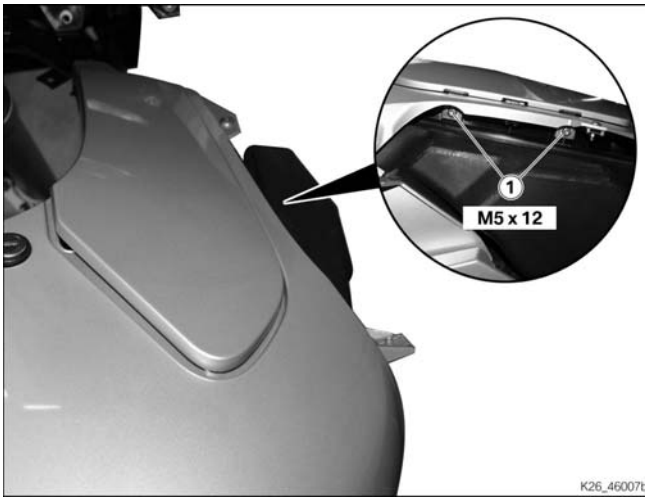
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).



- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

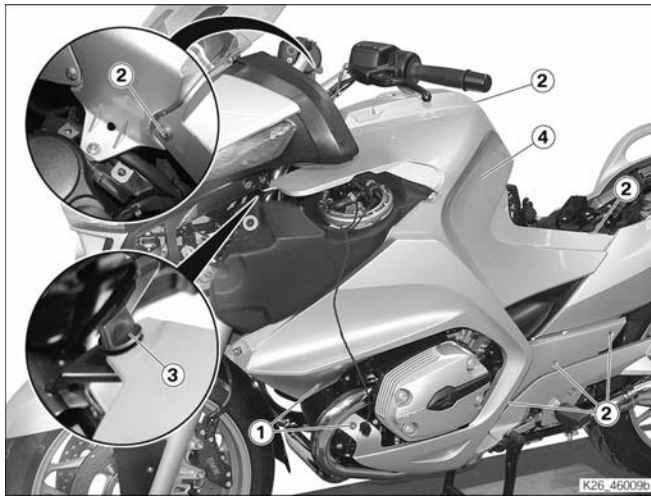
(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **13 62 010 Replacing intake-air temperature sensor**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

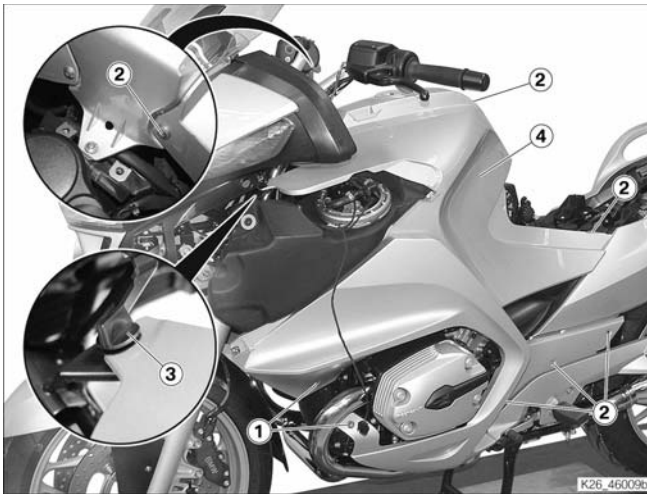


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

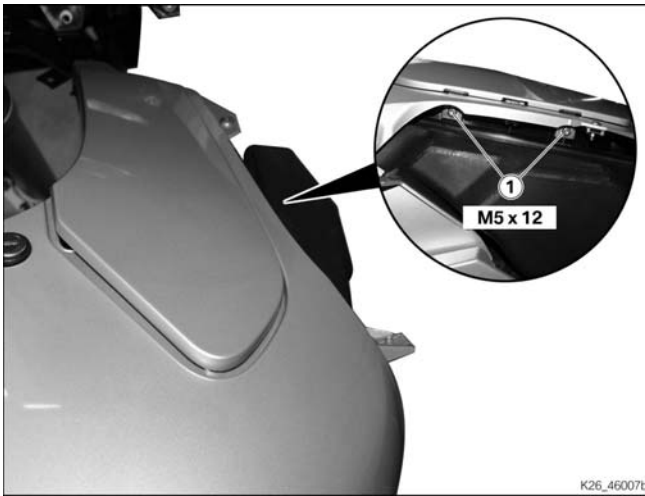
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



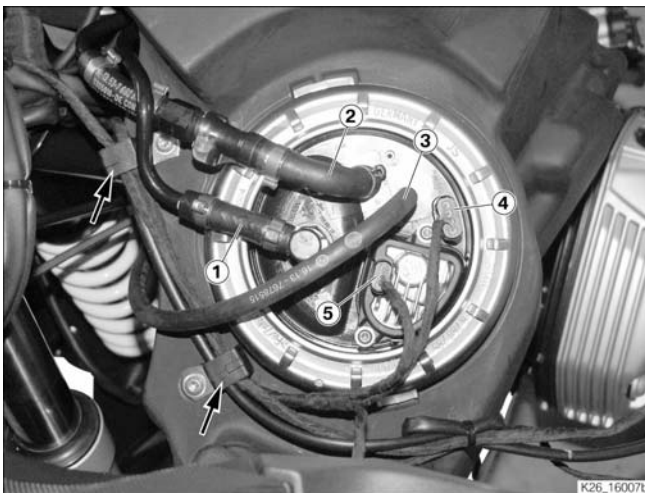
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

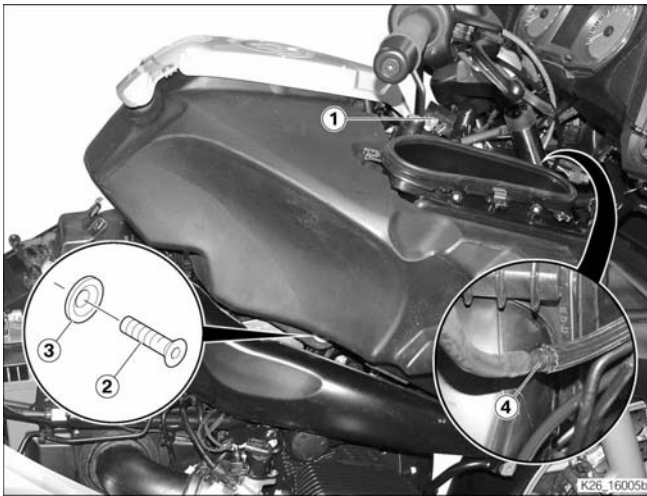


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

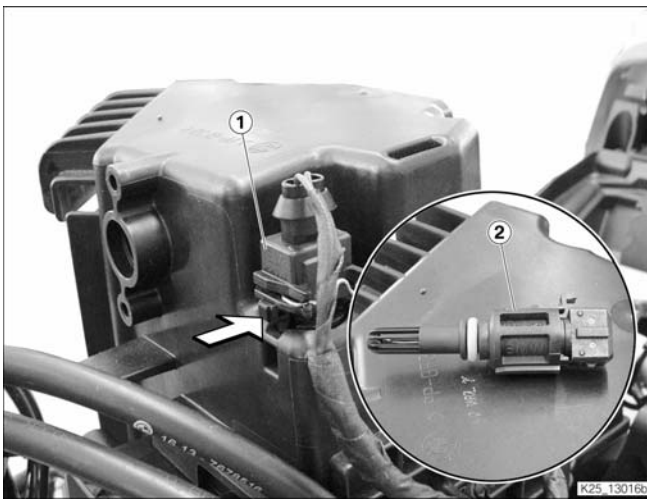


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing air temperature sensor

- Disconnect plug (1).
- Push the locking device toward the air temperature sensor and pull out air temperature sensor (2).



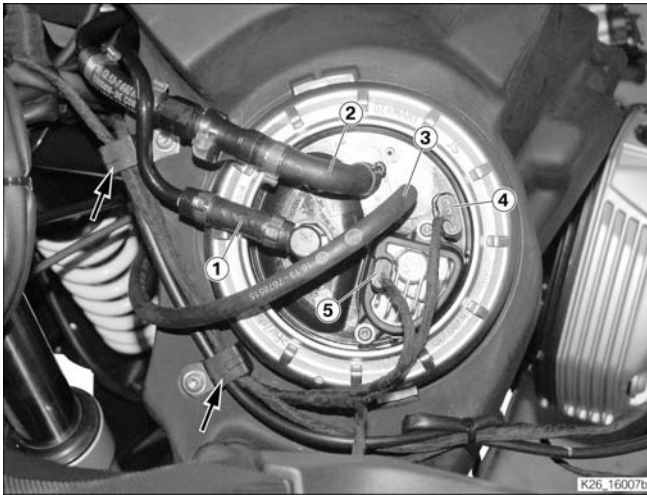
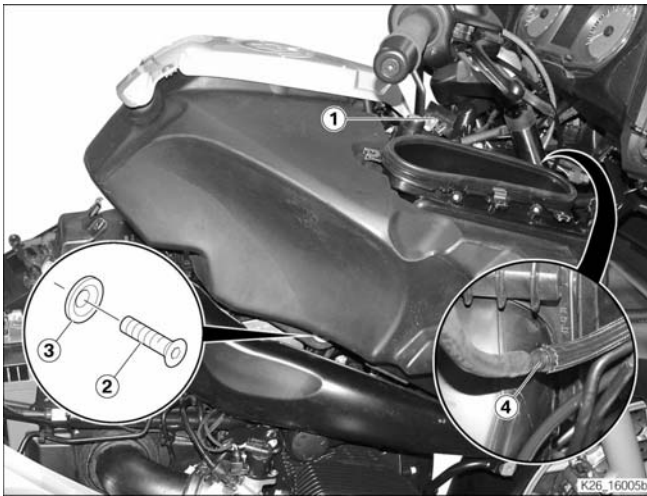
(-) Installing air temperature sensor

- Install air temperature sensor (2) in the intake air silencer.
- Connect plug (1).




(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.



- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! **Attention**

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

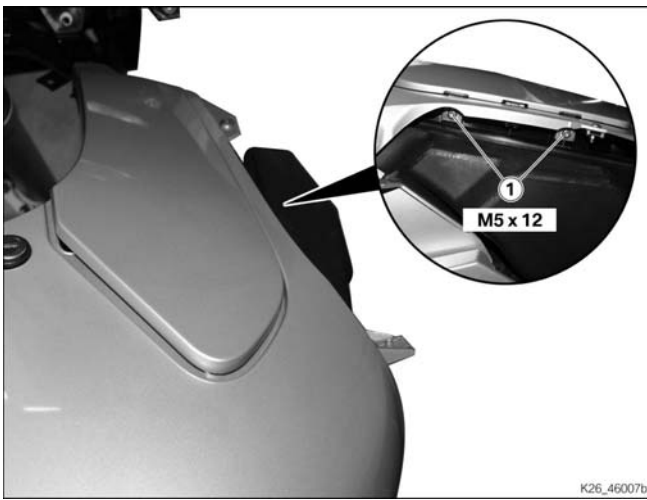
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



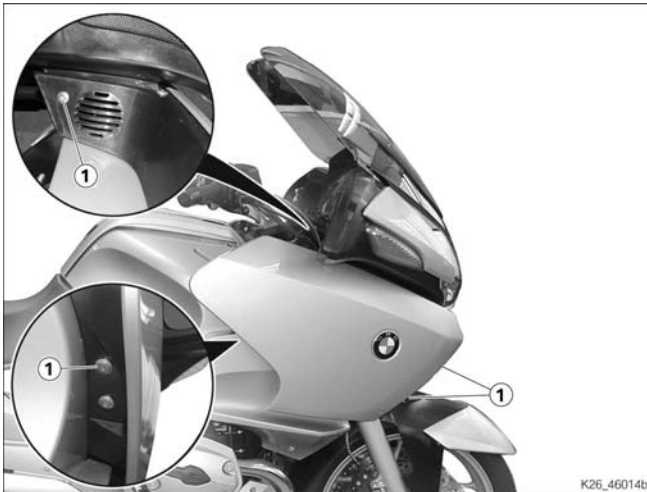
(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



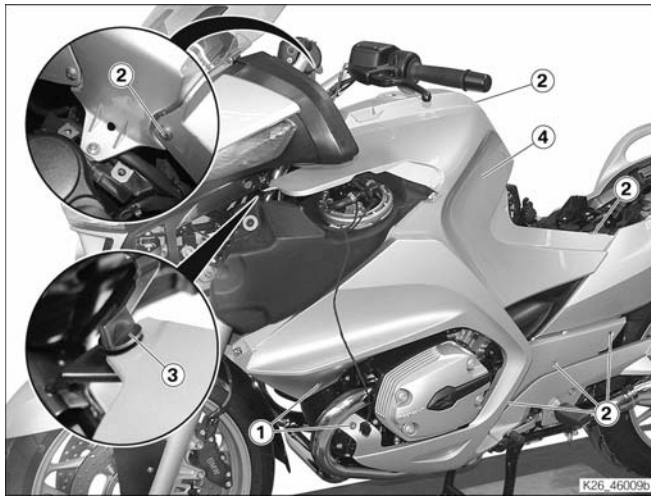
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **13 63 000 Replacing throttle-valve potentiometer**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

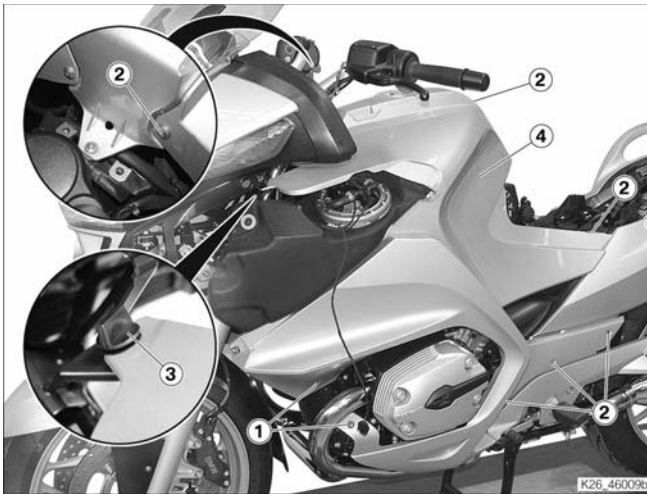


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

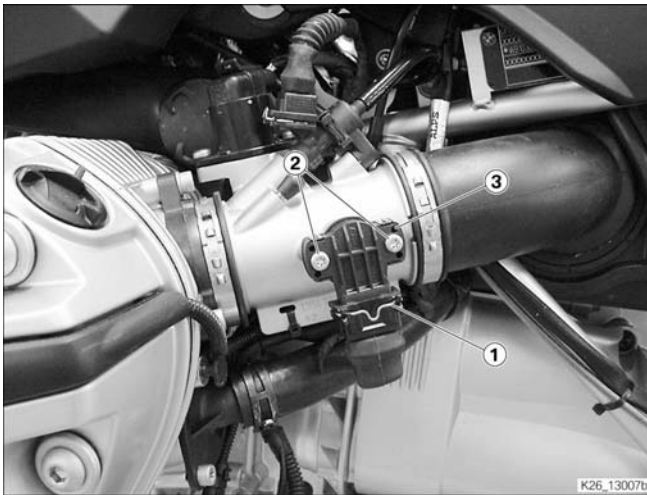


- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

(-) Removing throttle-valve potentiometer



- Disconnect plug (1).
- Remove screws (2).
- Remove throttle-valve potentiometer (3).

(-) Installing throttle-valve potentiometer

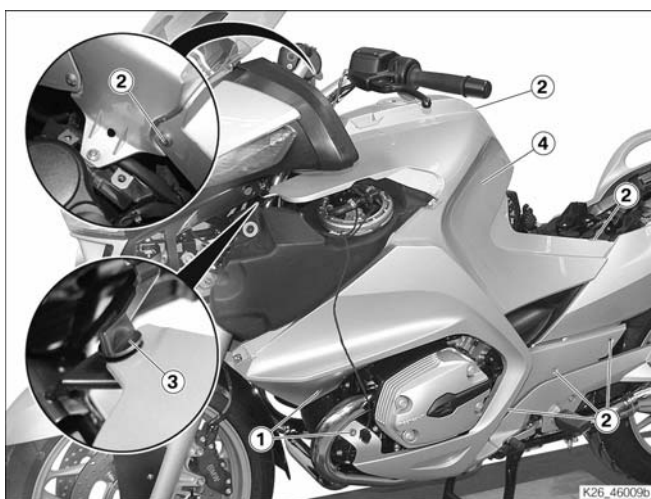
- Hold throttle-valve potentiometer (3) in position.
 - Install screws (2).
 - Connect plug (1).
-



Note

It is not necessary to adjust the throttle-valve potentiometer after installation (self-teaching system).

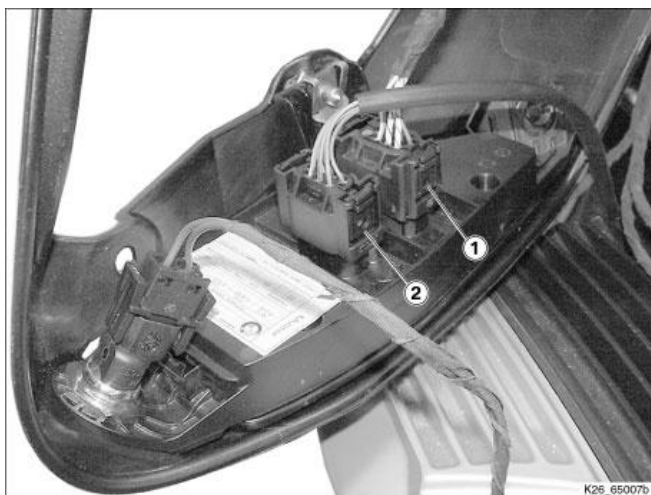
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



K26_46012b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **13 63 020 Replacing idle actuator**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

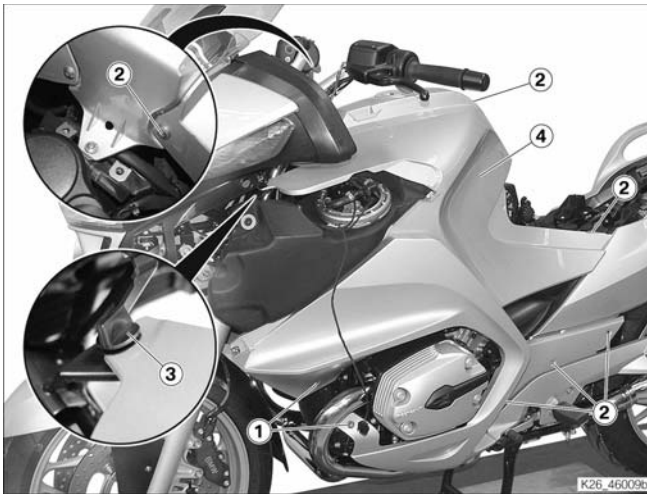


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

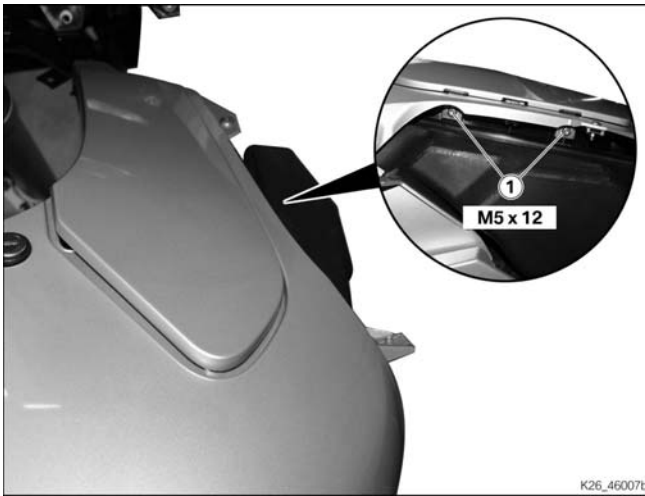
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



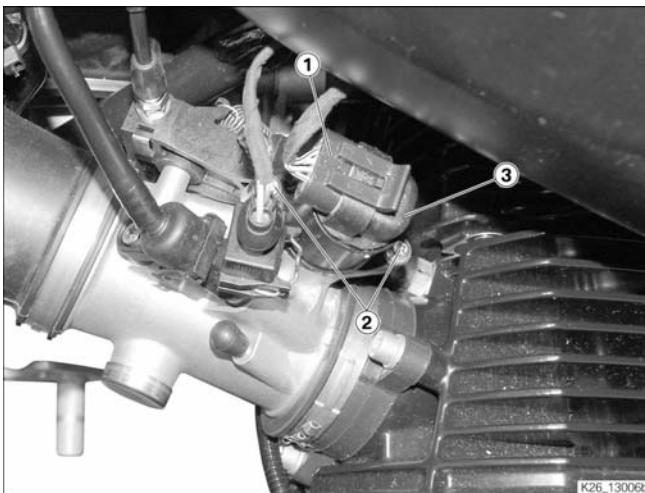
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



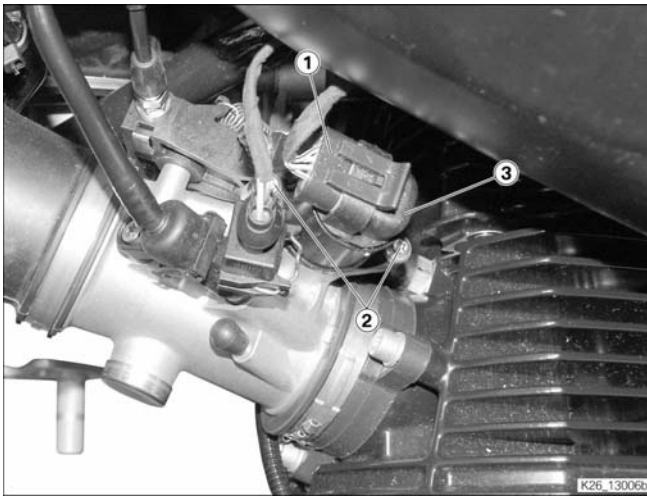
(-) Removing idle actuator

- Disconnect plug (1).
- Remove screws (2).
- Remove idle actuator (3).



(-) Installing idle actuator

- Install idle actuator (3).
- Install and tighten screws (2).
- Connect plug (1).



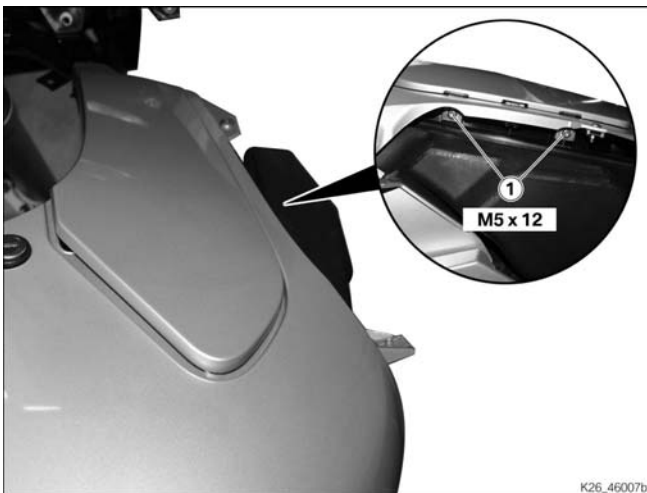
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



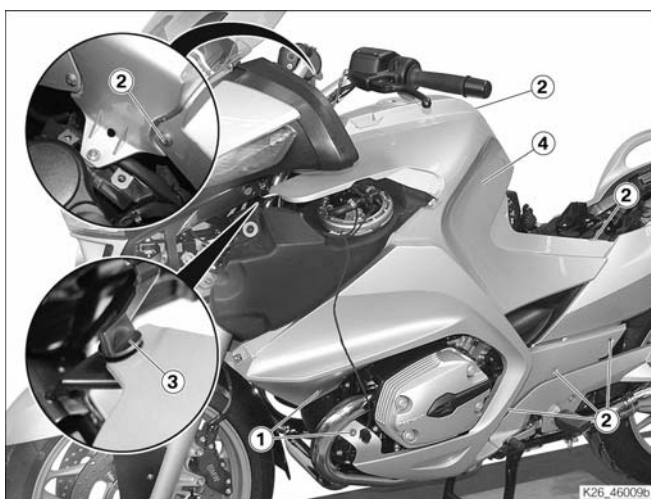
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

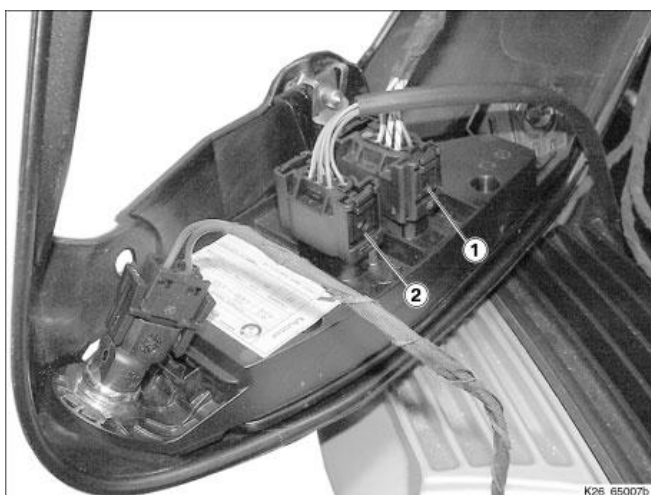
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **13 64 180 Replacing injection valves**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

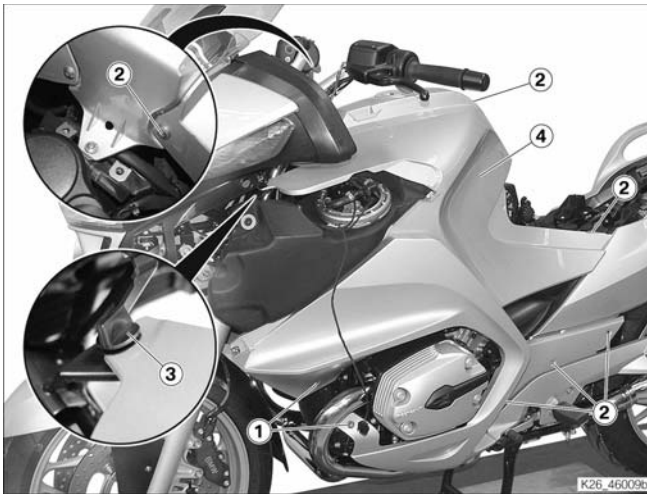


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

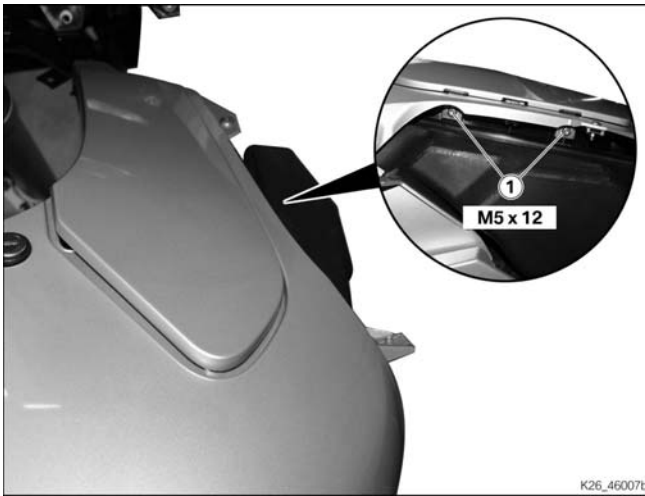
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



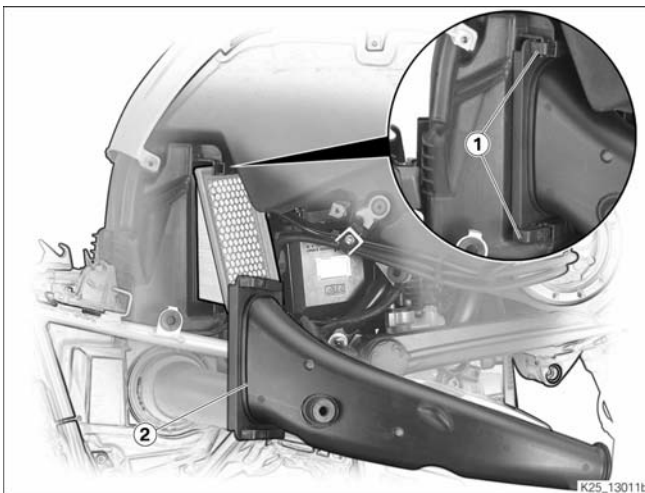
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



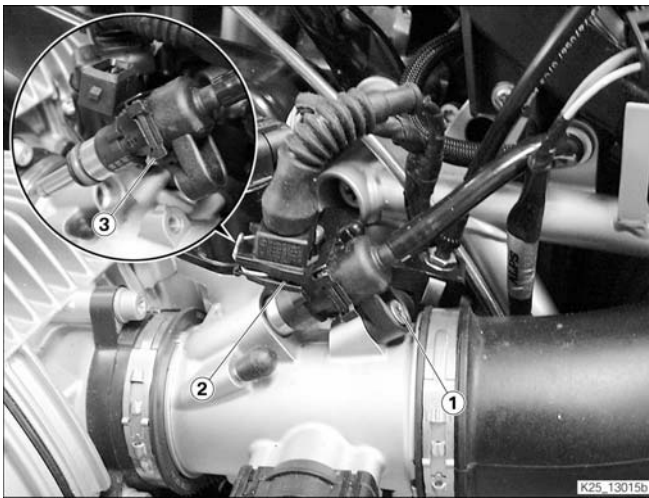
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



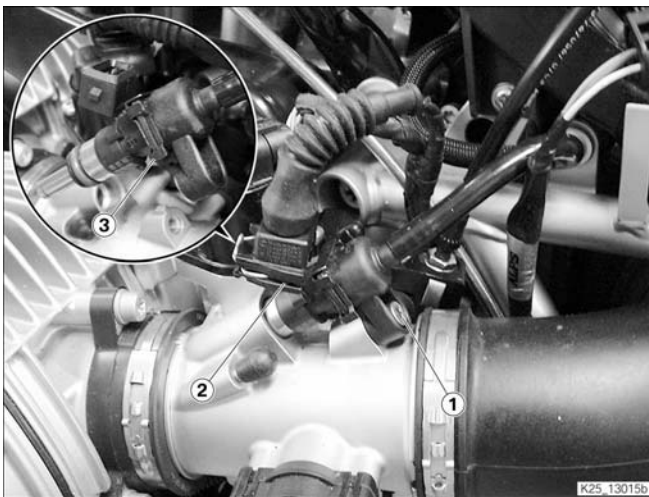
(-) Removing injection valve

- Remove screw (1).
- Disconnect plug (2).
- Pull out the injection valve with holder from the throttle-valve stub.
- Remove clip (3).




- Remove the injection valve from its holder, noting the O-ring.

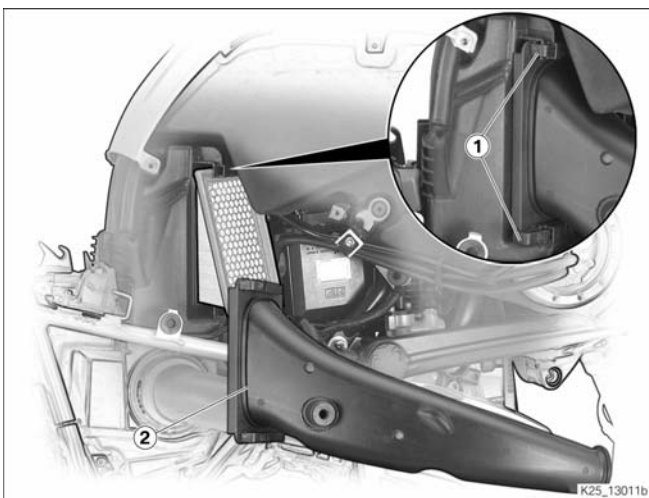
(-) Installing injection valve



- Check the sealing ring of the injector valve for damage. Replace the sealing ring if it is swollen or damaged.
- Install the injection valve in its holder, noting the O-ring.
- Install clip (3).
- Slip the injection valve with holder into the throttle-valve stub.
- Connect plug (2).
- Install screw (1) and tighten.

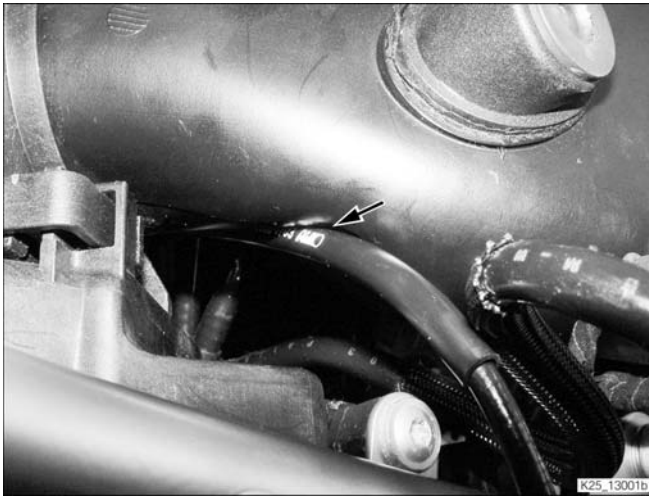
 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

(-) Installing intake air pipe



- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.



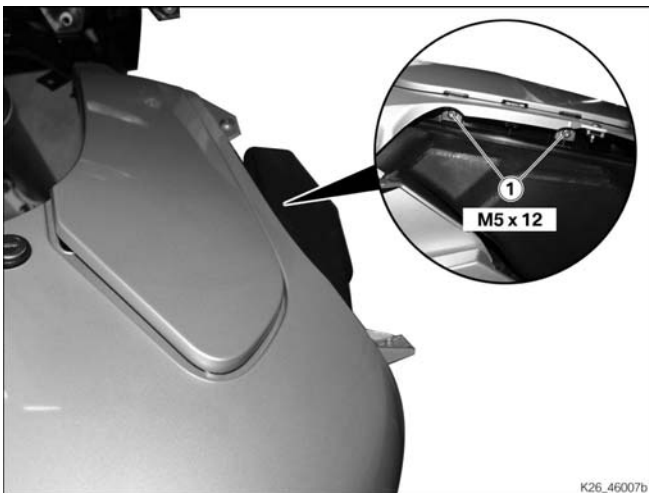
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



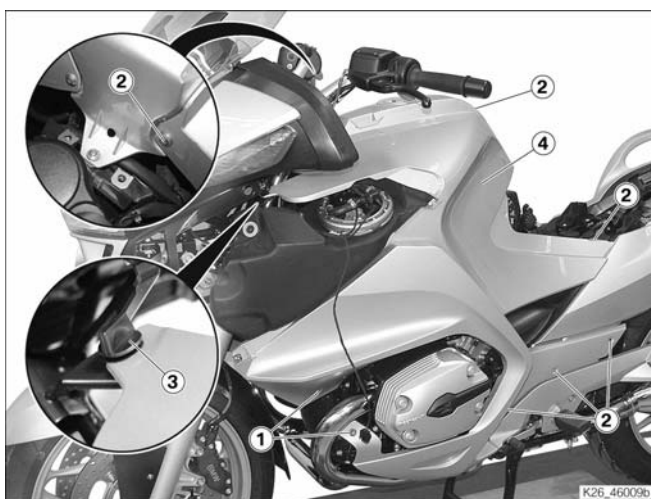
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

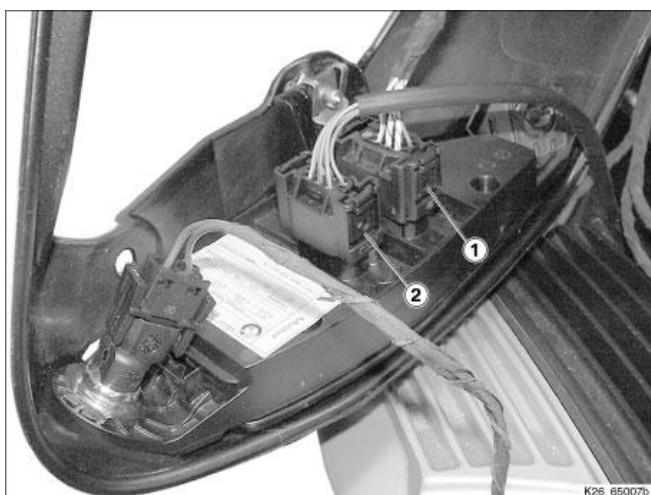
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **13 71 010 Replacing intake air silencer**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

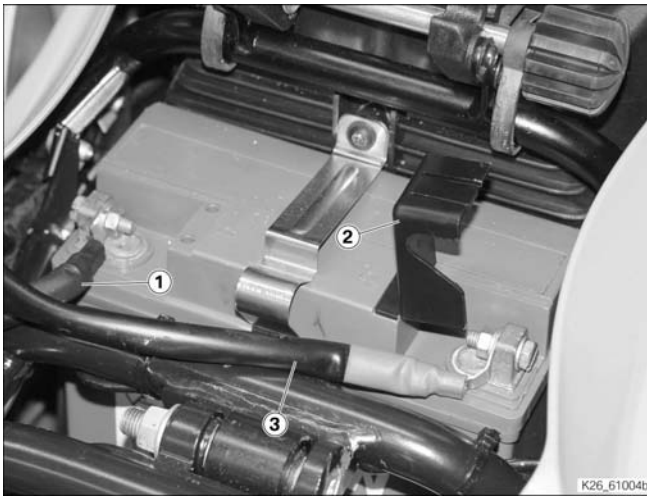
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

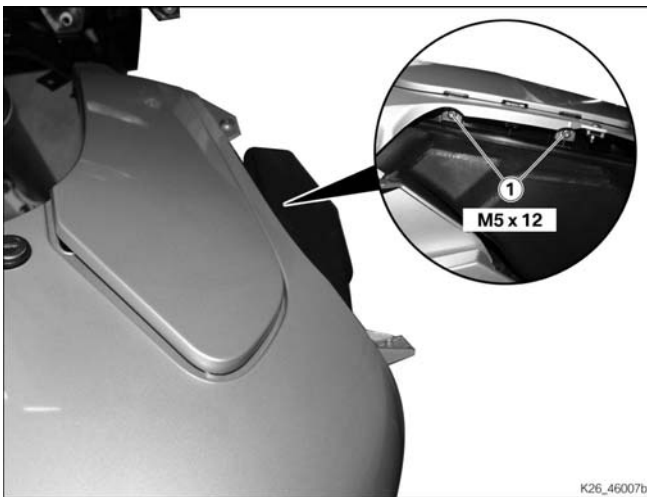
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



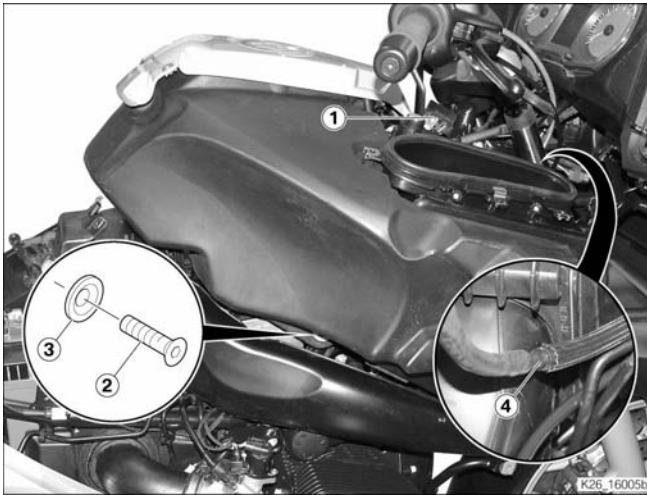
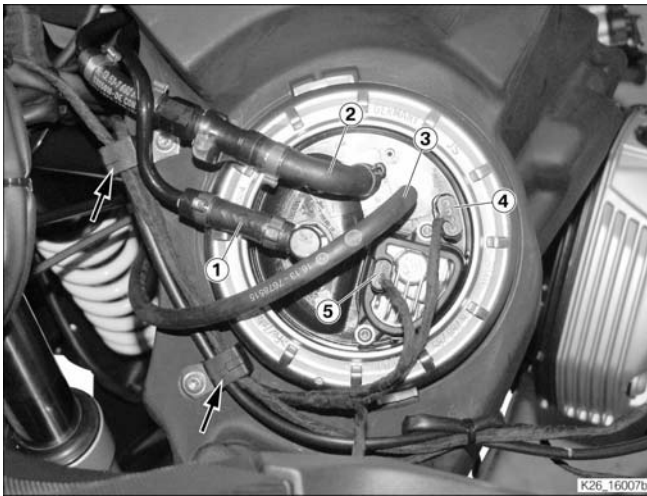
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

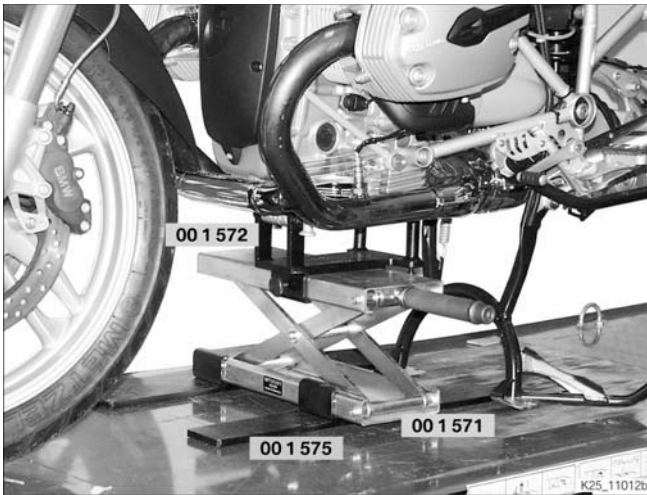


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

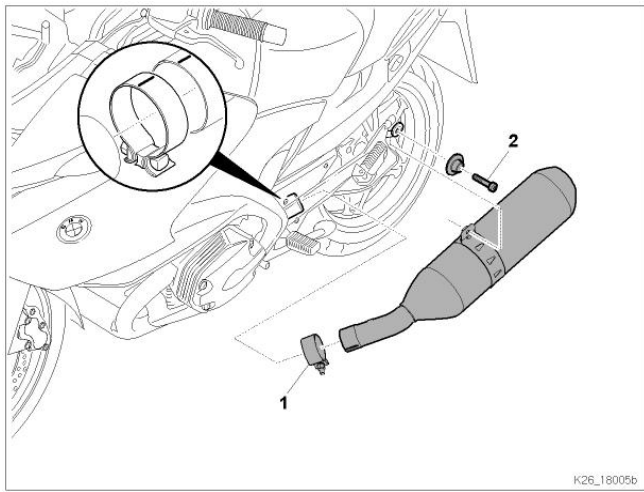


(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

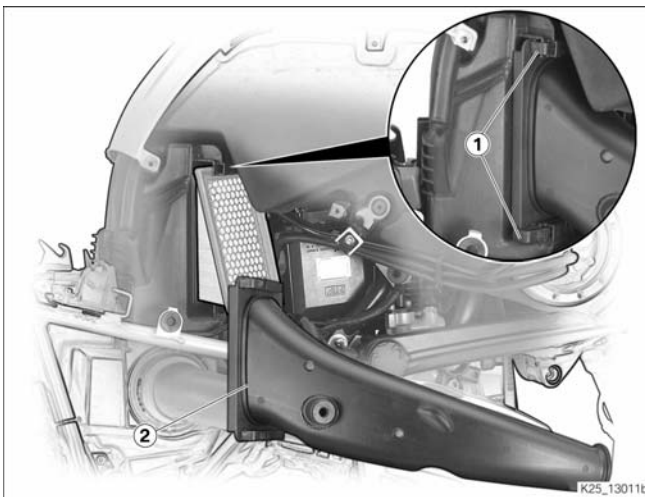
(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



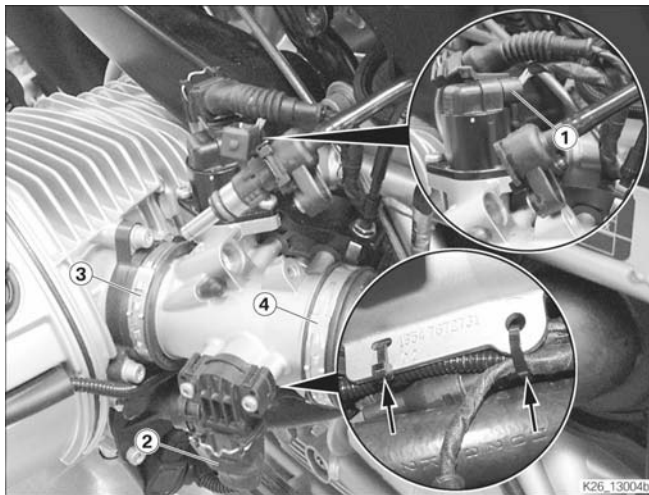
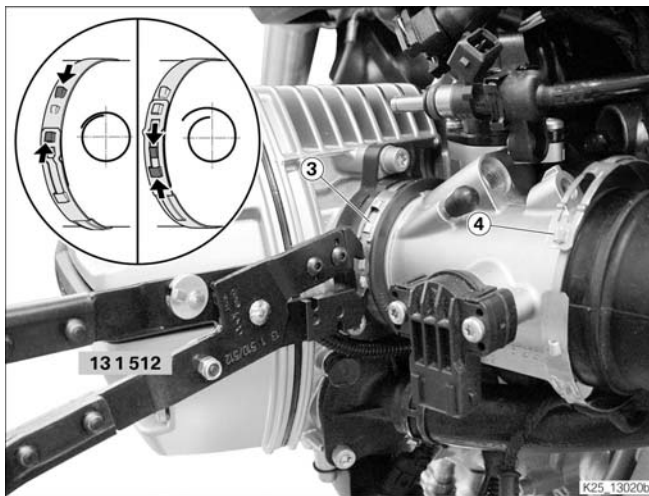
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.



(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

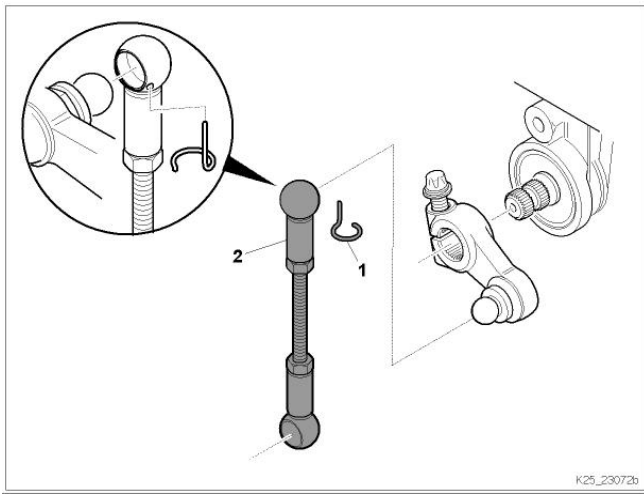
(-) Securing throttle valve stub with cable divider

- Tie up throttle valve stub and cable divider with cable tie (arrow).



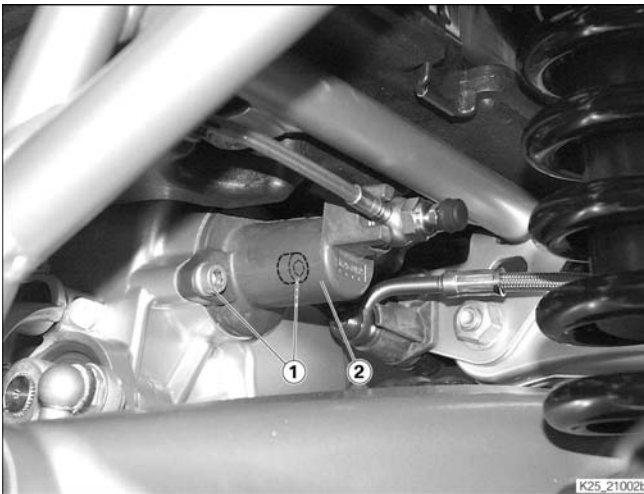
(-) Disengaging selector rod from shift lever

- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.



(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.

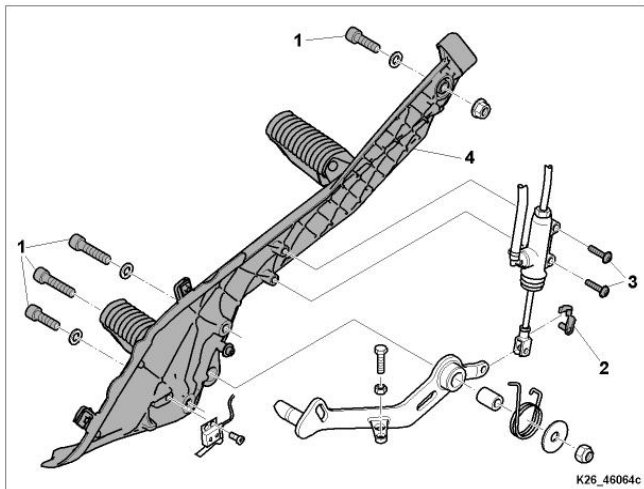


(-) Removing right footrest plate

- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.



Technical data

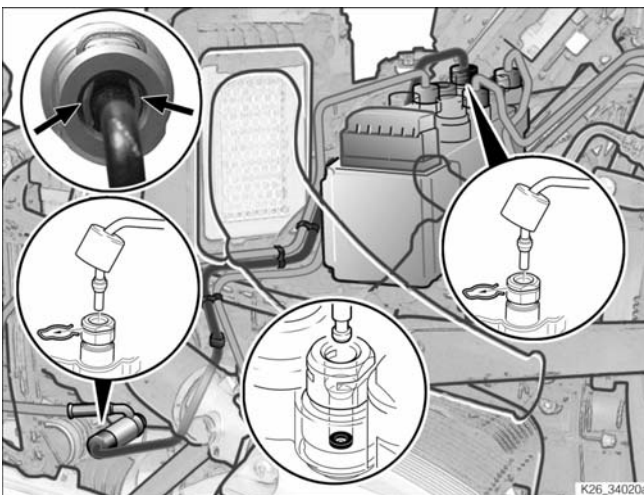
Release temperature, screws for rear brake master cylinder		100 °C	
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- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.



- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.

(-) Disconnecting brake pipe for rear wheel circuit from pressure modulator



- Push the protective cap up.
- Remove the spring clip.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap the area around the connector in a cloth.
- Open the retaining clips, lift the brake pipe out of the pressure modulator and catch escaping brake fluid with a cloth.
- Seal the open end of the brake pipe to prevent brake fluid from dripping.

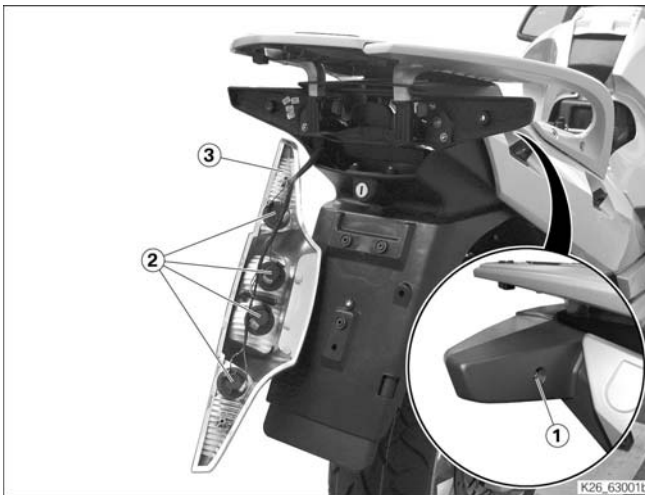


Note

Use the protective cap from a bleed screw to seal the brake pipes.

(-) Removing rear-light unit

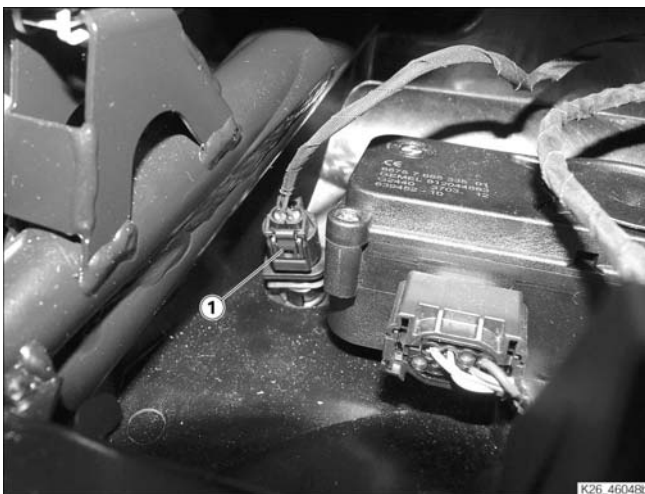
- Remove screws (1).
- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).



(-) Disengaging wiring harness at rear

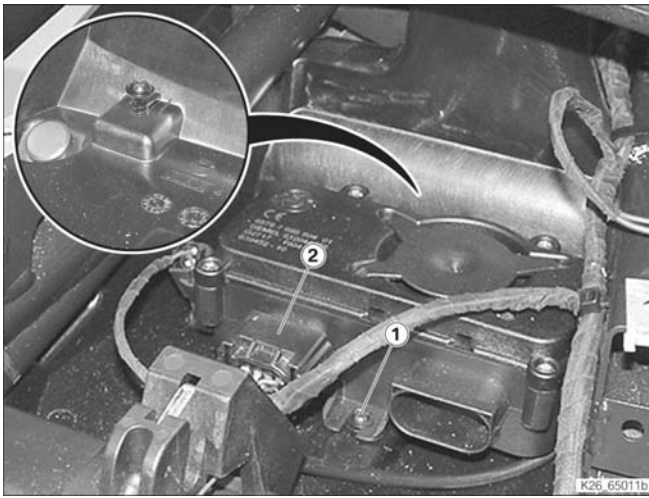
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



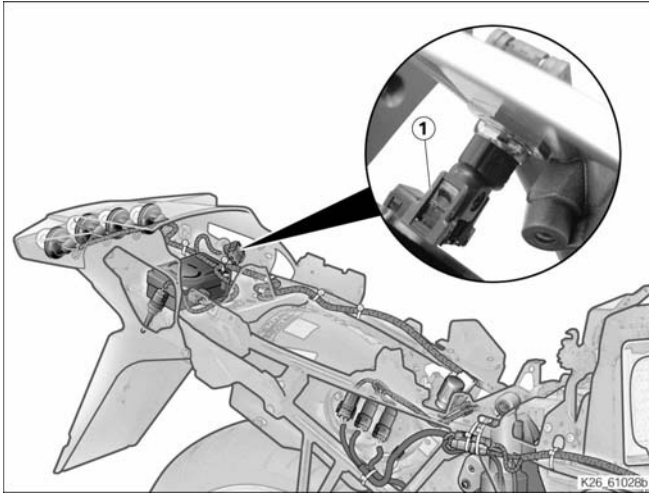
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

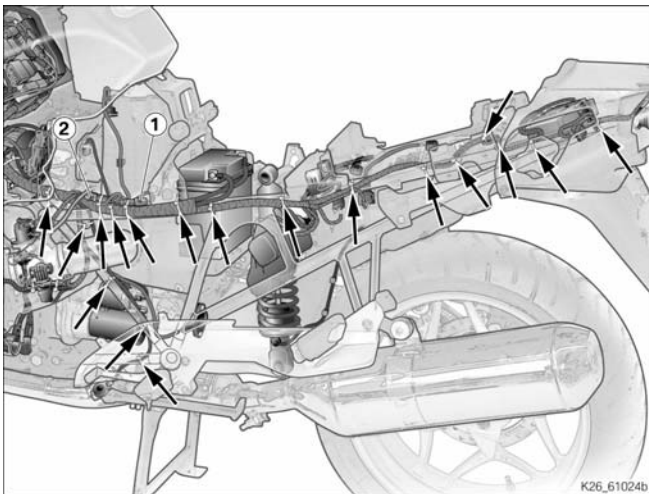


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.

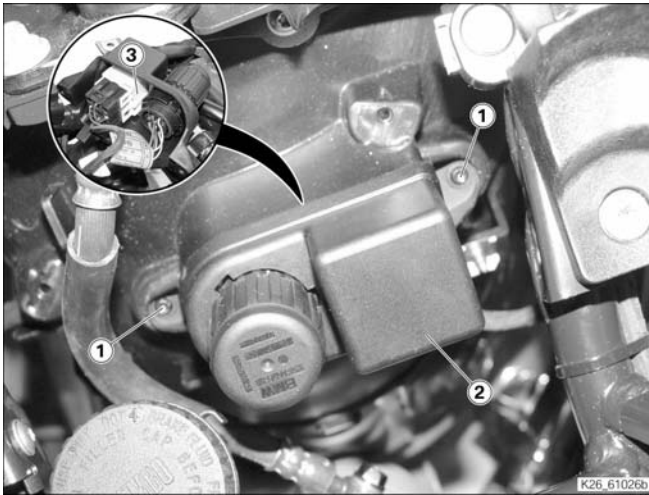
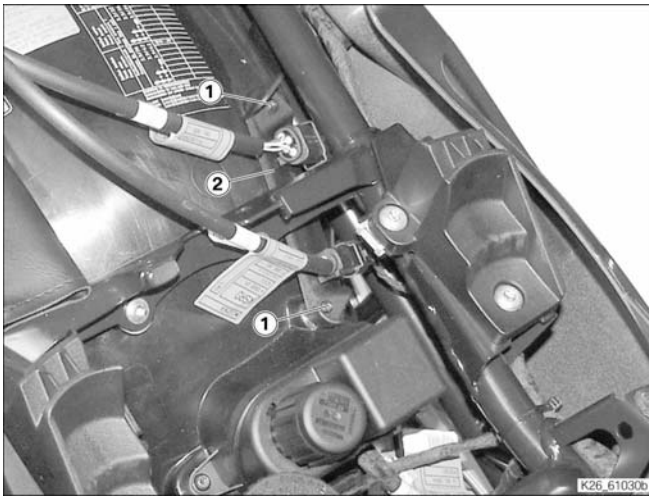


- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.

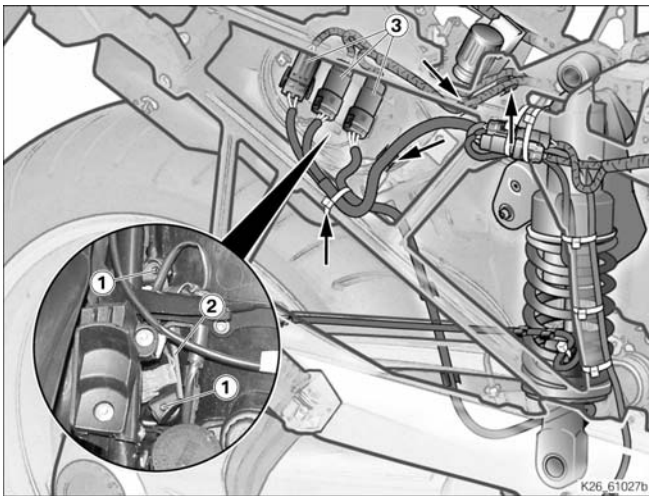


Variant, Seat heating

- Remove screws (1).
- Pass holder (2) forward with the cables.

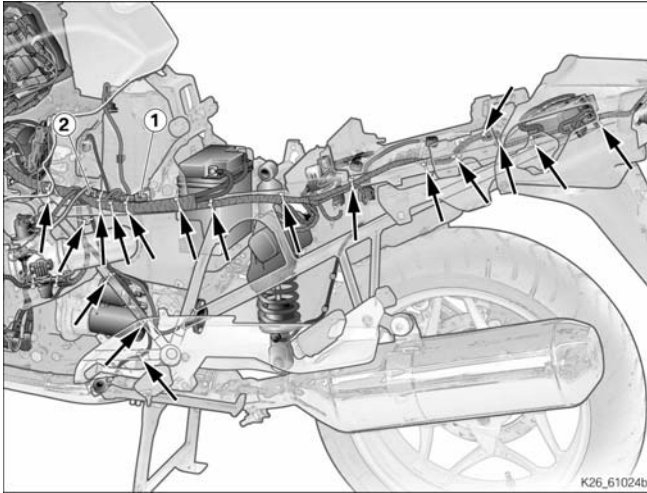
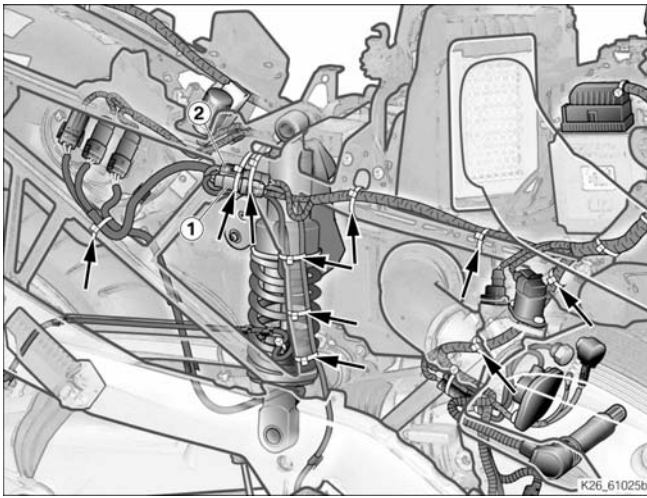


- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.



Variant, ESA

- Remove screws (1).
 - Pass holder (2) forward with the cables.
 - Disconnect plug (3) of the spring strut.
-
- Disconnect plug (1) of the speed sensor.



- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.

(-) Removing rear section of motorcycle



- Open hose clip (1).
- Disconnect the hose from the intake air silencer.

- Secure the front wheel on the lifting platform.
- Using straps, secure the rear section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.



► **Releasing threaded fastener on rear frame**

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.

! **Attention**

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

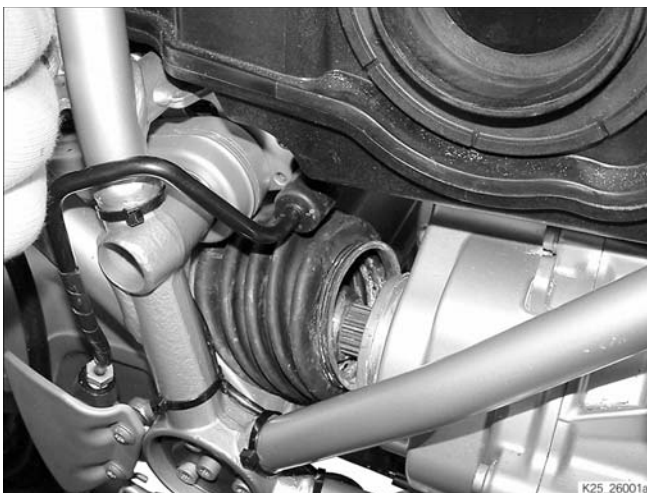
Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

Apply masking tape to the part of the swinging arm that could be damaged.

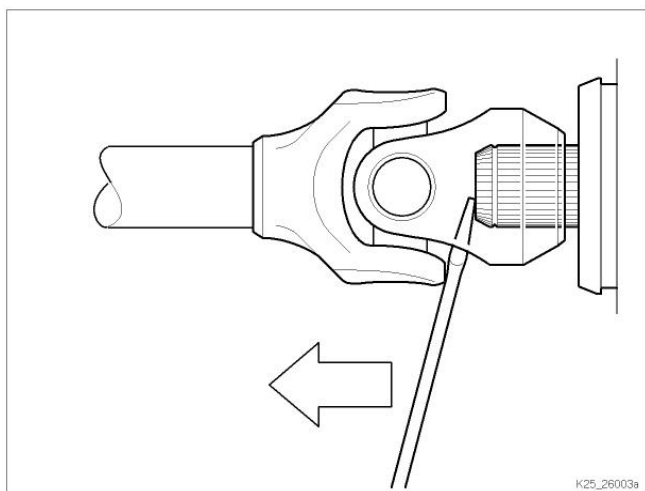
- Slacken screw (4), but do not remove it at this point.

▷ **Pressing universal shaft off gearbox output shaft**

- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.



- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the



shaft in this position.

- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Remove screw (4).



- Thread the fuel-tank breather hose out of the rear frame.
- Disconnect the fuel pressure regulator from the intake air silencer.
- Using crane (No. 46 5 671), (No. 46 5 672), (No. 46 5 673), (No. 46 5 674), carefully lift the rear section clear of the motorcycle, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.



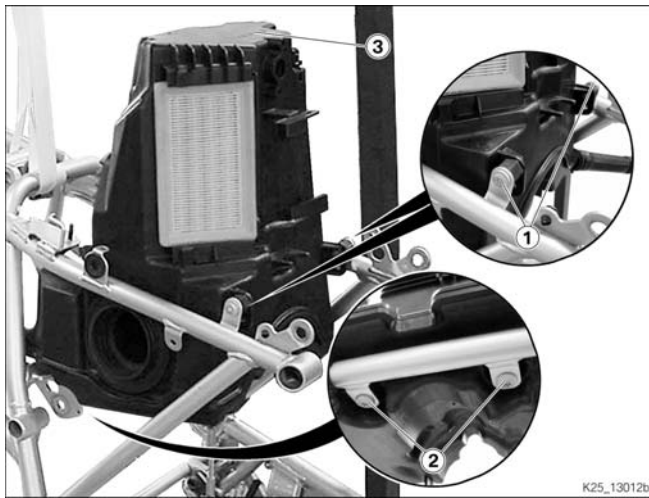
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



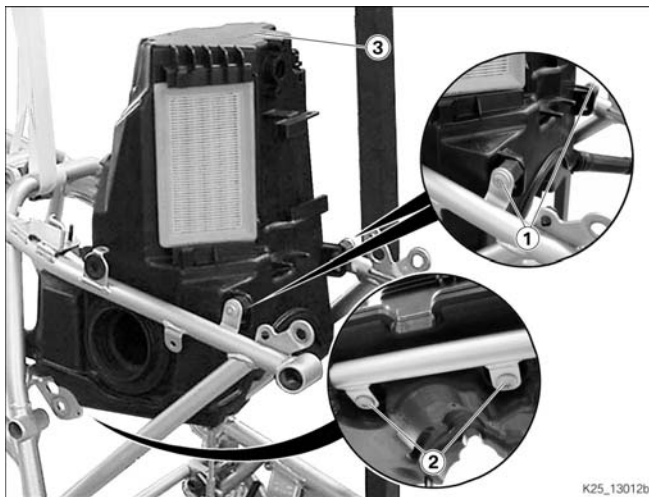
- Pass the control-circuit line with the brake master cylinder forward out of the way.
- Carefully set down the rear section where it will not be damaged.

(-) Removing intake air silencer




- Remove screws (1).
- Remove screws (2).
- Pull intake air silencer (3) up and forward to remove.


(-) Installing intake air silencer



- Install intake air silencer (3).
- Install screws (2).


 Tightening torques		
Airbox to rear frame, M6	8 Nm	

- Install screws (1).

 Tightening torques		
Airbox to rear frame, M6	8 Nm	

(-) Installing rear section of motorcycle

- Remove dirt and old lubricant from the splines of the gearbox output shaft.
- Lubricate the splines of the gearbox output shaft.

 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

- Carefully manoeuvre the rear section of the motorcycle into position at the front section, making sure that the wiring harness is correctly positioned.
- Mate the universal shaft with the gearbox output shaft and align the rear frame with the anchorages.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have




to be disassembled in order to permit reinstallation of the universal shaft.

- Carefully turn the rear wheel to check that the universal shaft is still correctly positioned.
- Position the fuel pressure regulator on the intake air silencer.



► **Securing rear frame to motorcycle**

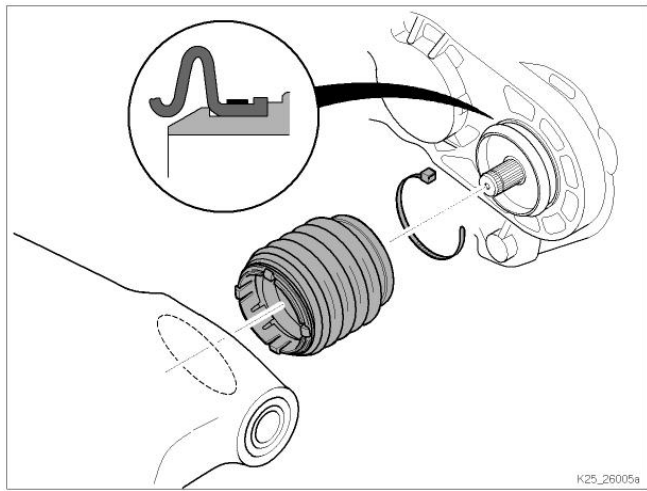
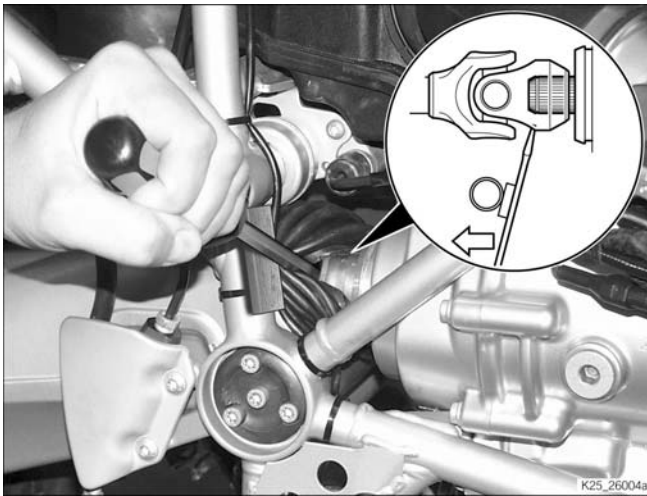
- Install screw (4), but do not tighten it at this point.
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert screws (1) on left and right.
- Tighten screw (4).
- Tighten screws (1), (2) and (3).

 Tightening torques		
Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	



► **Pressing universal shaft onto gearbox output shaft**

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.



Consumables/lubricants

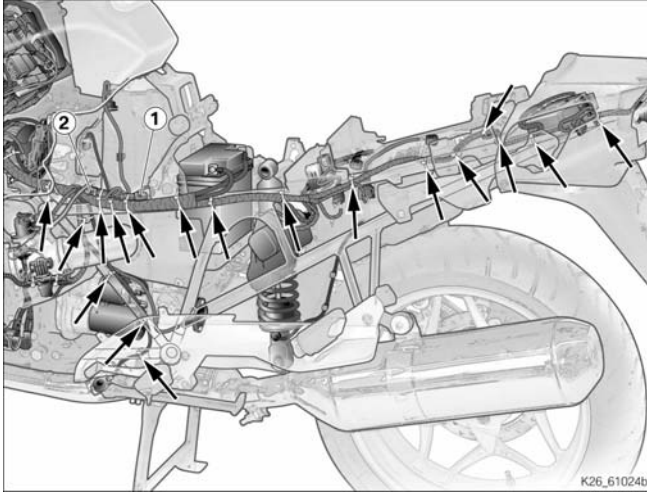
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174
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- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.

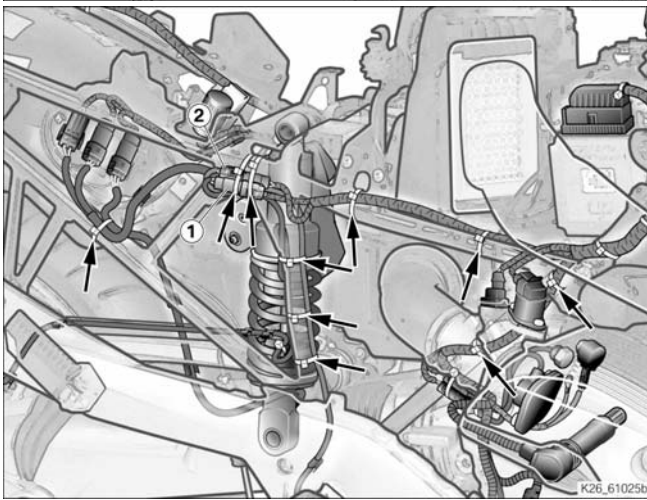
- ◀
- Release the straps securing the front wheel and disengage crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) with the straps from the rear section of the motorcycle.
- Release the control-circuit line complete with the brake master cylinder and pass it through to the rear.
- Route the fuel-tank breather hose into position along the rear frame.
- Connect the hose of the crankcase breather to the intake air silencer.
- Slide hose clamp (1) into position.



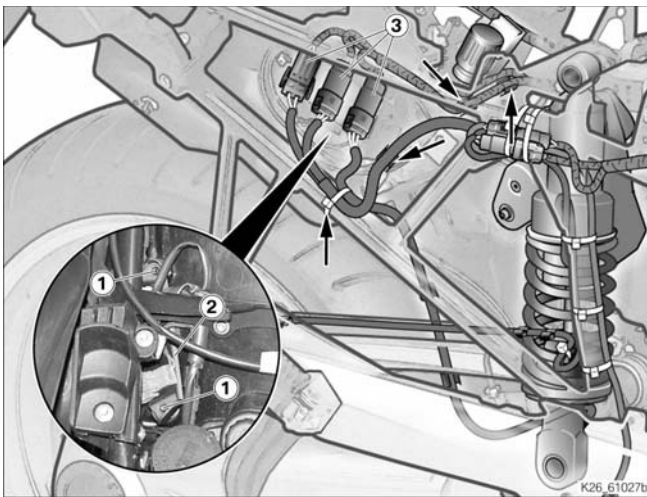
(-) Securing wiring harness at rear



- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.



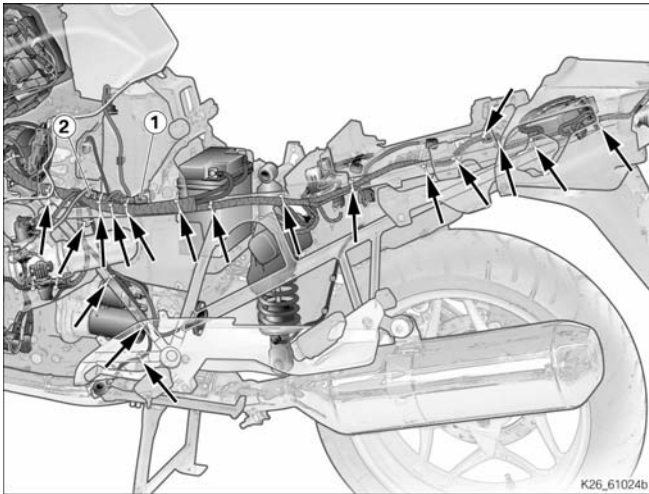
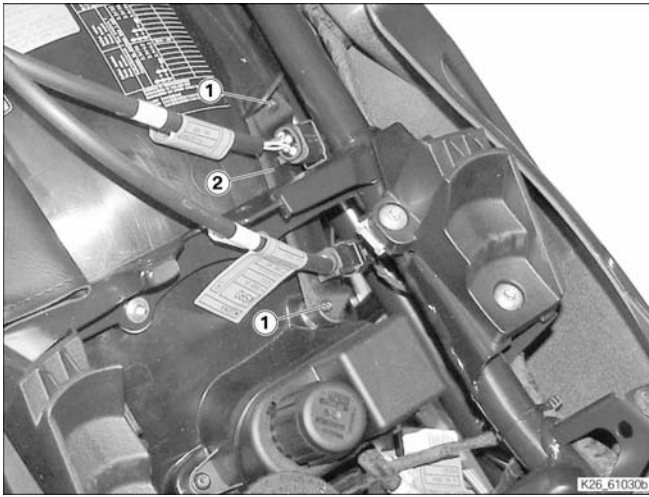
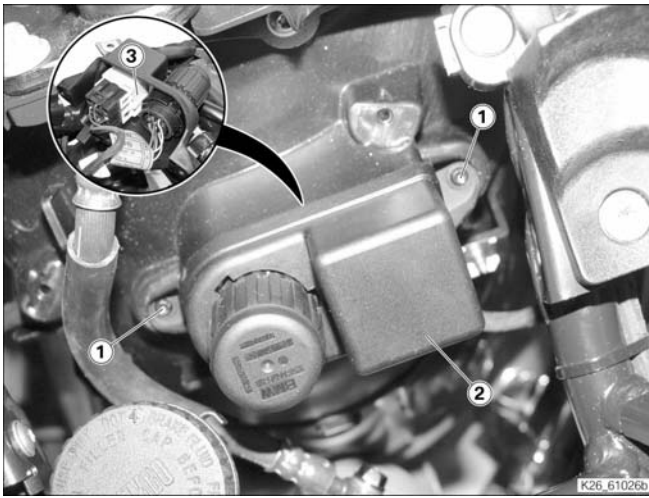
- Connect plug (1) of the speed sensor.



Variant, ESA

- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Secure holder (2) with screws (1).

- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).



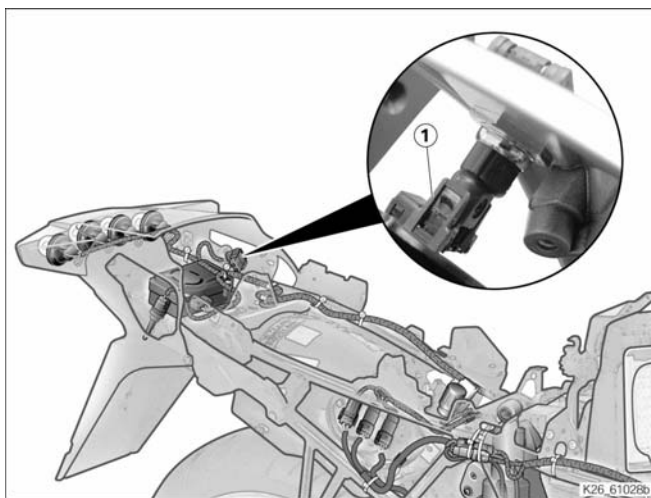
Variant, Seat heating

- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

- Secure the wiring harness to the rear frame with cable ties (arrows).

Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



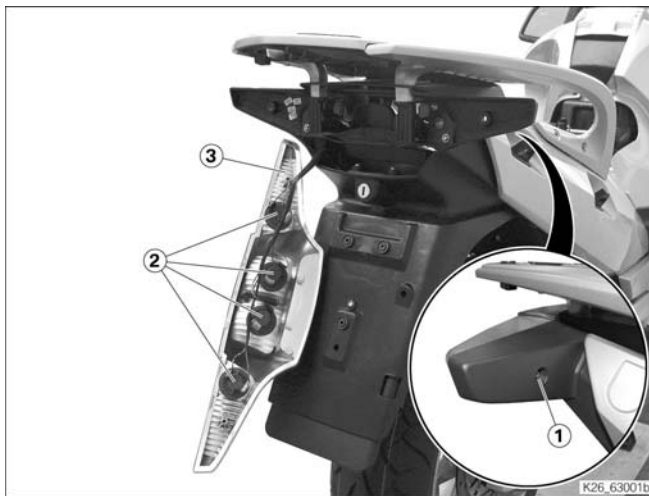
Variant, On-board computer

- Connect plug (1) of the temperature sensor.

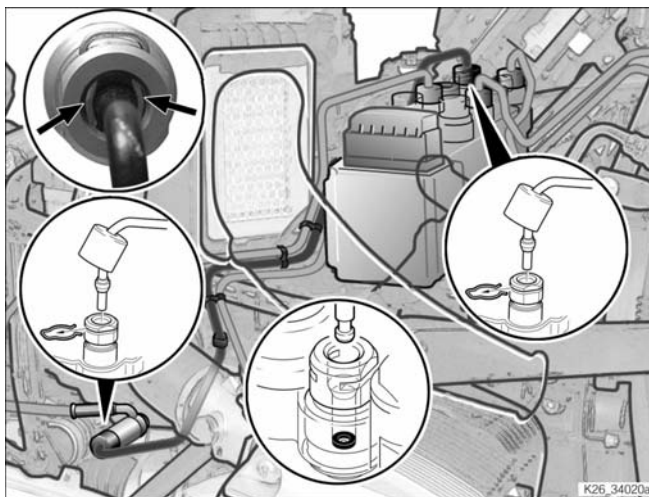


(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



(-) Connecting brake pipe for rear wheel circuit to pressure modulator



Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.



Warning

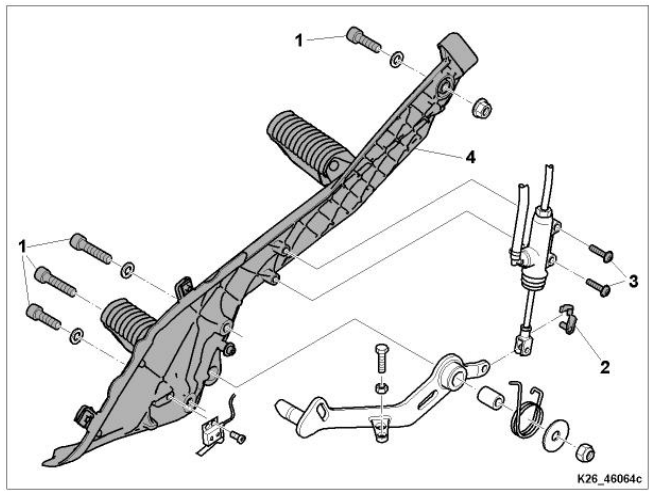
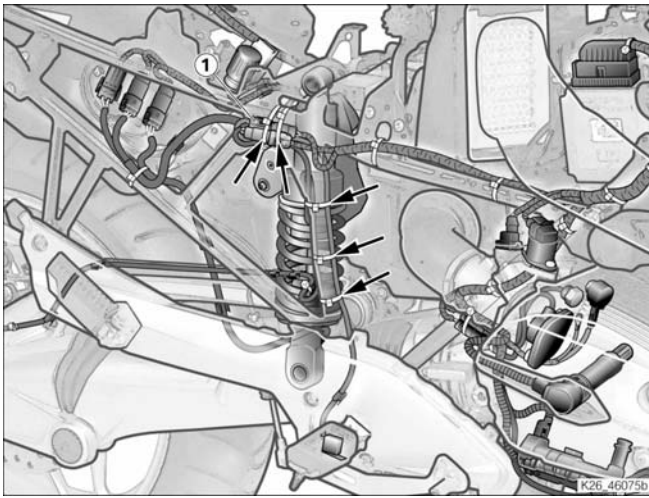
Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.


- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Installing right footrest plate


- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

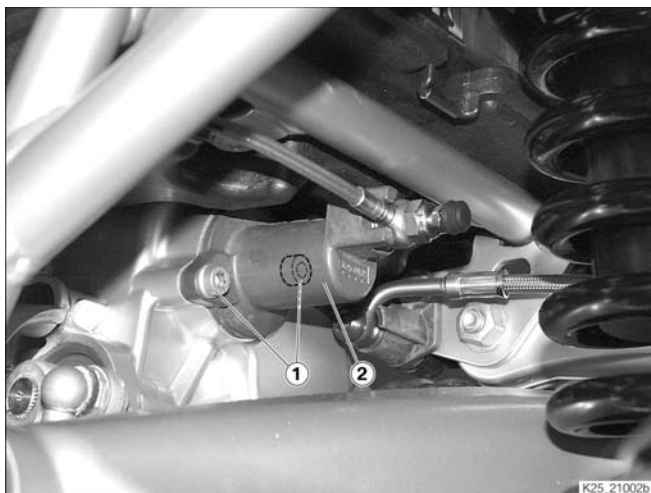
- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.

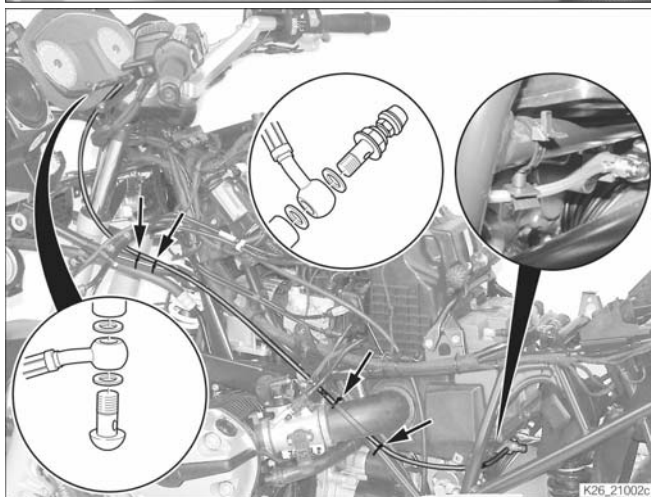


(-) Installing clutch slave cylinder



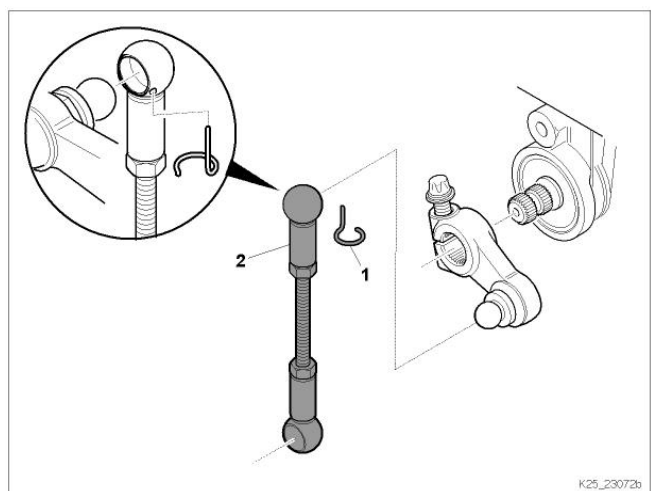
- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.

 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	




- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.

(-) Securing selector rod to shift lever



- Grease the ball head of the shift lever and the ball socket of selector rod (2).

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

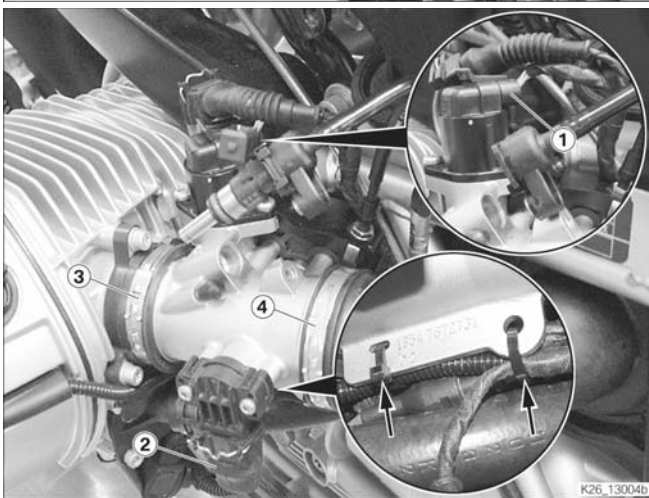
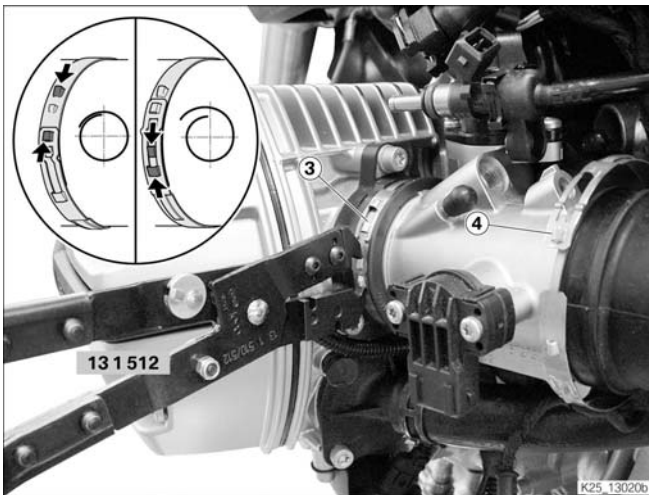
(-) Releasing throttle valve stub with cable divider

- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.



(-) Installing throttle-valve stub

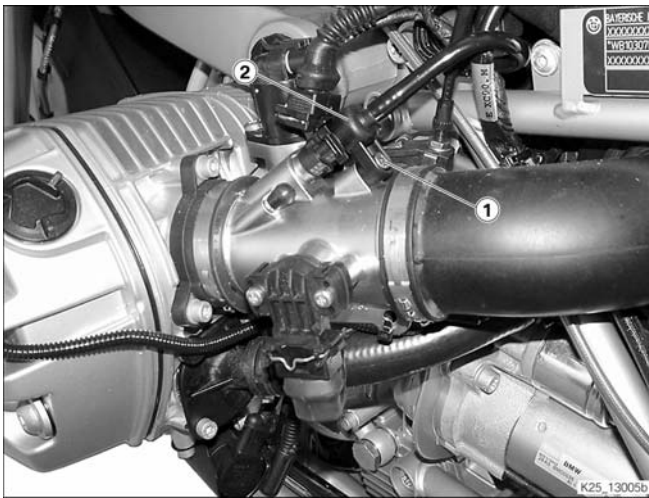
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .




- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing right and left injection valves

- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure

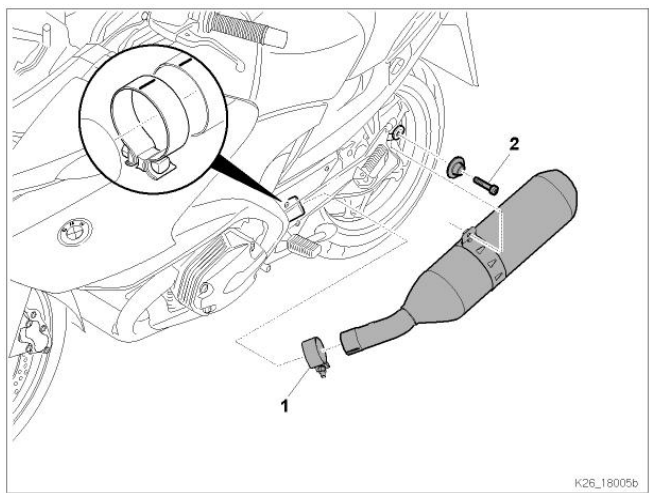


with screws (2).


 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.


(-) Installing silencer



- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

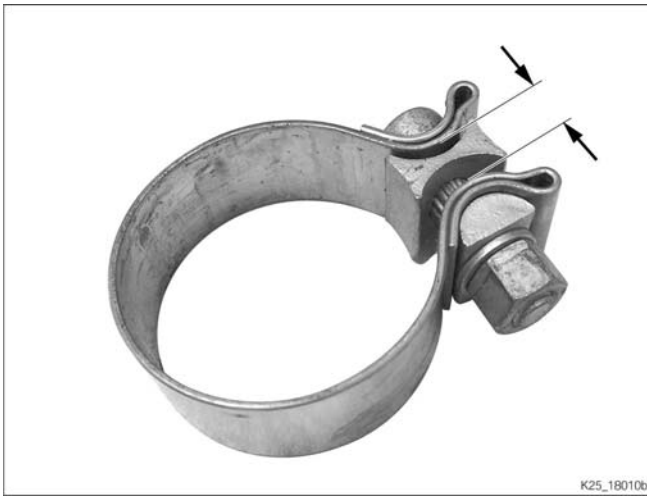
- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


► Checking Torca clamp on silencer

- Tighten the Torca clamp.



Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

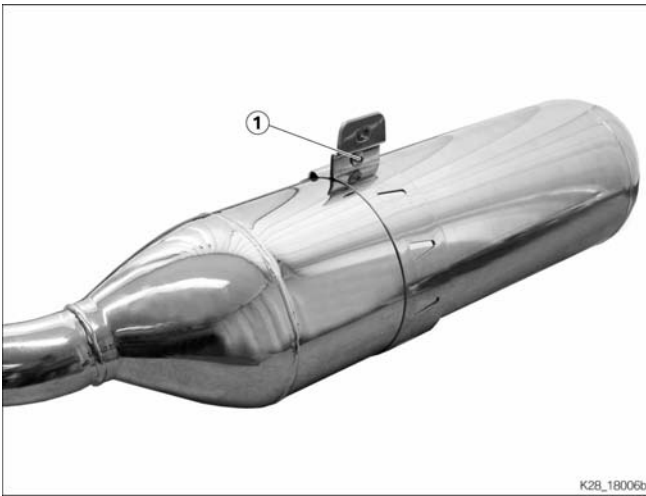


Attention


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.


Open the clamp far enough and grease it lightly.




- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

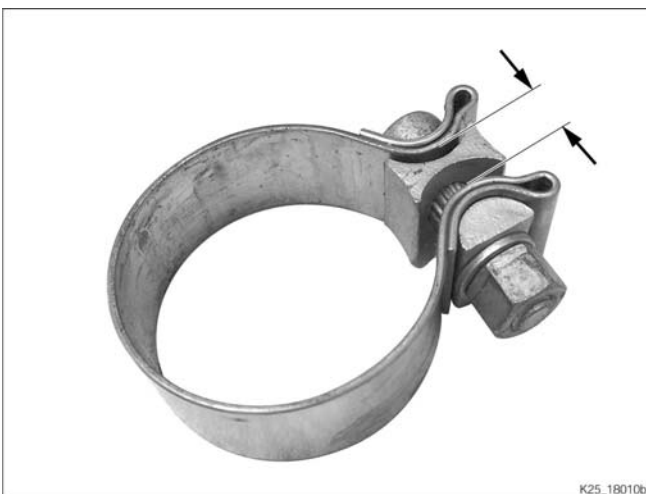



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.

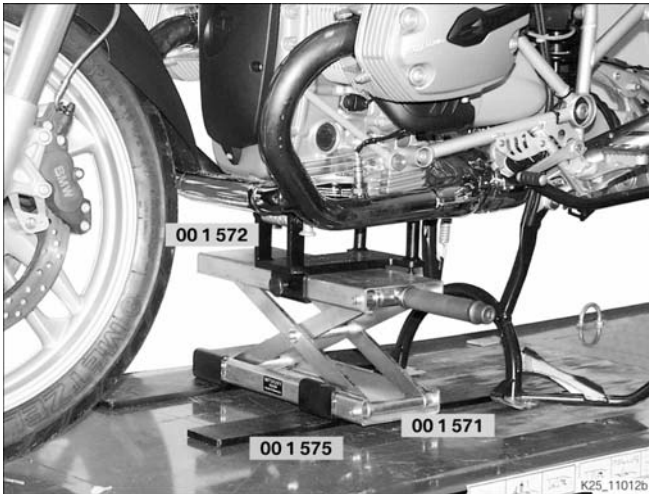


Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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(-) Removing engine stand



- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .

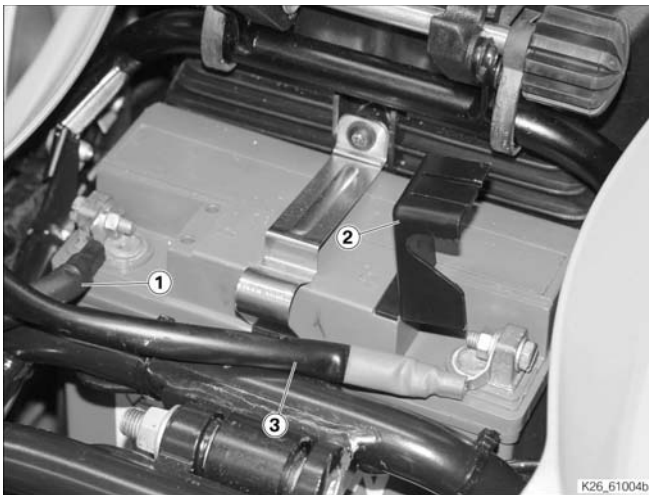
(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.



- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

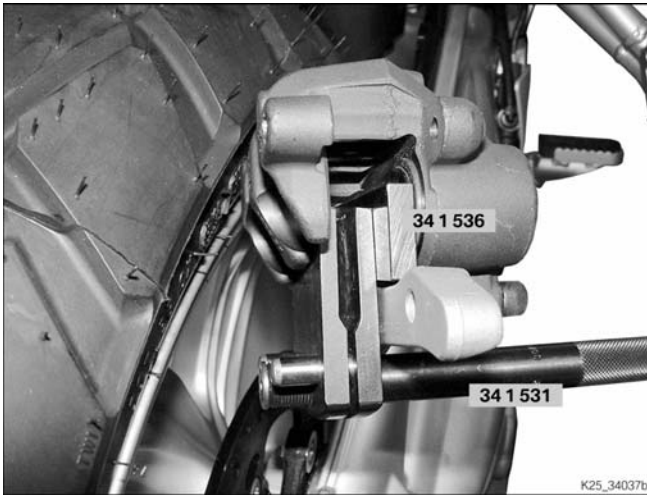


Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the


pressure modulator.



- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

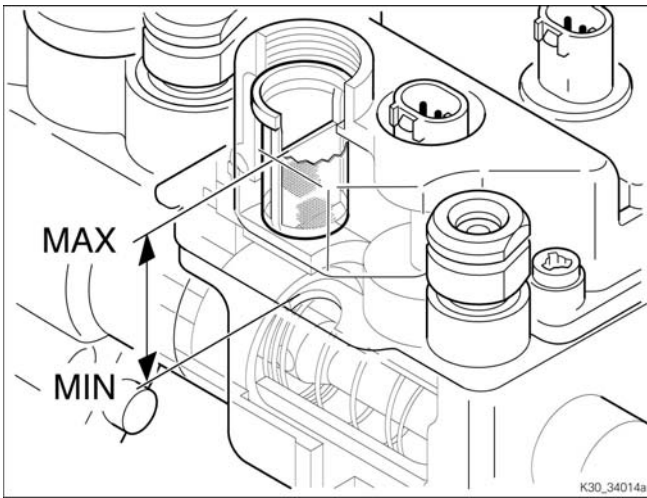
- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

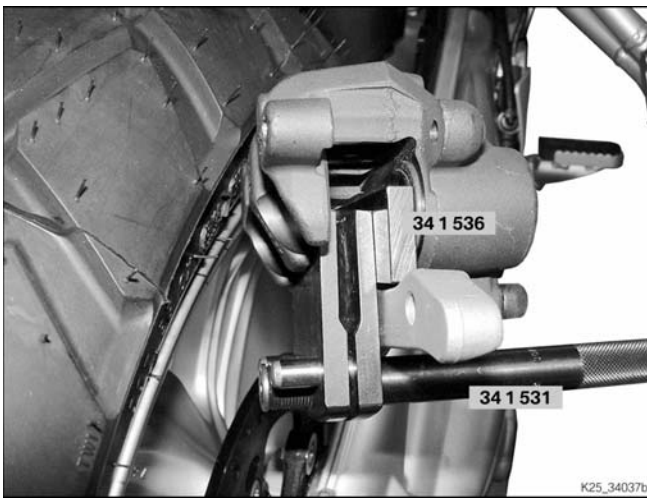
Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in



accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.



► **Instructions for filling rear wheel circuit reservoir**

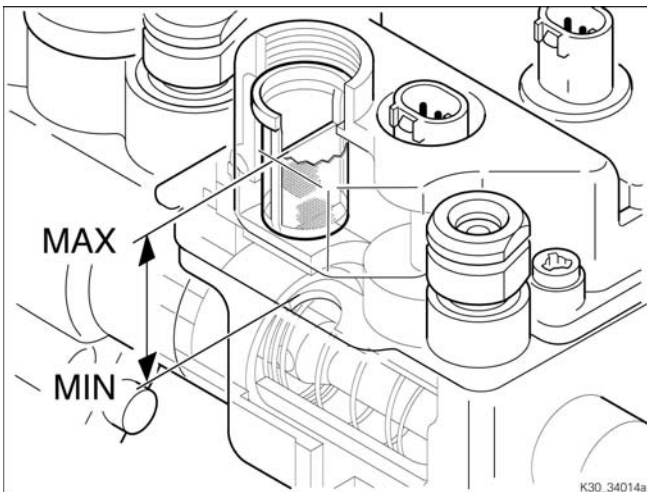
- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536) , in the rear brake caliper.



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.



- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.



Consumables/lubricants

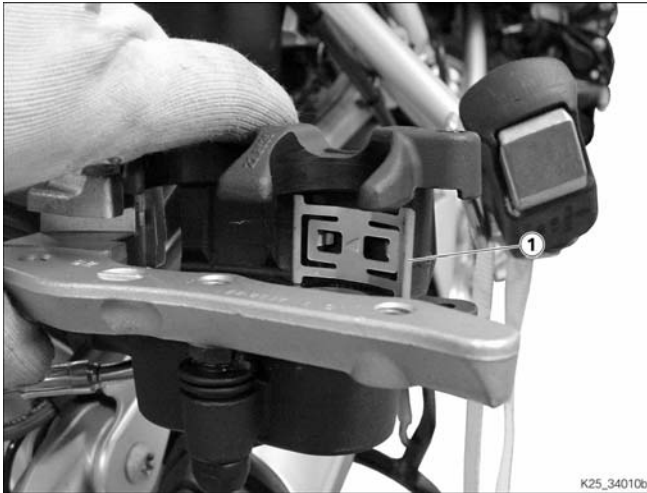
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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- Hand-tighten the cap of the rear wheel-circuit reservoir.

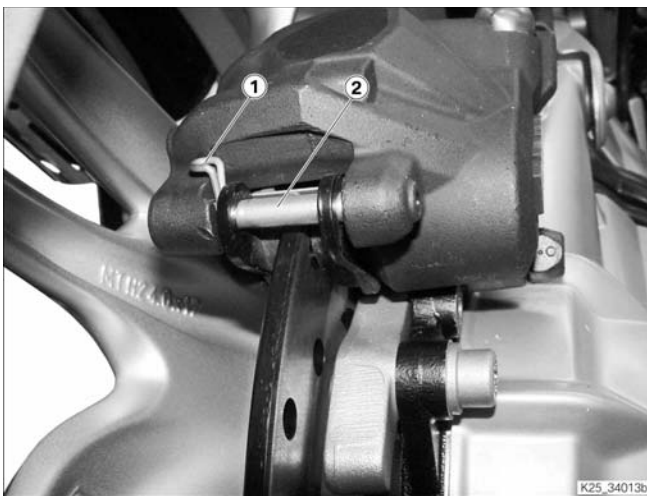
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary

▷ **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.
- » Arrow points in direction of travel.



K25_34010b



K25_34013b


- Install the brake pads.
- Manually install retaining pin (2).

▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).



K25_34034b

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

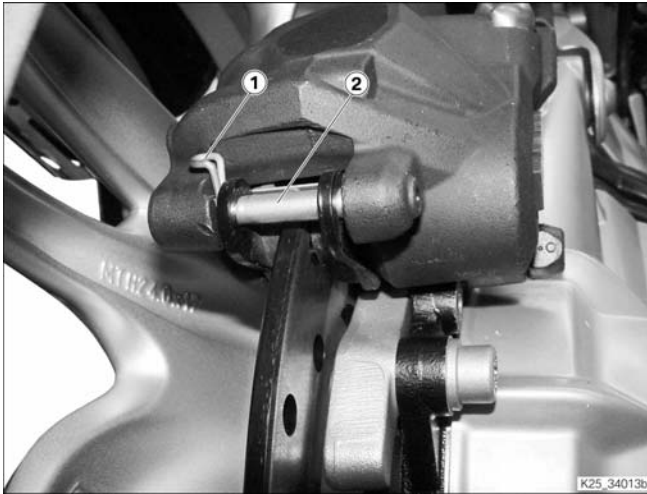
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



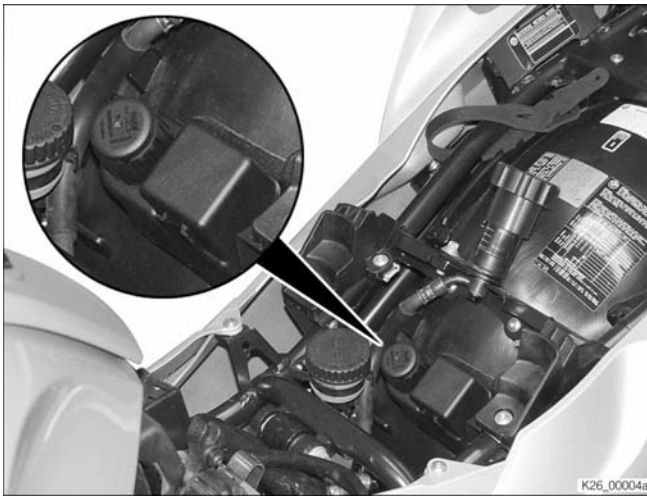
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.



- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



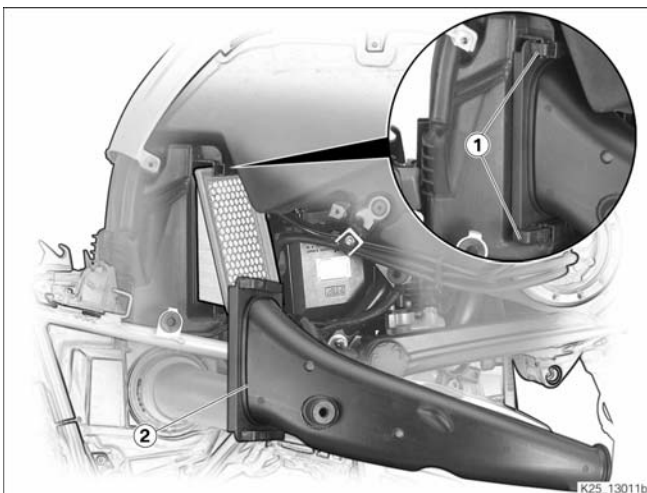
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

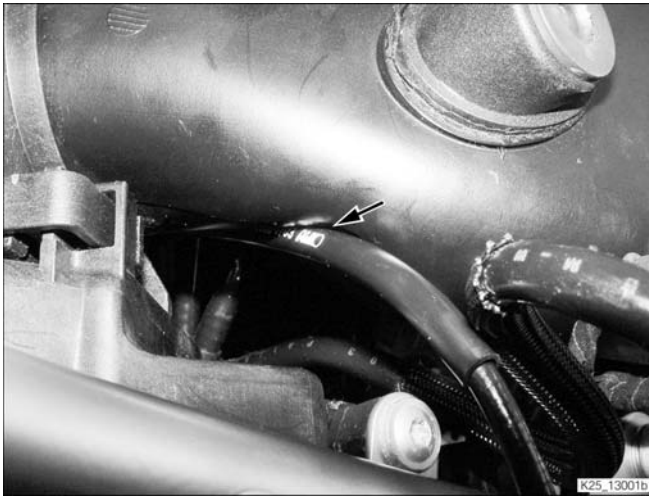
- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing intake air pipe



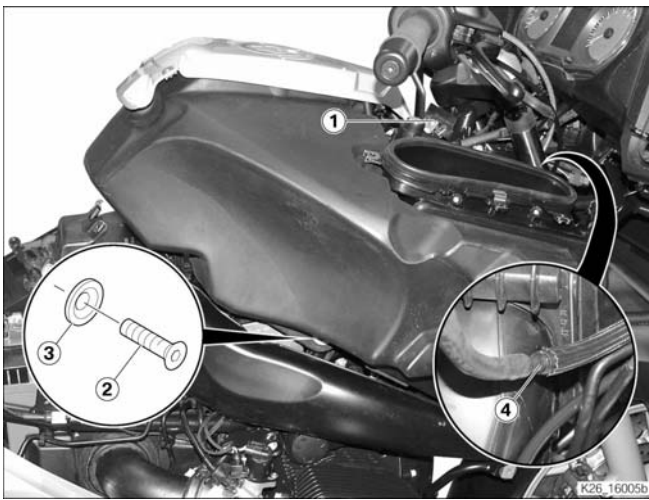
- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the



guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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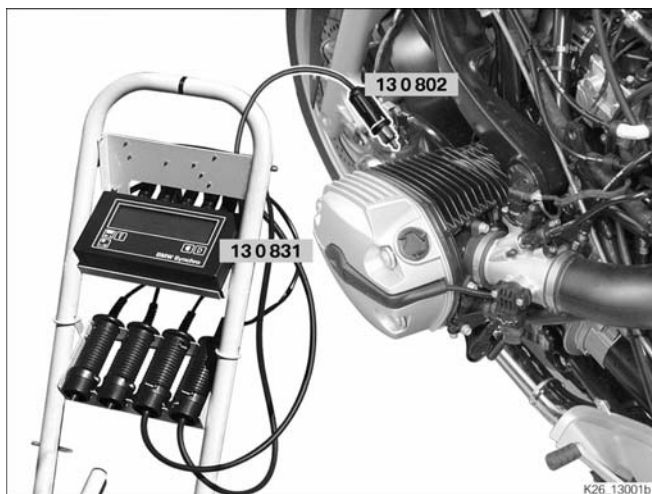
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

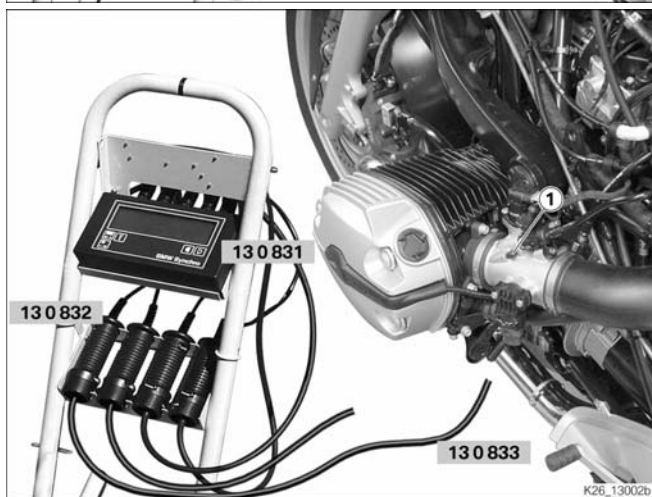
- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



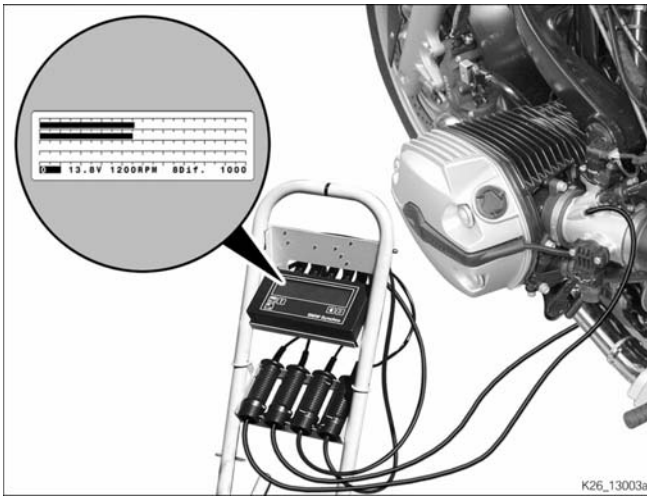
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions

issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

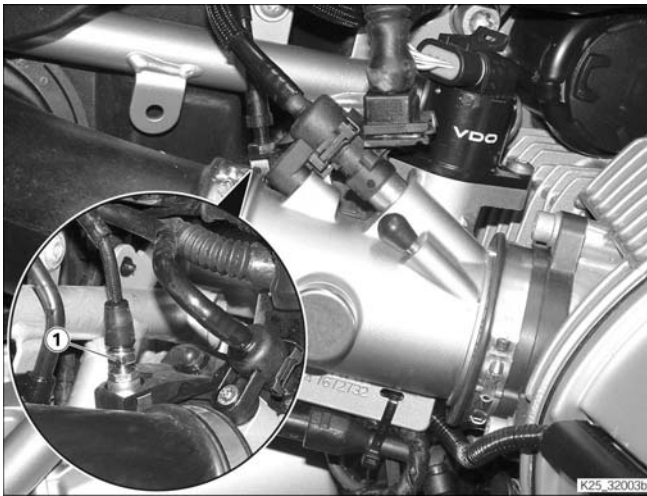
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.



» Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

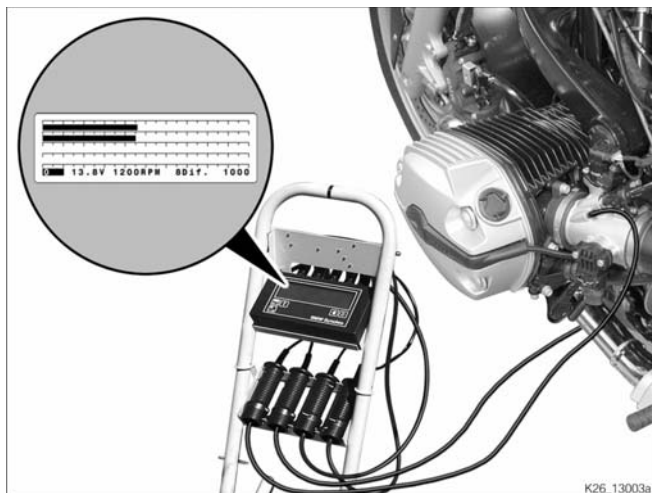
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.

- Disconnect the BMW Motorrad battery charger from the vehicle.

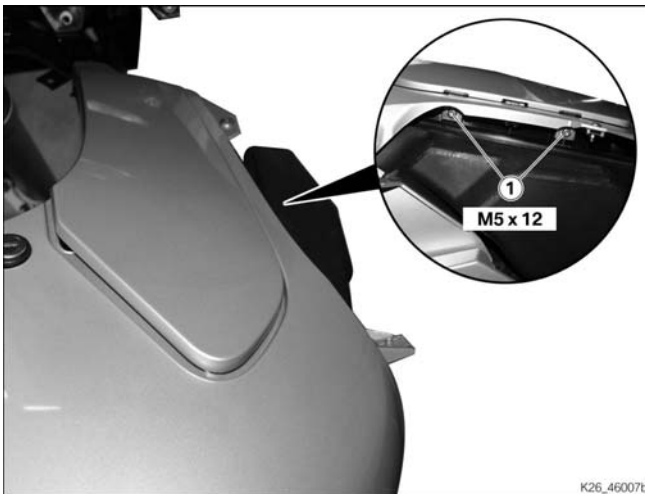
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



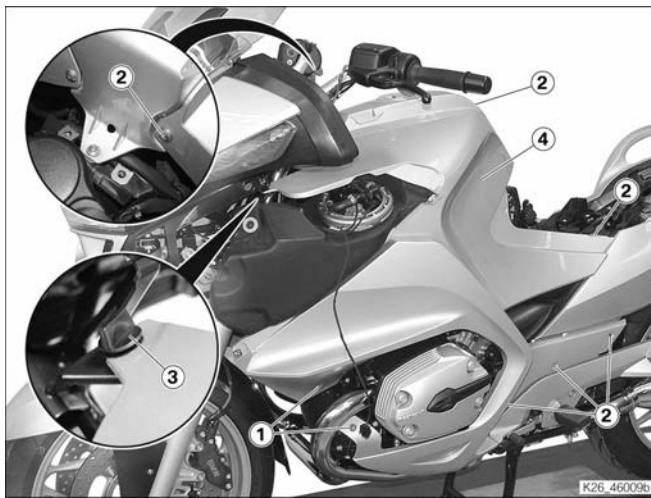
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).



- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **13 72 001 Replacing air filter element**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



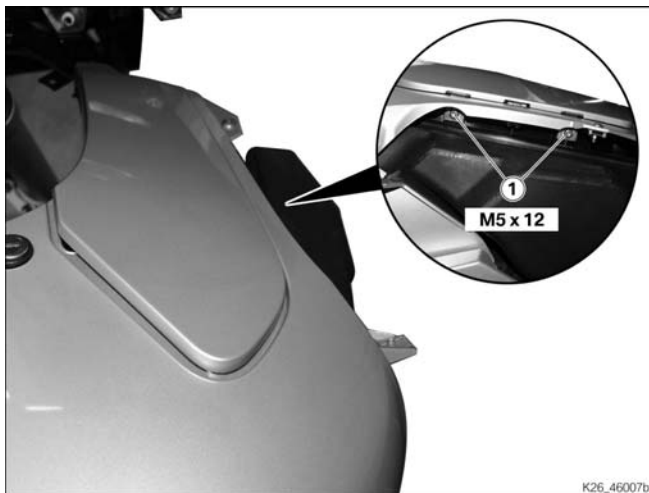
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



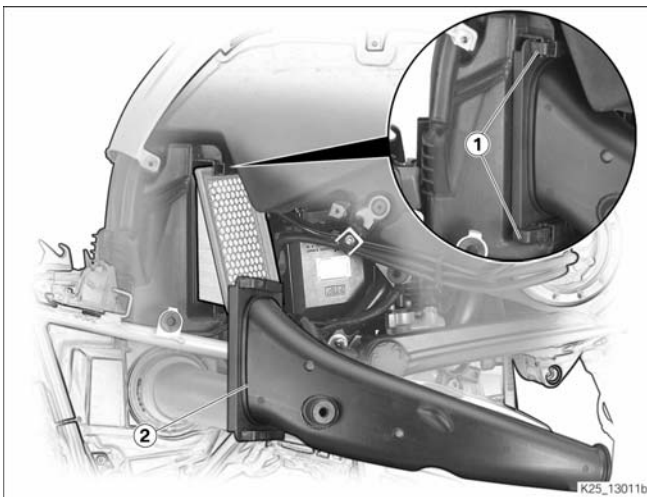
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



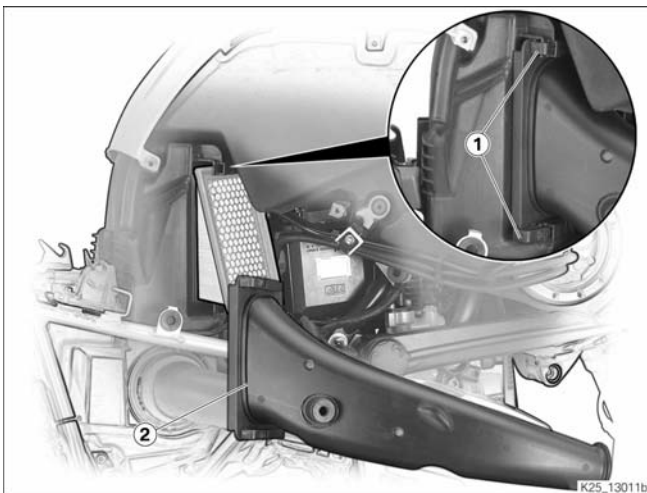
(-) Removing air filter

- Release both retaining clips (1) and remove.
- Remove intake air pipe (2).
- Pinch the old filter element together at the top in the air filter housing and pull it out.

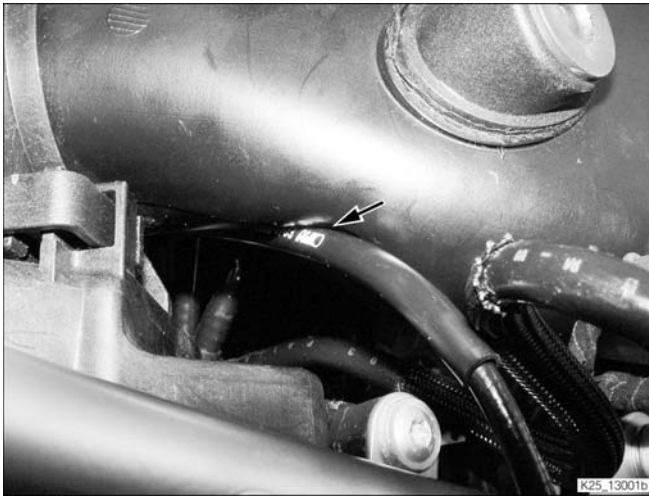


(-) Installing air filter

- Install the air filter.
- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.



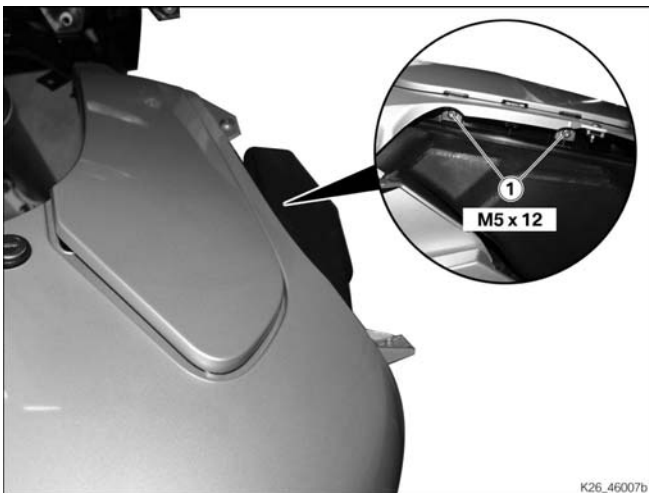
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **16 11 030 Removing and installing fuel tank**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

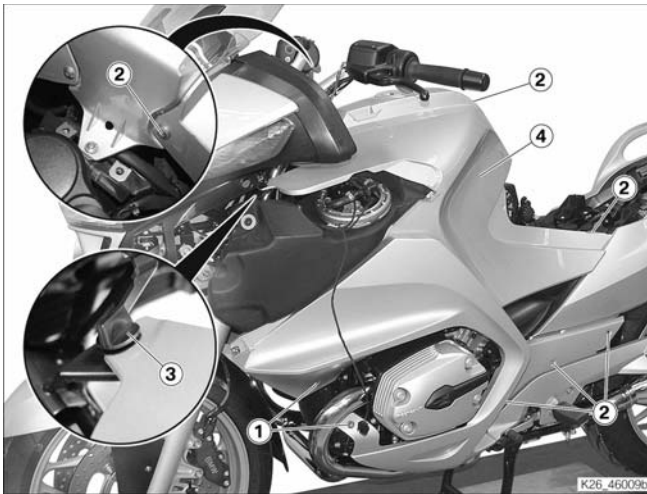


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

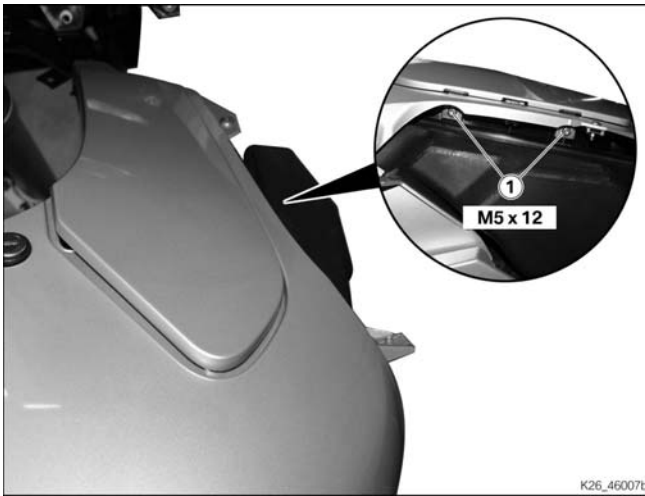
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



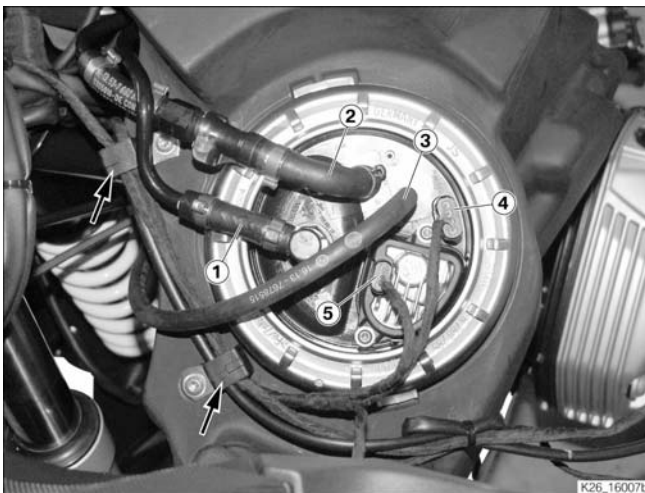
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

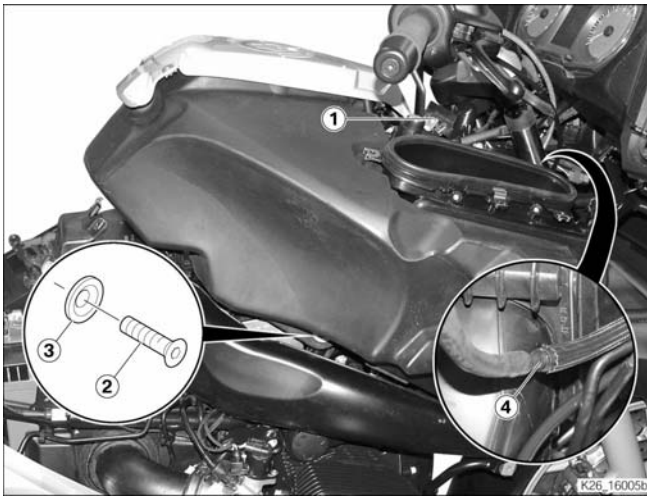


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

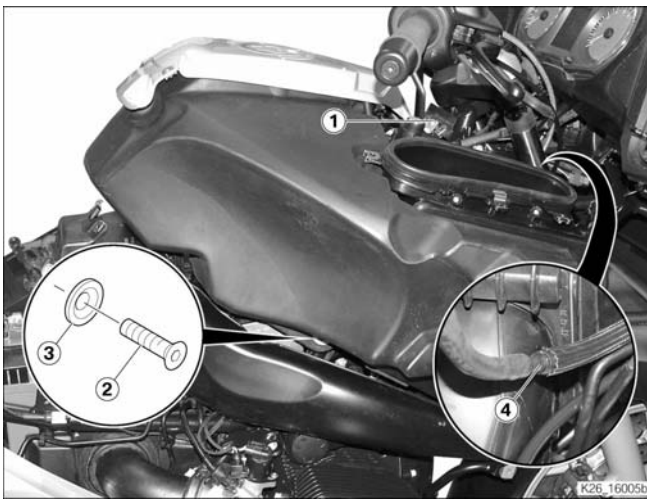



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



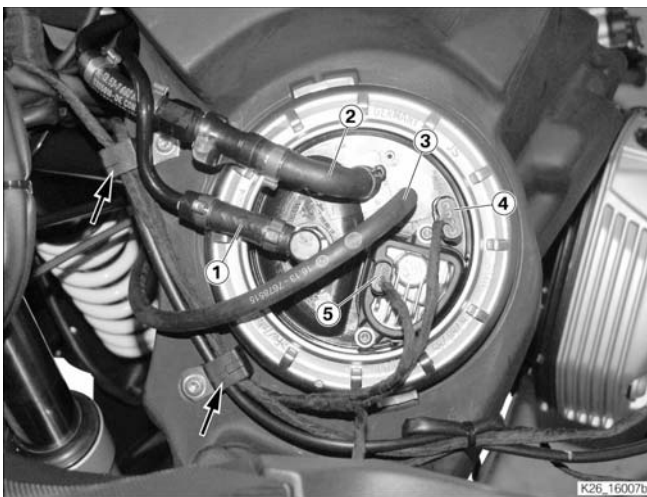
(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.



 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

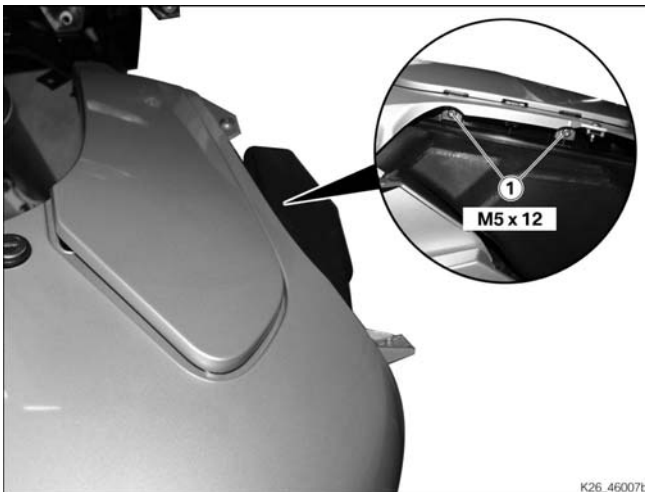
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

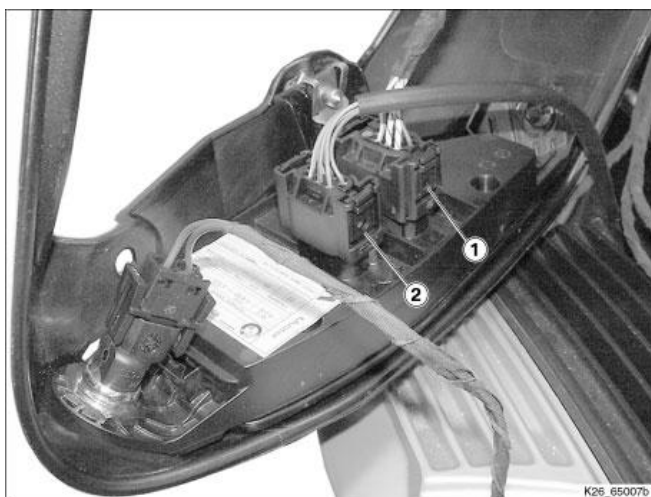
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

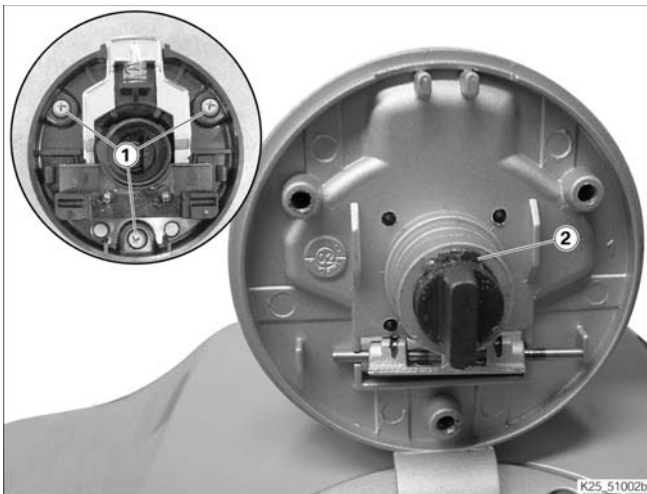
 **16 11 213 Replacing cap for fuel tank**



(-) Removing fuel tank cover

- Remove screws (1).
- Close off fuel filler pipe in fuel tank.
- Remove fuel tank cover.

(-) Replacing fuel tank cover

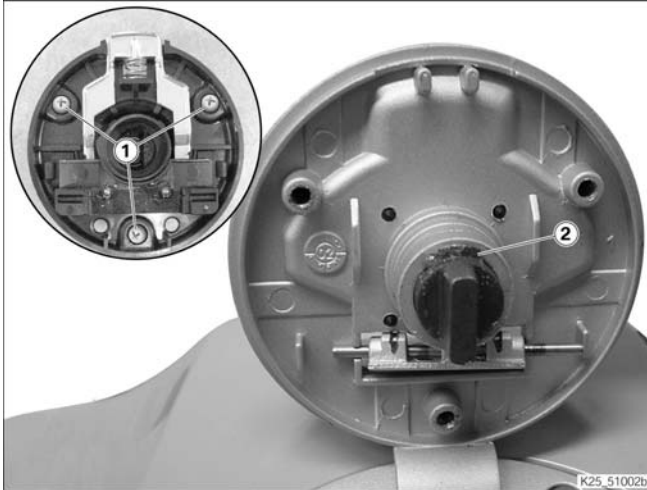


► Removing lock barrel for fuel filler cap

- Open the fuel filler cap.
- Lay a protective cover over the fuel tank filler opening.
- Remove 3 screws (1).
- Remove the bottom part of the fuel-tank cap.
- Push the key into the lock barrel.
- Press down retainer (2) and pull out the lock barrel with the key.



- Install striker (1) (with lug pointing toward the latch).
- Use a screwdriver to push the striker down and turn it counter-clockwise 90° until it engages.



► **Installing lock barrel for fuel filler cap**

- Grease the lock barrel.



Consumables/lubricants

Grease for lock cylinders	Lubricating grease	81 22 9 407 421
---------------------------	--------------------	--------------------

- Insert the lock barrel with the key into the lock until retainer (2) engages.
- Slip the bottom part of the fuel-tank cap into position and install screws (1).
- Remove the cover from the fuel-tank filler neck and close the tank cap.



(-) Installing fuel tank cover

- Remove cap from fuel filler neck.
- Make sure that the seal is seated correctly under the fuel filler neck.
- Place fuel tank cover in position, fit screw (1) and evenly tighten crosswise.



 **16 11 222 Replacing safety valve**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



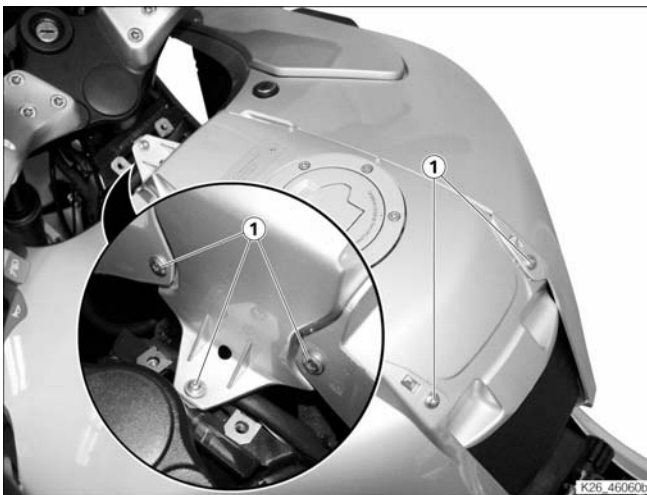
(-) Removing fuel tank cover

- Remove screws (1).
- Close off fuel filler pipe in fuel tank.
- Remove fuel tank cover.

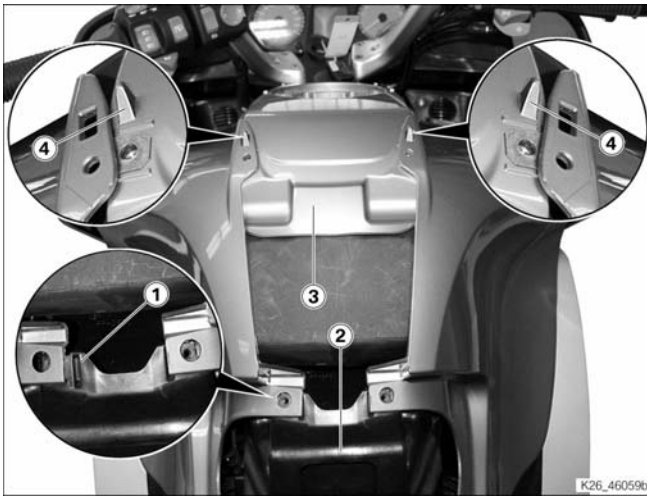


(-) Removing centre fuel-tank cover

- Remove screws (1).



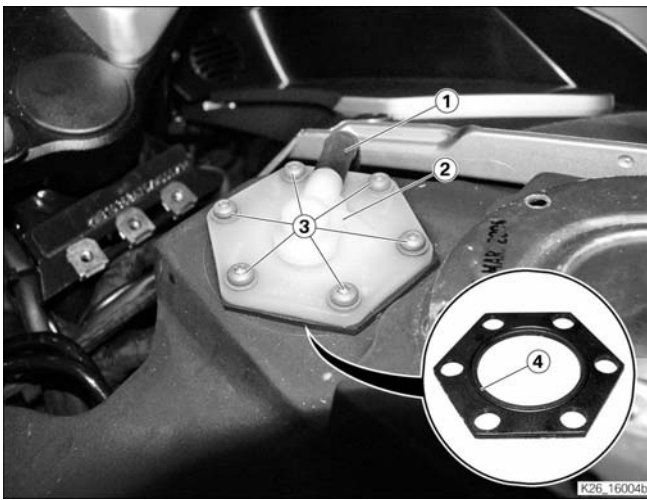
- Disengage locating lug of left-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Disengage locating lug of right-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing



it down, noting panel lug (4).

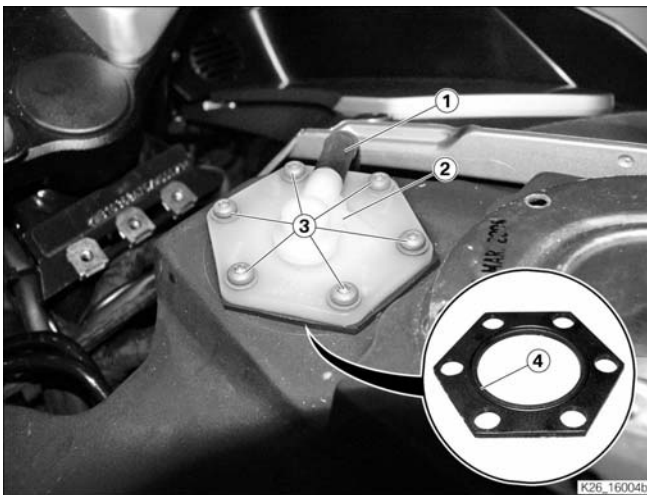
- Pull middle tank cover (3) in forward direction and remove.

(-) Removing safety valve



- Disconnect hose (1) from safety valve (2).
- Remove screws (3).
- Remove safety valve (2) together with seal (4).

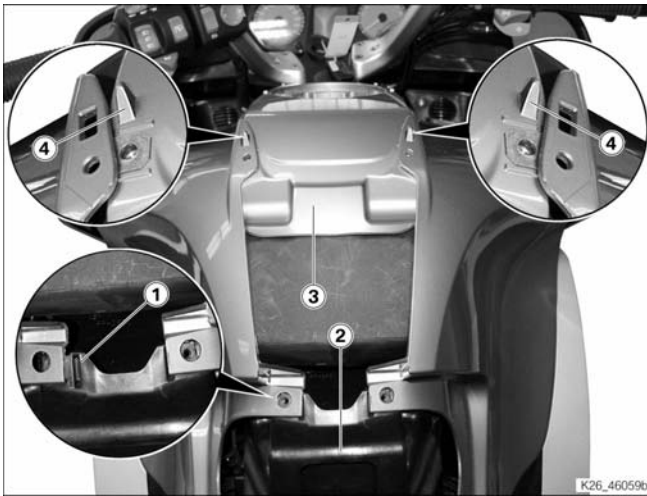
(-) Installing safety valve



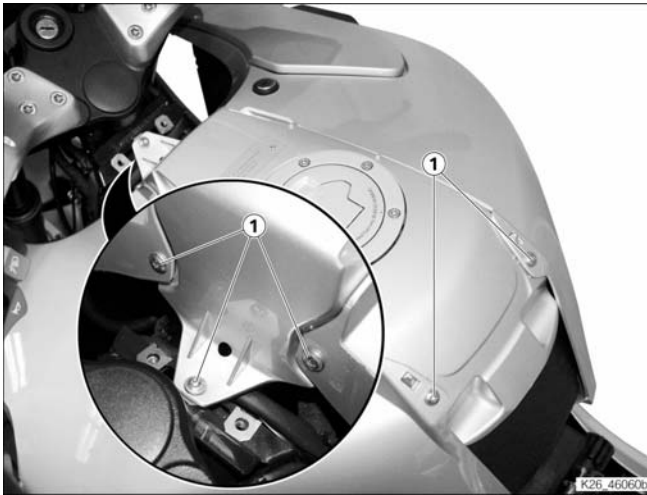
- Check gasket (4) for damage. Replace the gasket if it is swollen or damaged.
- Fit safety valve (2) together with seal (4).
- Install screws (3).
- Connect hose (1) to safety valve (2).

(-) Installing middle tank cover

- Fit middle tank cover (3) aligned in forward direction.
- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the right-hand tank cover in groove (1) of seat bracket (2).



- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the left-hand tank cover in groove (1) of seat bracket (2).



- Install screws (1).

(-) Installing fuel tank cover

- Remove cap from fuel filler neck.
- Make sure that the seal is seated correctly under the fuel filler neck.
- Place fuel tank cover in position, fit screw (1) and evenly tighten crosswise.



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **16 11 531 Replacing fuel tank (fuel tank removed)**

(-) Replacing fuel tank

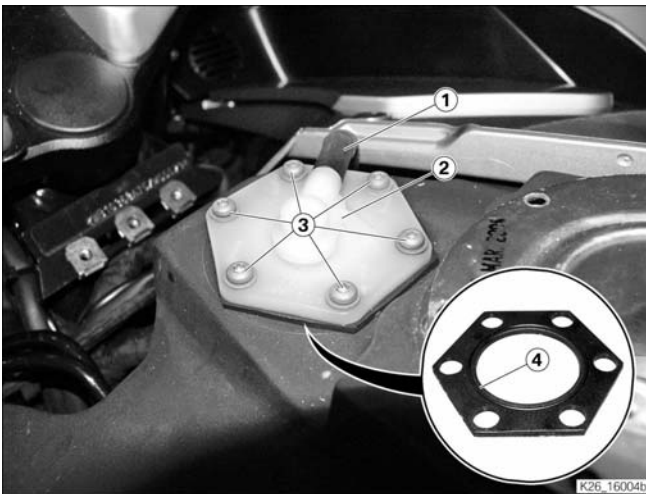
► Disassembling fuel tank

▷ Removing fuel tank cover

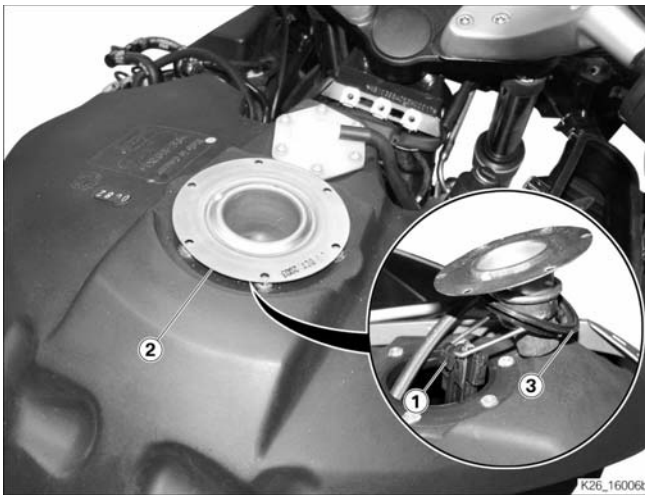
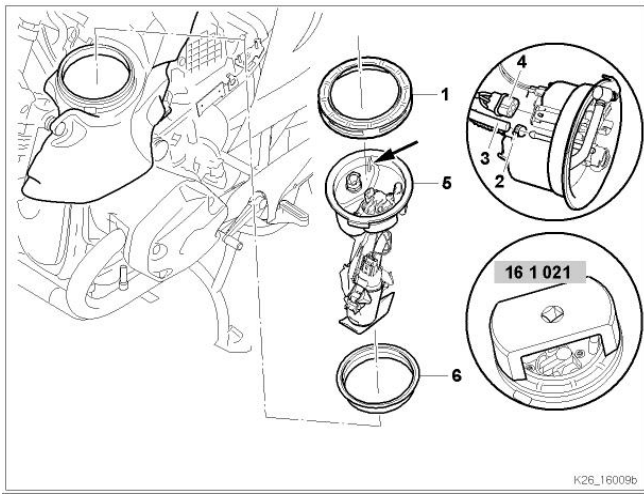
- Remove screws (1).
- Close off fuel filler pipe in fuel tank.
- Remove fuel tank cover.



- Remove the centre fuel-tank cover.
- Remove screws (3).
- Remove safety valve (2) together with seal (4).



- Remove union nut (1) with wrench for fuel-tank ring (No. 16 1 021).
- Lift off the pump flange; if necessary pry it off at the lug (arrow).
- Open clip (2) and disconnect hose (3).
- Disconnect plug (4).
- Remove fuel pump unit (5) with seal (6) from fuel tank.



▷ **Removing fuel-level sensor**

- Lift filler neck (2).
- Disengage fuel-level sensor (1) from filler neck (2).
- Lift out fuel-level sensor (1).



- Remove the filler neck with hose and gasket.



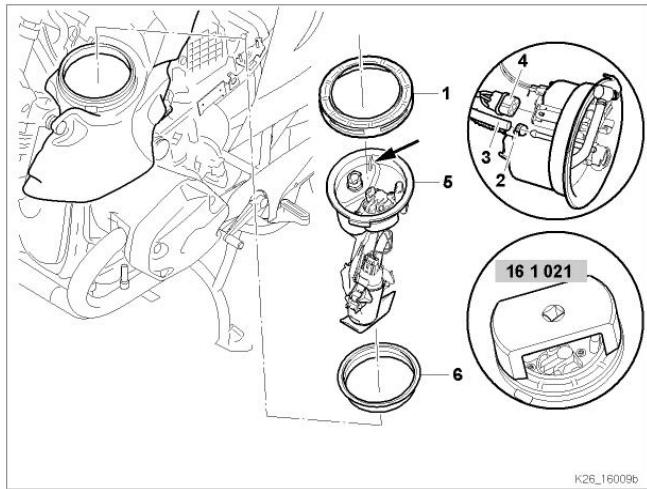
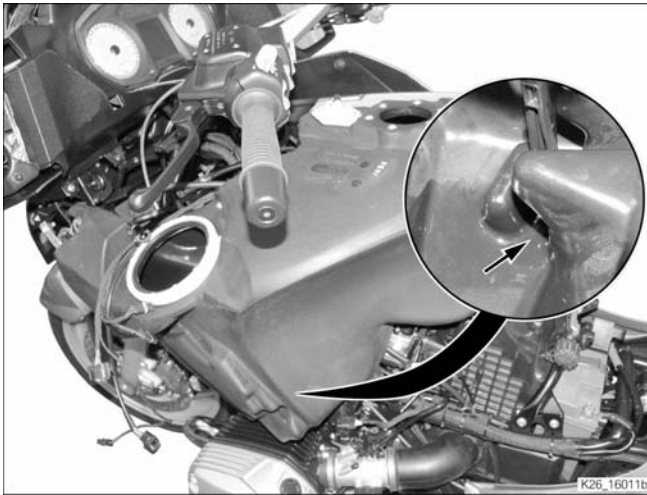
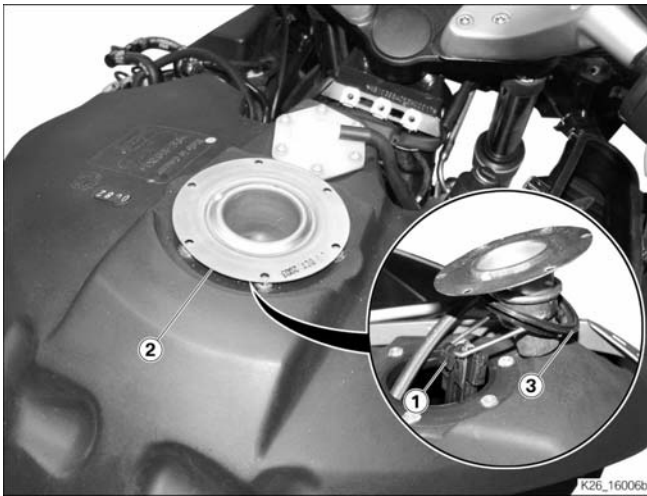
- Remove the old fuel tank and install a new fuel tank.
- Remove reusable small items from the old fuel tank and install them on the new fuel tank.

▶ **Assembling fuel tank**

- Install the filler neck with hose and gasket.

▷ **Installing fuel-level sensor**

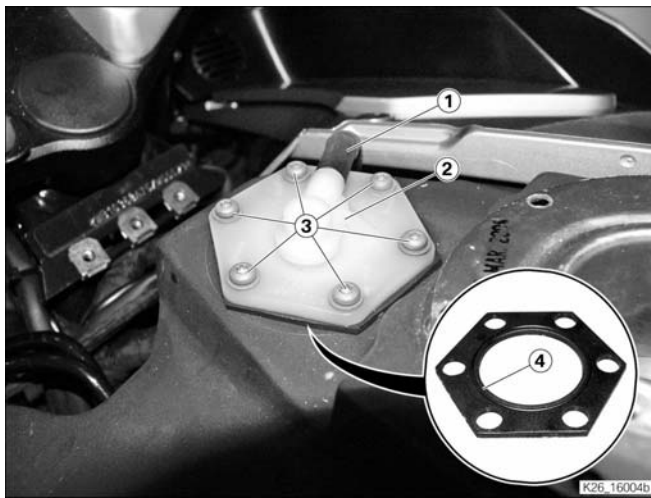
- Check sealing ring (3) for damage. Replace the sealing ring if it is swollen or damaged.
- Engage fuel-level sensor (1) in filler neck (2).



- Lower the fuel-level sensor and filler neck into the fuel tank, making sure that the fuel-level sensor engages the bottom guide (arrow) of the fuel tank.
- Make sure that the seal is seated correctly under the fuel filler neck.

- ◁
- Connect plug (4) to fuel pump unit.
 - Connect hose (3) and secure with clip (2).
 - Install fuel pump unit (5) in fuel tank, paying attention to seal (6).
 - Install union nut (1) with wrench for fuel-tank ring (No. 16 1 021) .

- Check gasket (4) for damage. Replace the gasket if it is swollen or damaged.
- Fit safety valve (2) together with seal (4).
- Install screws (3).



- Install the centre fuel-tank cover.

▷ **Installing fuel tank cover**



- Remove cap from fuel filler neck.
- Make sure that the seal is seated correctly under the fuel filler neck.
- Place fuel tank cover in position, fit screw (1) and evenly tighten crosswise.



 **16 12 008 Replacing fuel filter**

(-) Draining fuel tank



Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

- Drain the fuel tank, using commercially available special tool.

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

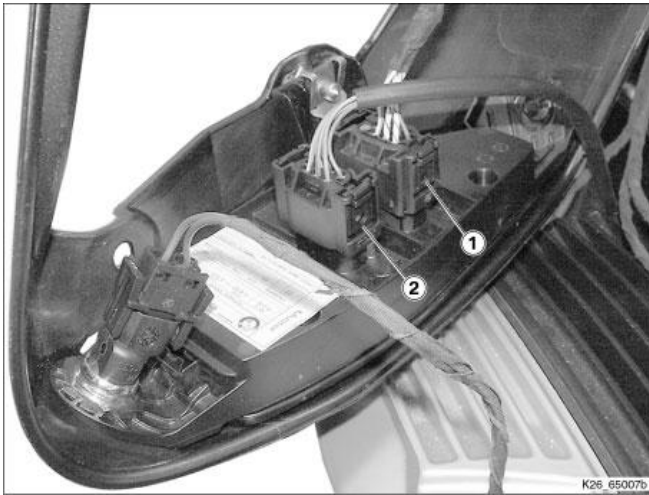
- Remove screws (1).



- Disconnect plug (1) from socket.



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Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

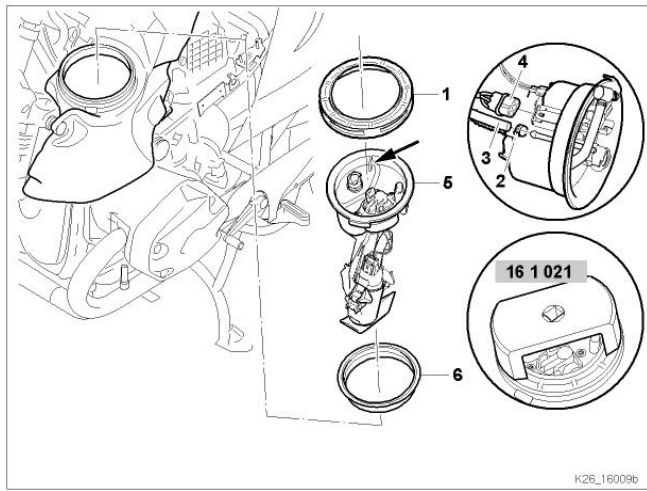
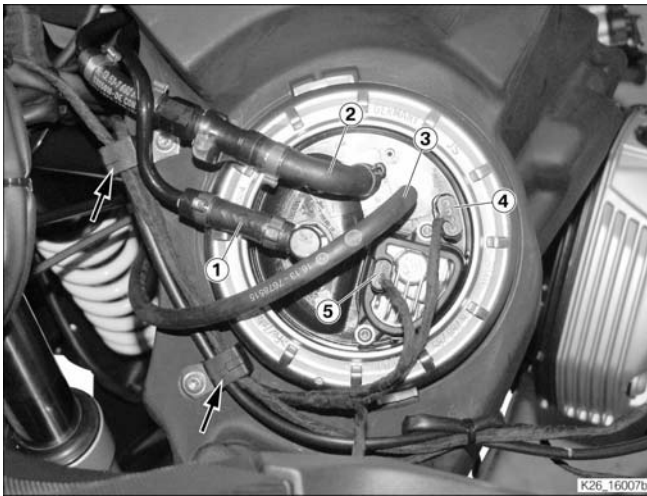
- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



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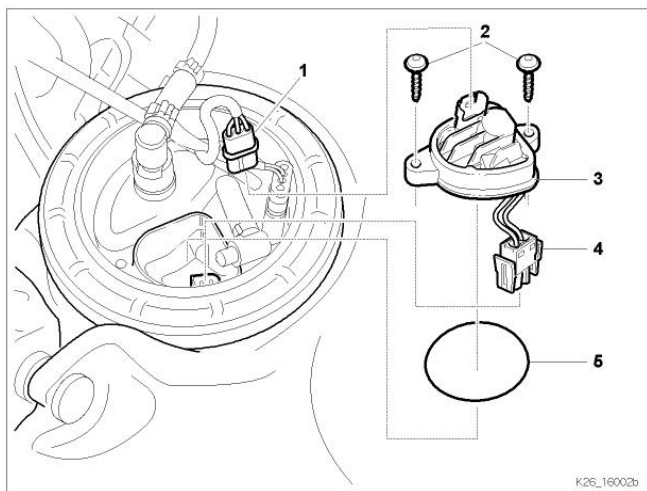
(-) Removing fuel pump unit

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).



- Remove union nut (1) with wrench for fuel-tank ring (No. 16 1 021) .
- Lift off the pump flange; if necessary pry it off at the lug (arrow).
- Open clip (2) and disconnect hose (3).
- Disconnect plug (4).
- Remove fuel pump unit (5) with seal (6) from fuel tank.

(-) Removing electronic fuel pump



- Remove screws (2).
- Lift electronics section (3) and disconnect plug (4).
- Remove electronics section with sealing ring (5).

(-) Removing fuel filter

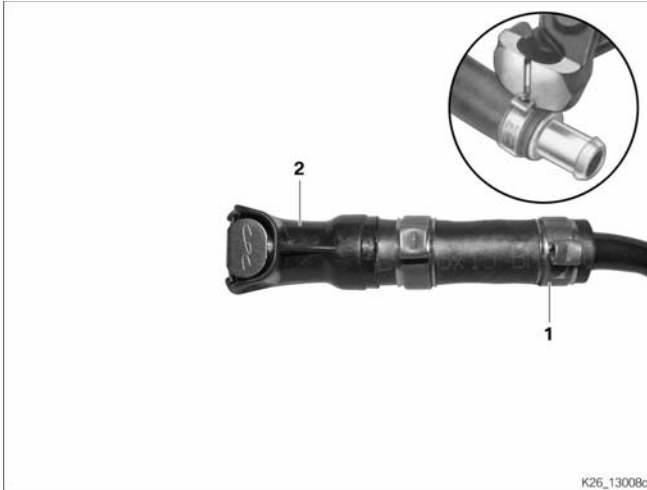
► Removing quick-release coupling



Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.



⚠ Attention

Nature: If a hose is clamped twice at the same point with non-reusable hose clips, there is no guarantee that the connection will remain leaktight.

Avoidance: Always replace hoses secured with non-reusable hose clips.

- Open quick-release coupling (2).

⚠ Attention

Nature: Fuel feed lines are pressurised. Fuel escapes when a connection is opened.

Avoidance: Catch escaping fuel in a suitable container.

- Use end-cutting nippers to cut open hose clip (1).

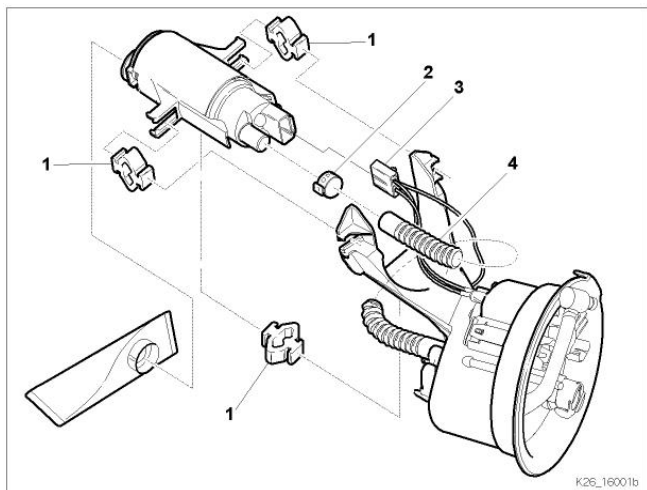
⚠ Attention

Nature: Quick-release coupling parts in components (e.g. pump flange) are bonded to prevent leaks and both components are damaged if removal is necessary.

Avoidance: Do not attempt to remove permanently installed quick-release coupling parts. Replace the entire component instead.

- Pull the male/female parts of the coupling off the hose.

- Release clip (2).
- Disconnect hose (4).
- Disconnect plug (3).

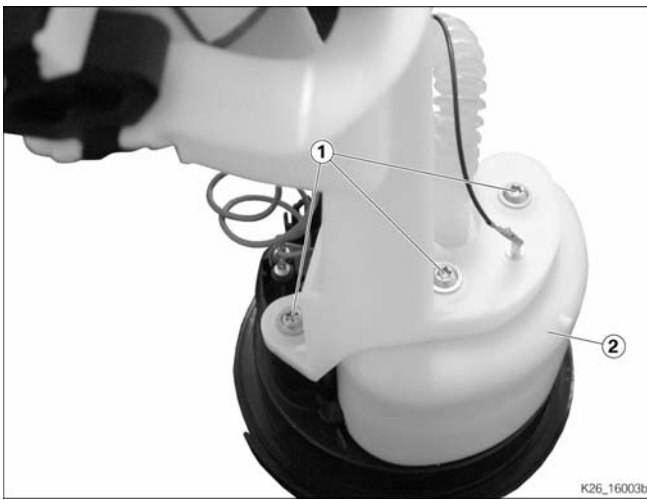


- Remove screws (1).
- Remove the fuel pump with bracket from fuel filter (2).
- Dispose of the fuel filter in an environmentally friendly manner.

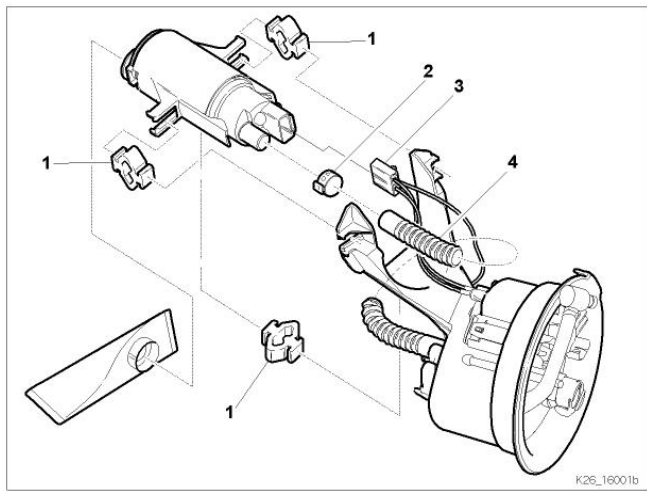


(-) Installing fuel filter

- Position the fuel pump with bracket on fuel filter (2).
- Install screws (1).



- Connect plug (3).
- Push hose (4) onto the fuel pump and secure hose clip (2) with pliers (No. 13 1 500) .



Note

The fuel filter will not work correctly if it is not correctly installed.

Note the correct direction of flow through the fuel filter.

► Installing quick-release coupling



Warning

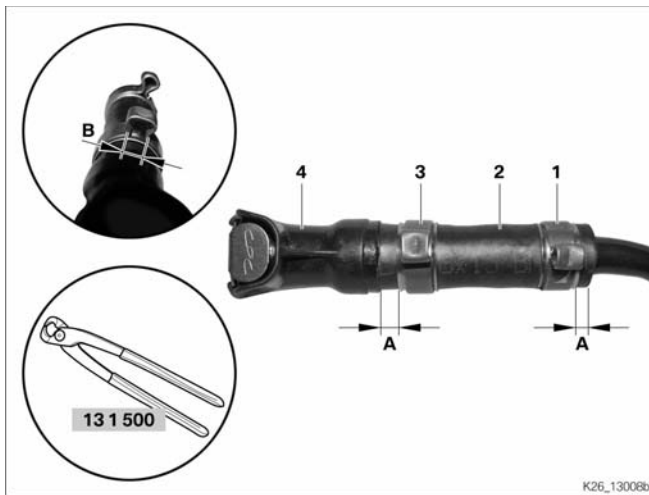
Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

⚠ Attention

Nature: Quick-release coupling parts in components (e.g. pump flange) are bonded to prevent leaks and both components are damaged if removal is necessary.

Avoidance: Do not attempt to remove permanently installed quick-release coupling parts. Replace the entire component instead.




⚠ Attention


Nature: If a hose is clamped twice at the same point with non-reusable hose clips, there is no guarantee that the connection will remain leaktight.

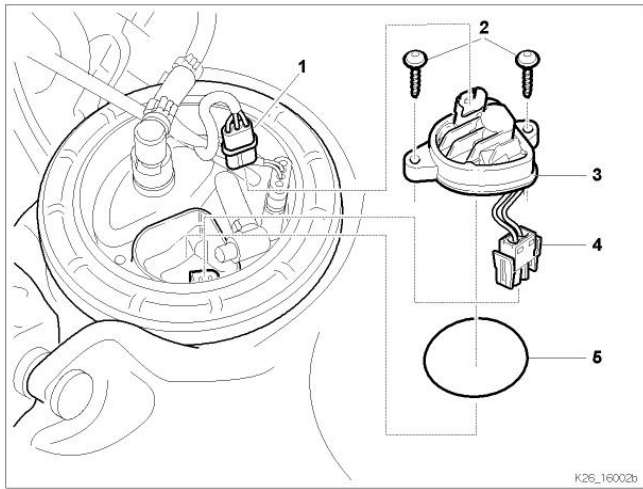
Avoidance: Always replace hoses secured with non-reusable hose clips.

- Push length of hose (2) onto female part of coupling (4) and the length of hose onto the male part of the coupling.
- Slip clip (3) onto the hose until distance (A) is correct and use pliers (No. 13 1 500) to squeeze the clip to size (B).

 Technical data			
Distance A (distance from end of hose to hose clamp)		3 mm	
Distance B (specified closed size for single-eye clamp on quick-action coupling)		4 mm	

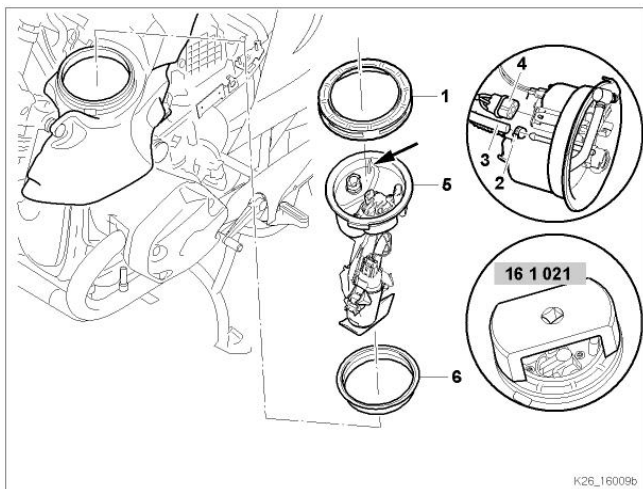
- Slip clip (1) onto the quick-release coupling with hose.
- Push the quick-release coupling with hose onto the pipe.
- Align clip (1) at distance (A) and use pliers (No. 13 1 500) to fully squeeze it closed.

 Technical data			
Distance A (distance from end of hose to hose clamp)		3 mm	



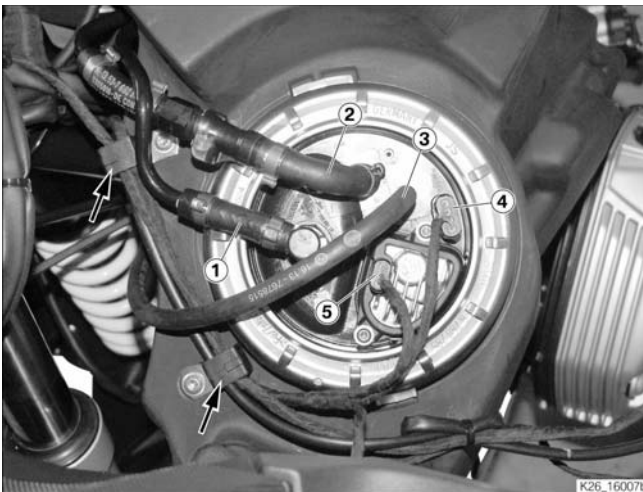
(-) Installing electronic fuel pump

- Check sealing ring (5) for damage. Replace the sealing ring if it is swollen or damaged.
- Position sealing ring (5) on electronics section (3).
- Connect plug (4).
- Carefully install the electronics section with sealing ring, making sure that the sealing ring is correctly seated.
- Install screws (2).



(-) Installing fuel pump unit

- Connect plug (4) to fuel pump unit.
- Connect hose (3) and secure with clip (2).
- Install fuel pump unit (5) in fuel tank, paying attention to seal (6).
- Install union nut (1) with wrench for fuel-tank ring (No. 16 1 021).



- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Secure overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

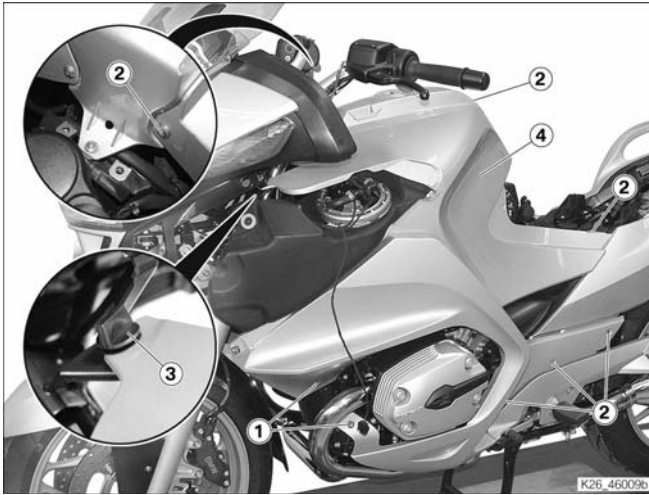
⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

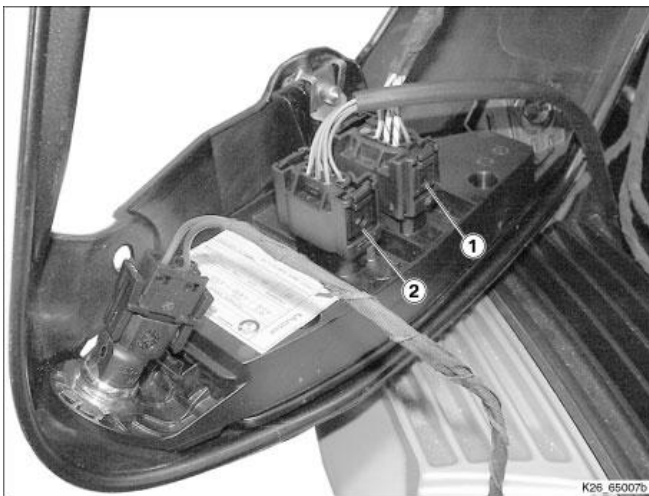
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

(-) Filling fuel tank



Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

- Fill the fuel tank with fuel.



Technical data

Fuel-tank capacity	usable	27 l	
	including reserve of	4 l	

 **16 14 000 Replacing fuel gauge**

(-) Draining fuel tank



Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

- Drain the fuel tank, using commercially available special tool.

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



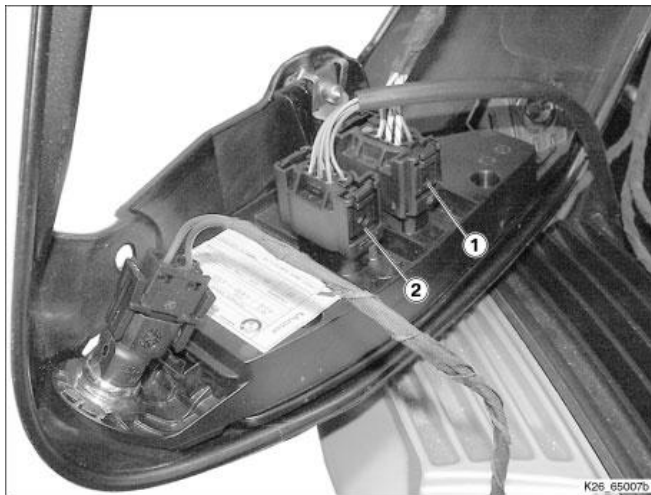
- Disconnect plug (1) from socket.



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Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



K26_65007b

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

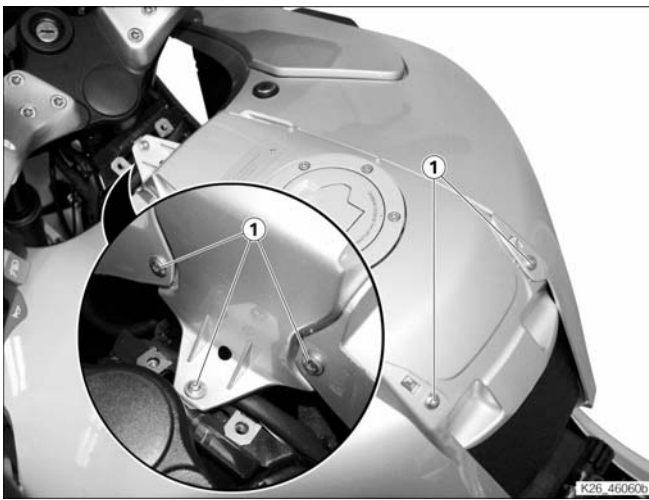
(-) Removing fuel tank cover

- Remove screws (1).
- Close off fuel filler pipe in fuel tank.
- Remove fuel tank cover.



(-) Removing centre fuel-tank cover

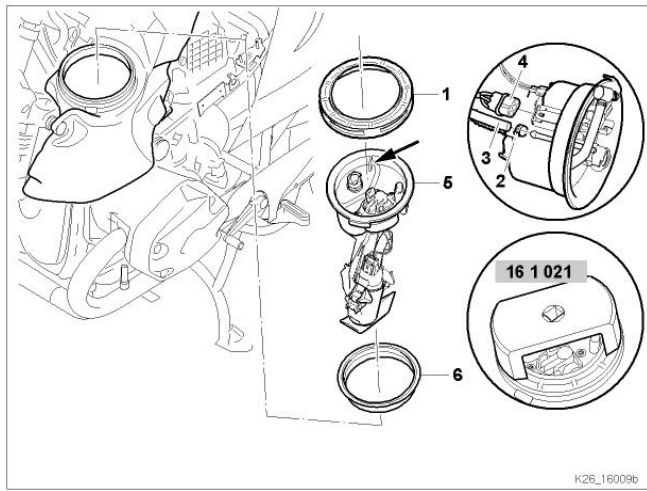
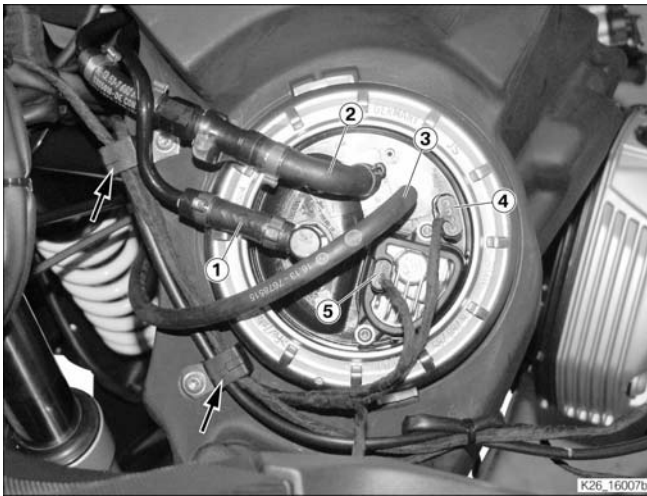
- Remove screws (1).



- Disengage locating lug of left-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Disengage locating lug of right-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Pull middle tank cover (3) in forward direction and remove.

(-) Removing fuel pump unit

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).



- Remove union nut (1) with wrench for fuel-tank ring (No. 16 1 021) .
- Lift off the pump flange; if necessary pry it off at the lug (arrow).
- Open clip (2) and disconnect hose (3).
- Disconnect plug (4).
- Remove fuel pump unit (5) with seal (6) from fuel tank.

(-) Replacing fuel-level sensor

► Removing fuel-level sensor

- Lift filler neck (2).
- Disengage fuel-level sensor (1) from filler neck (2).
- Lift out fuel-level sensor (1).



- Remove the old fuel-level sensor and install a new fuel-level sensor.
- The new fuel-level sensor has to be calibrated when **dry**.
- Connect the new fuel-level sensor to the fuel-pump

unit while it is **removed** from the fuel tank.

- Connect the fuel-pump unit **while still removed** to the motorcycle.

► Preparation for initialising/calibrating new parts

Precondition

- Engine switched off.
- Prop the motorcycle in such a way that it cannot move while initialisation/calibration is in progress.
- Motorcycle's battery is fully charged.



Note

Do not attempt to perform work of any other kind on the motorcycle while programming/coding are in progress.

- Switch off all electrical consumers.



Attention

Nature: Programming/coding is aborted if the voltage in the on-board system drops below 12.6 volts.

Avoidance: Connect the charger to the battery.

- Connect charger (No. 61 1 581) with cables (No. 61 1 582) to the battery. While initialisation/calibration is in progress, **do not** connect or disconnect the charger.

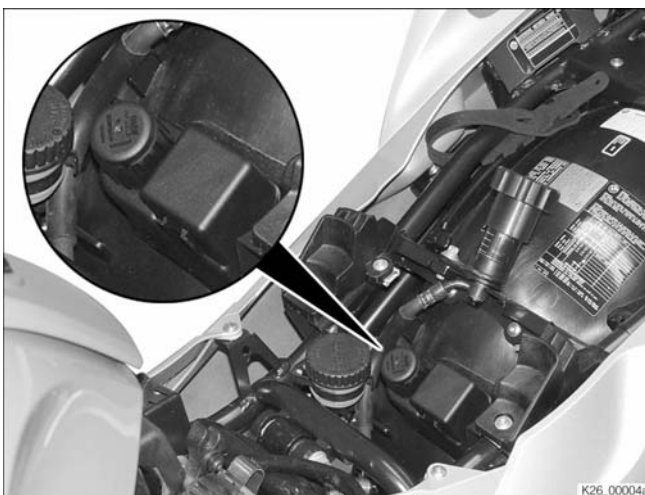
▷ Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



- Perform diagnosis. Rectify faults, if found, **before**

starting initialisation/calibration.

- Start initialisation/calibration with the CIP program and follow the instructions issued by the BMW Motorrad diagnostic system.



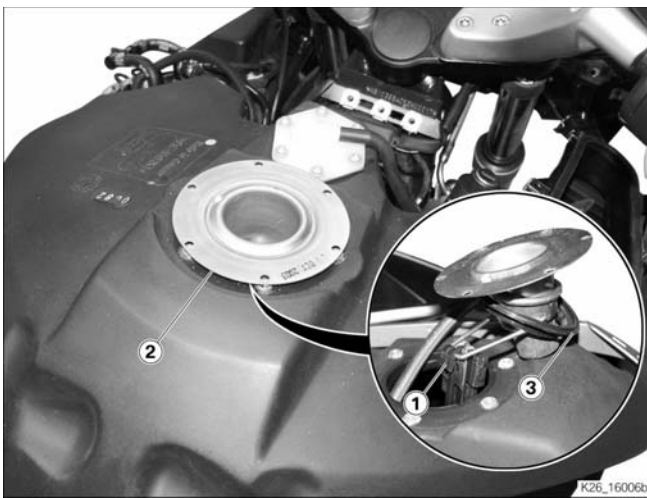
► **Disconnecting the BMW Motorrad diagnostic system from the motorcycle**

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

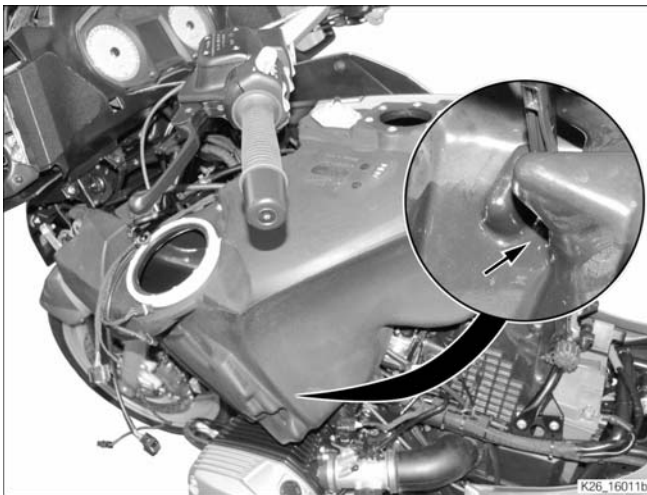


► **Installing fuel-level sensor**

- Check sealing ring (3) for damage. Replace the sealing ring if it is swollen or damaged.
- Engage fuel-level sensor (1) in filler neck (2).

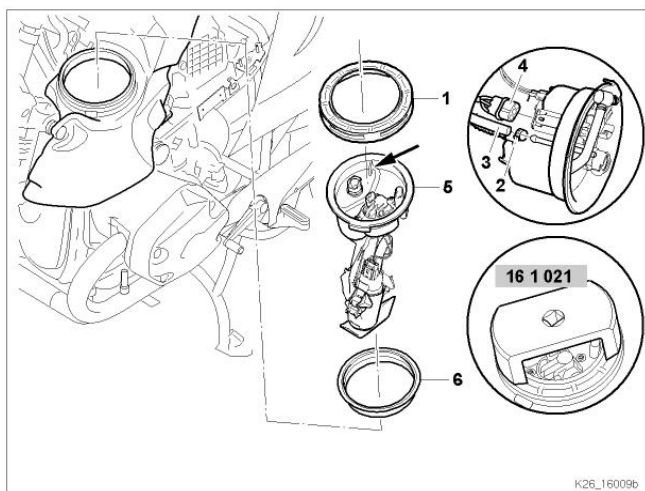


- Lower the fuel-level sensor and filler neck into the fuel tank, making sure that the fuel-level sensor engages the bottom guide (arrow) of the fuel tank.
- Make sure that the seal is seated correctly under the fuel filler neck.



(-) **Installing fuel pump unit**

- Connect plug (4) to fuel pump unit.
- Connect hose (3) and secure with clip (2).
- Install fuel pump unit (5) in fuel tank, paying attention to seal (6).
- Install union nut (1) with wrench for fuel-tank ring (No.



16 1 021) .

- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Secure overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! Attention

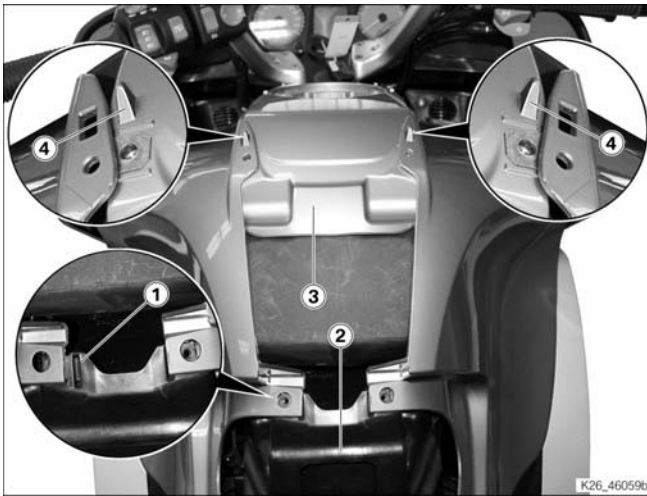
Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

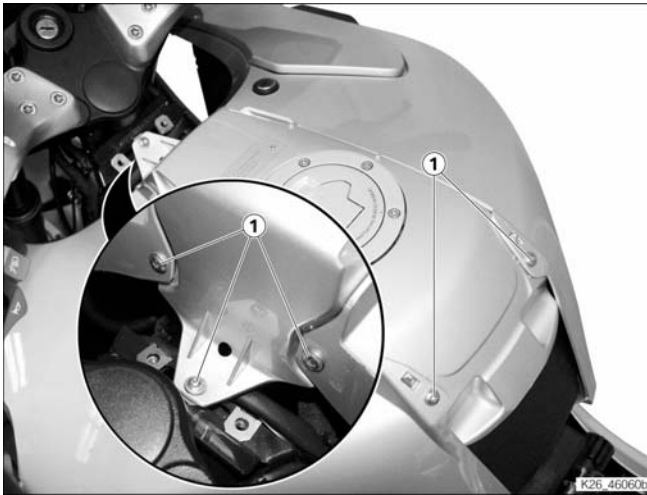
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing middle tank cover

- Fit middle tank cover (3) aligned in forward direction.
- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the right-hand tank cover in groove (1) of seat bracket (2).
- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the left-hand tank cover in groove (1) of seat bracket (2).



- Install screws (1).



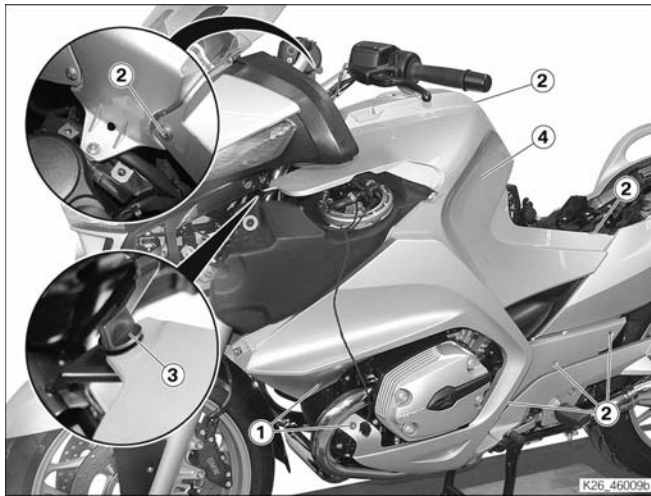
(-) Installing fuel tank cover

- Remove cap from fuel filler neck.
- Make sure that the seal is seated correctly under the fuel filler neck.
- Place fuel tank cover in position, fit screw (1) and evenly tighten crosswise.



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

(-) Filling fuel tank



Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

- Fill the fuel tank with fuel.



Technical data

Fuel-tank capacity	usable	27 l	
	including reserve of	4 l	

 **16 14 010 Replacing fuel pump electronics**

(-) Removing left-hand trim panel

- Remove screws (1).

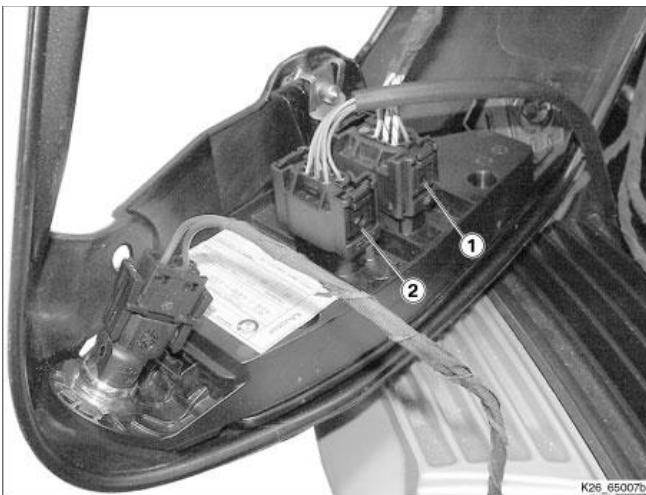


- Disconnect plug (1) from socket.



Variant, Radio with CD player

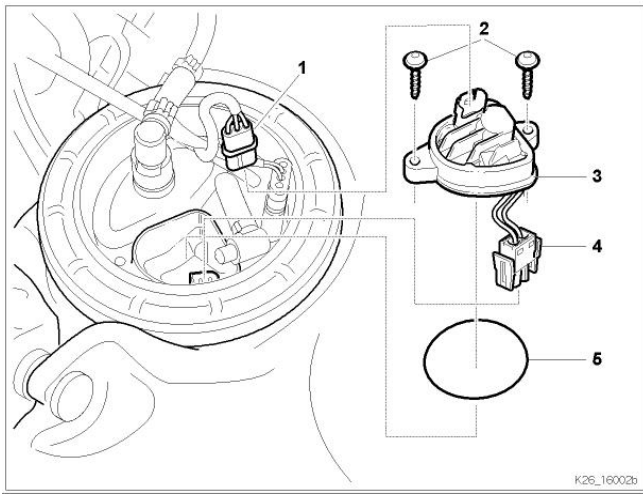
- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

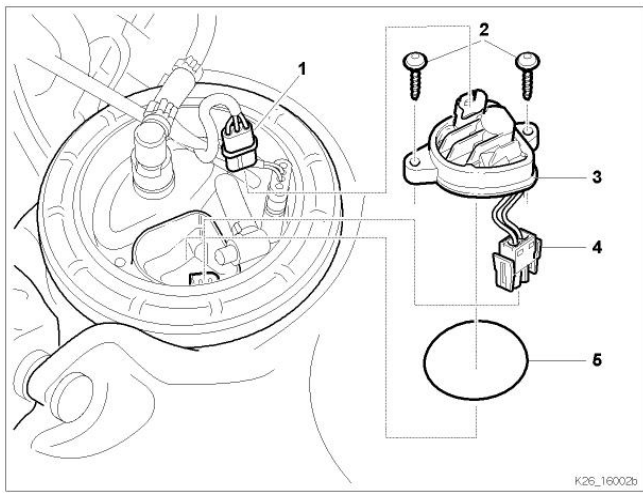
(-) Removing electronic fuel pump

- Disconnect plug (1).
- Remove screws (2).
- Lift electronics section (3) and disconnect plug (4).



- Remove electronics section with sealing ring (5).

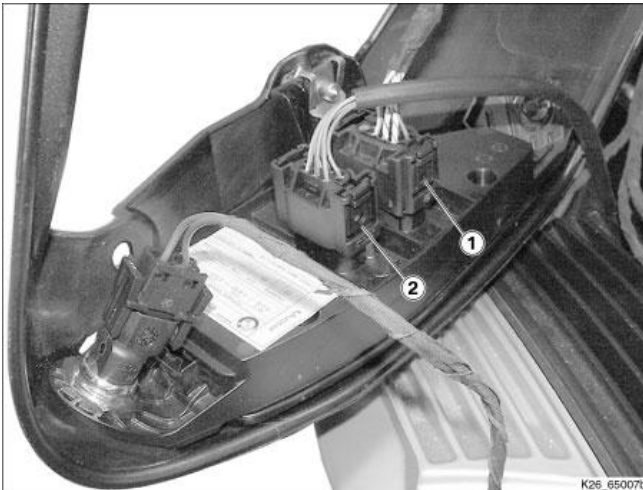
(-) Installing electronic fuel pump



- Check sealing ring (5) for damage. Replace the sealing ring if it is swollen or damaged.
- Position sealing ring (5) on electronics section (3).
- Connect plug (4).
- Carefully install the electronics section with sealing ring, making sure that the sealing ring is correctly seated.
- Install screws (2).
- Connect plug (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).

 **16 14 020 Replacing fuel pump**

(-) Draining fuel tank



Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

- Drain the fuel tank, using commercially available special tool.

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_46016a



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



K26_46009b

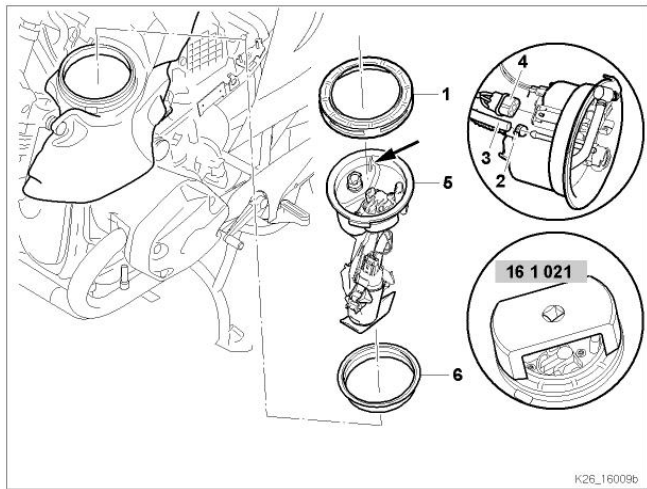
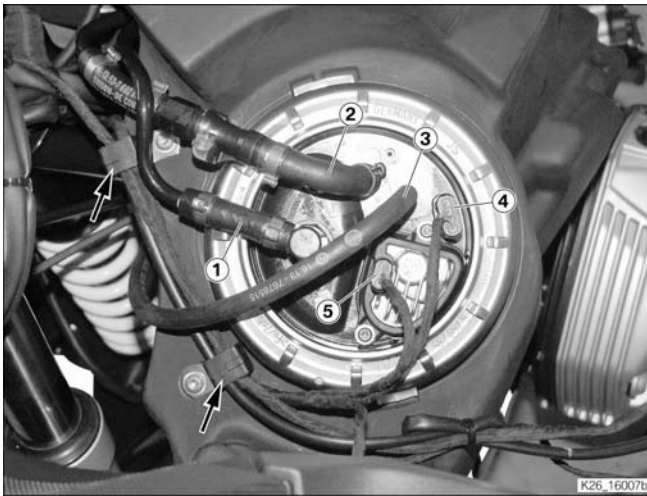
- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

(-) Removing fuel pump unit

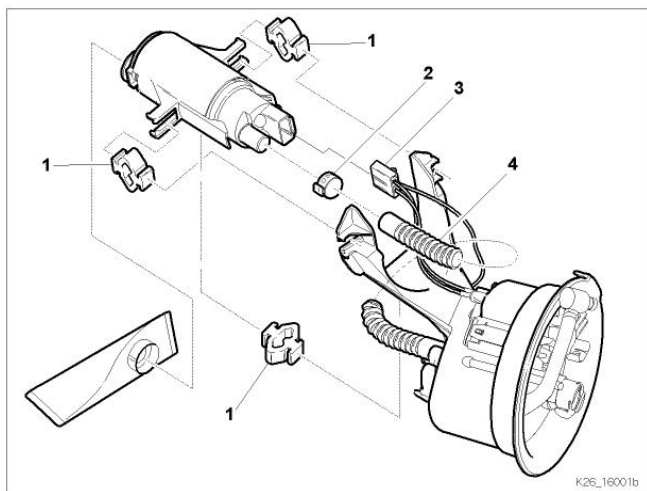
- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).



- Remove union nut (1) with wrench for fuel-tank ring (No. 16 1 021) .
- Lift off the pump flange; if necessary pry it off at the lug (arrow).
- Open clip (2) and disconnect hose (3).
- Disconnect plug (4).
- Remove fuel pump unit (5) with seal (6) from fuel tank.

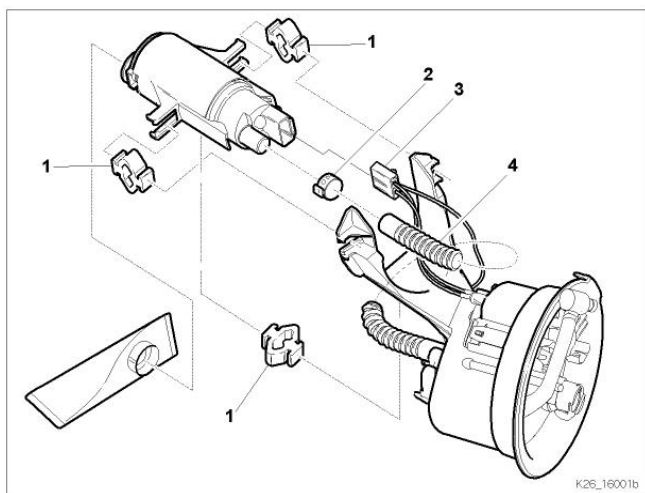
(-) Removing fuel pump

- Open hose clip (2).
- Disconnect hose (4).
- Disconnect plug (3).
- Remove three rubber buffers (1).

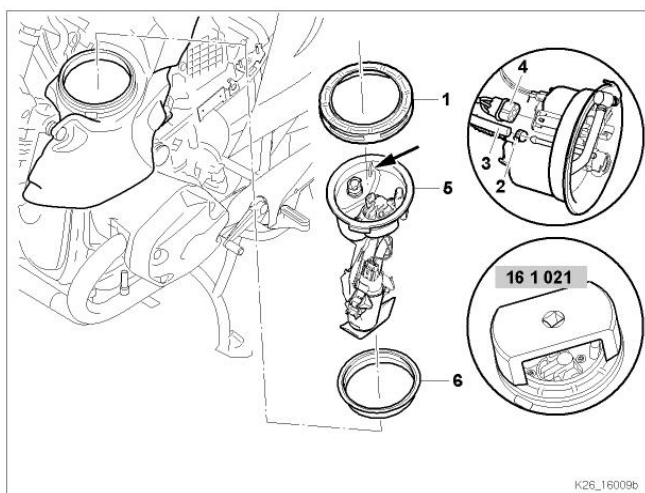


(-) Installing fuel pump

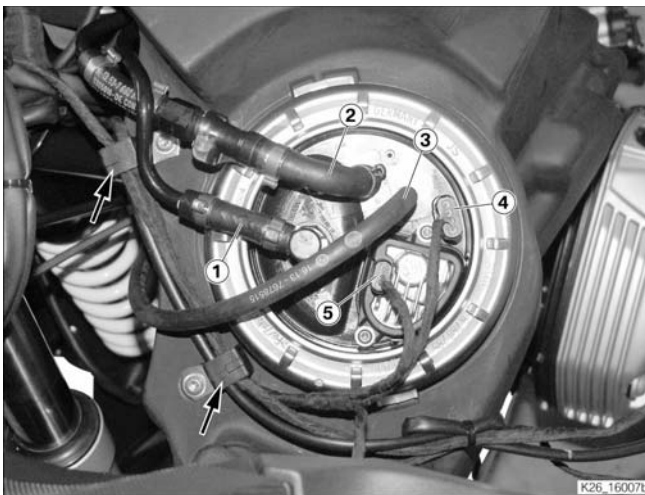
- Check rubber buffers (1) for damage. Replace damaged rubber buffers.
- Mount the fuel pump with rubber buffers on the fuel-pump unit.
- Secure hose (4) to the fuel pump with hose clip (2) using pliers (No. 13 1 500) .
- Connect plug (3) to the fuel pump.



(-) Installing fuel pump unit



- Connect plug (4) to fuel pump unit.
- Connect hose (3) and secure with clip (2).
- Install fuel pump unit (5) in fuel tank, paying attention to seal (6).
- Install union nut (1) with wrench for fuel-tank ring (No. 16 1 021).



- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Secure overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with

an audible click.

(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

(-) Filling fuel tank



Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

- Fill the fuel tank with fuel.



Technical data

Fuel-tank capacity	usable	27 l	
	including reserve of	4 l	

 **17 21 000 Replacing oil cooler**

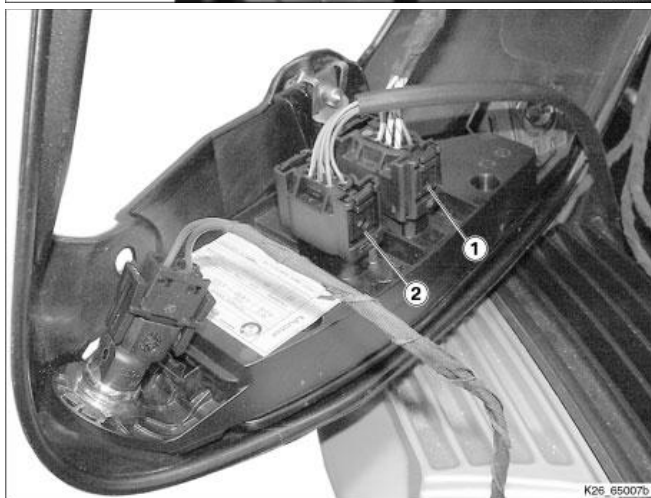


(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



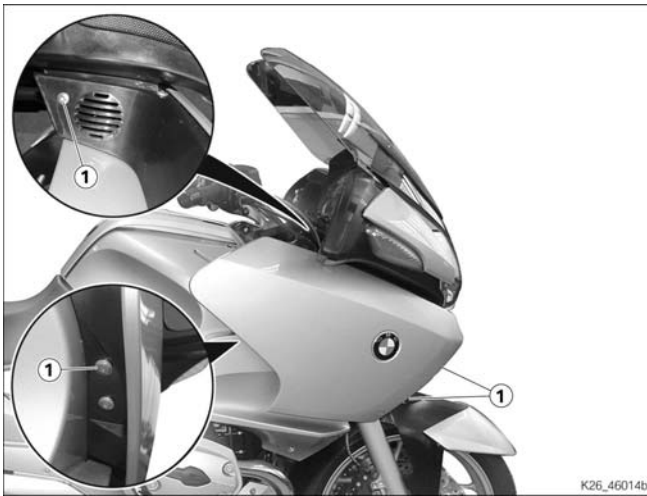
Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

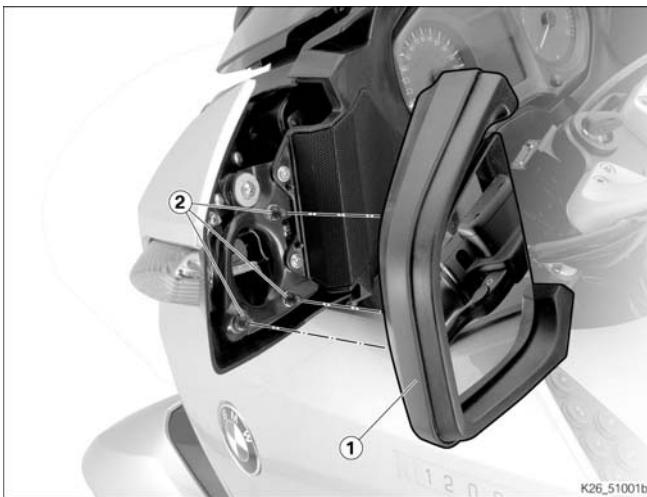
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing mirror

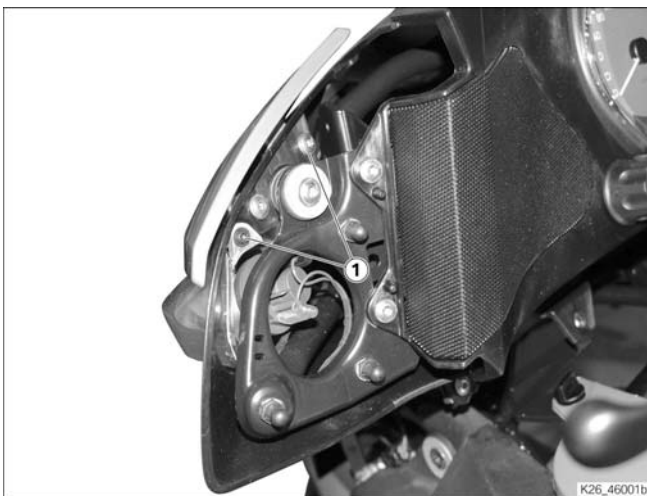
- Detach mirror (1).



Variant, Radio with CD player

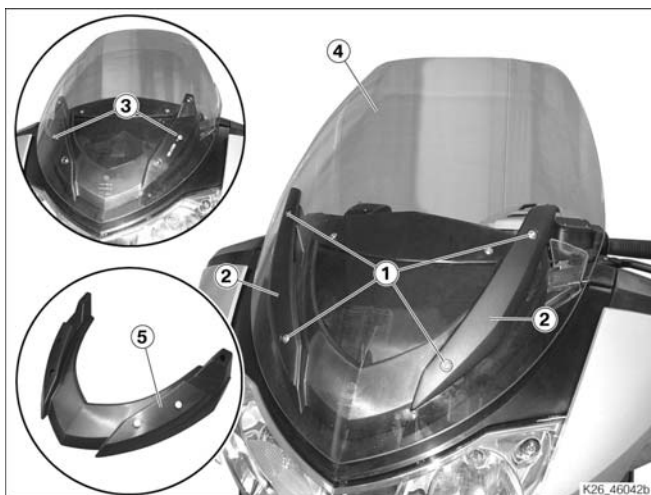
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



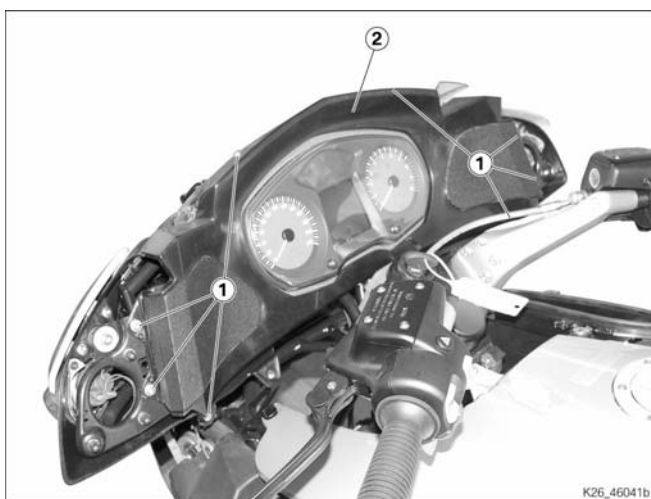
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).



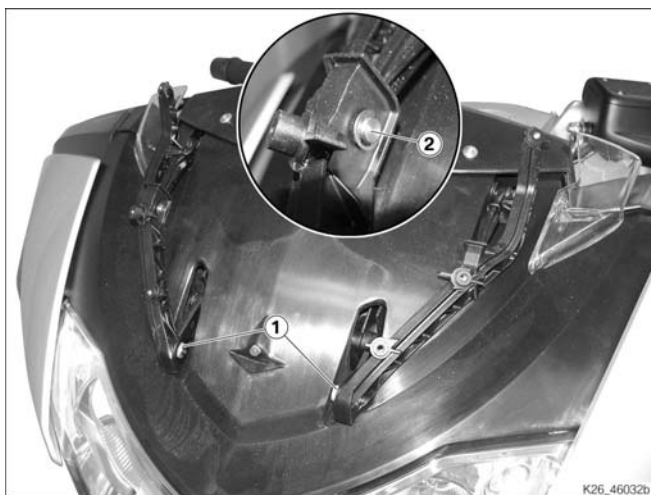
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Removing inner trim for instruments



- Remove screws (1).
- Remove inner trim (2).

(-) Partially removing holder for windscreen



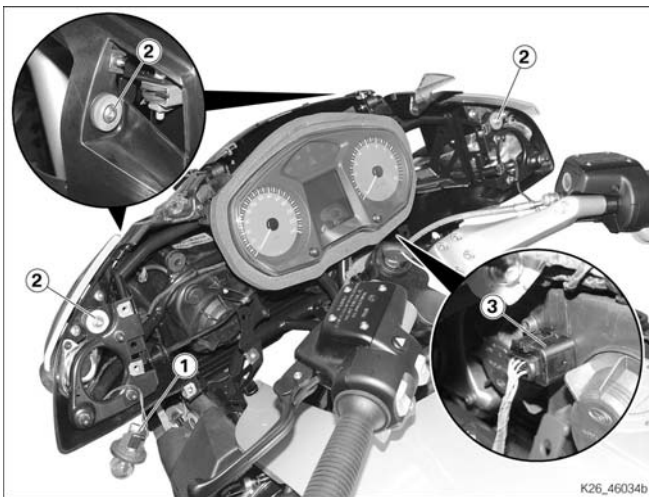
- Remove clips (1).
- Press out pin (2).

- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

(-) Removing oil cooler

- Remove screws (1).
- Open hose clips (2).
- Disconnect the hoses and catch the escaping oil in a suitable container.
-




Remove the oil cooler.

(-) Installing oil cooler

- Connect the hoses to the oil cooler.
- Install hose clips (2).
- Align the oil cooler and secure it with screws (1).



 Tightening torques		
Oil cooler to fairing bracket, M6 x 30	8 Nm	


(-) Installing entire top section of fairing

- Carefully place upper section of fairing in position.

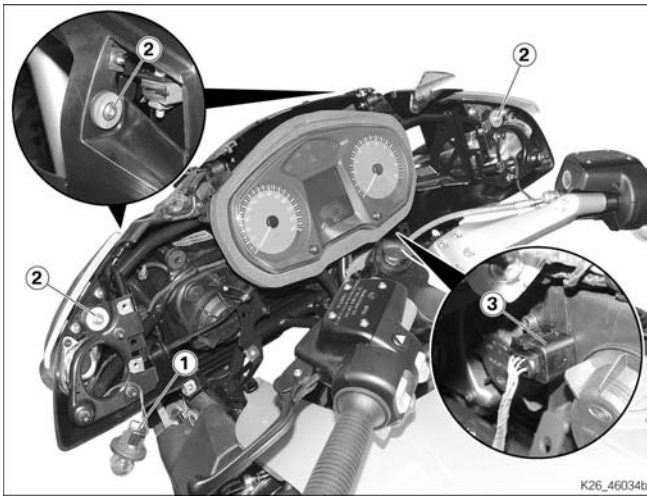
Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



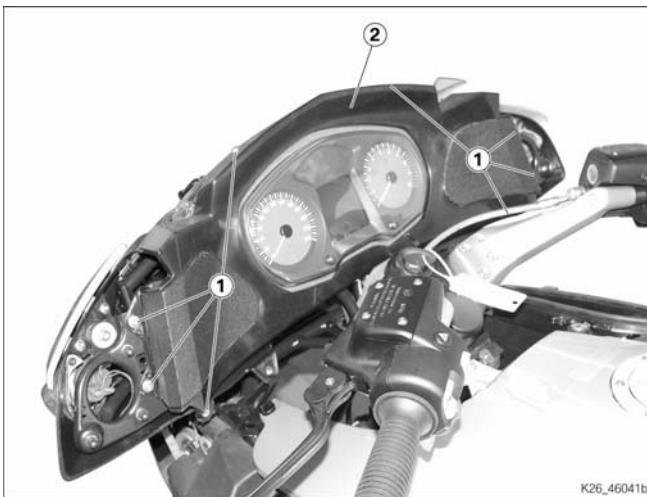
 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	

- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.



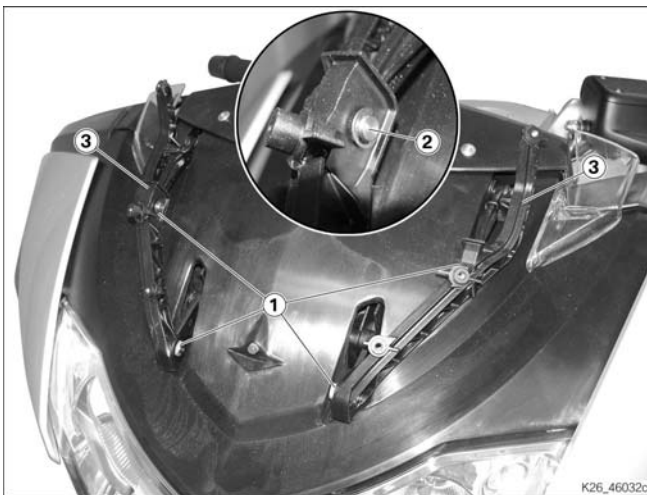
(-) Installing inner trim for instruments

- Place inner trim (2) in position.
- Install screws (1).



(-) Installing bracket for windscreen

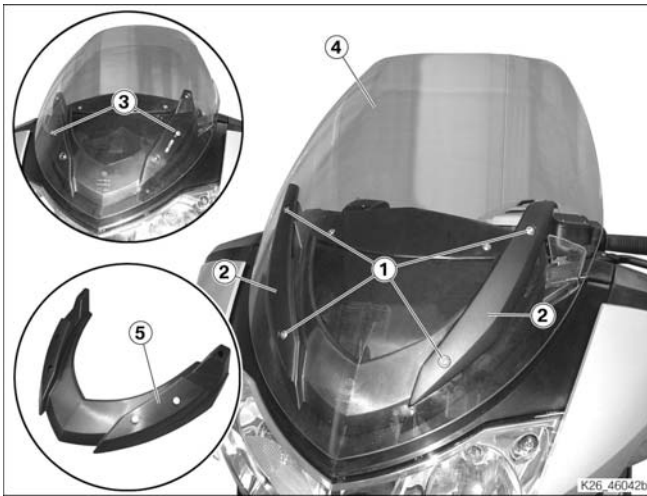
- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.





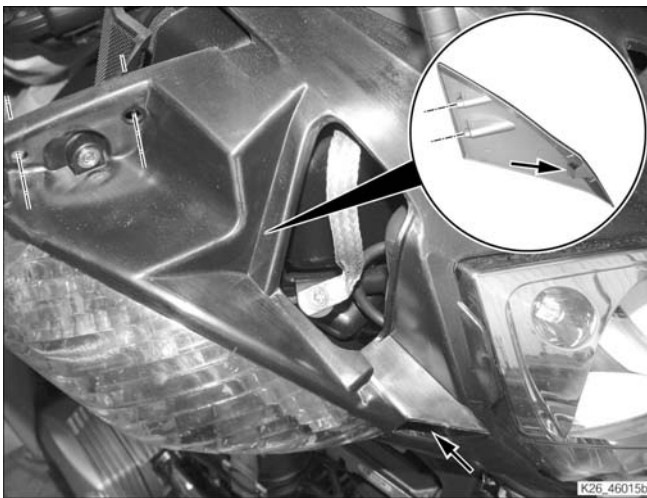
Tightening torques

Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	
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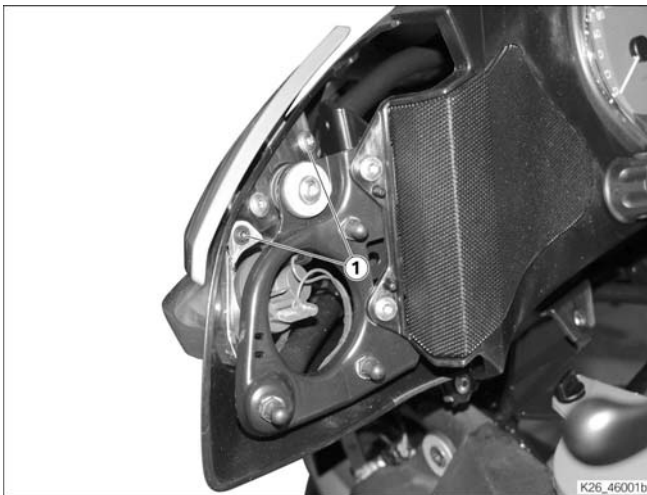
- Fit left and right trim panels (2) and secure with screws (1).

Variant, Radio with CD player

(-) Installing both left and right mirror trim panels



- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



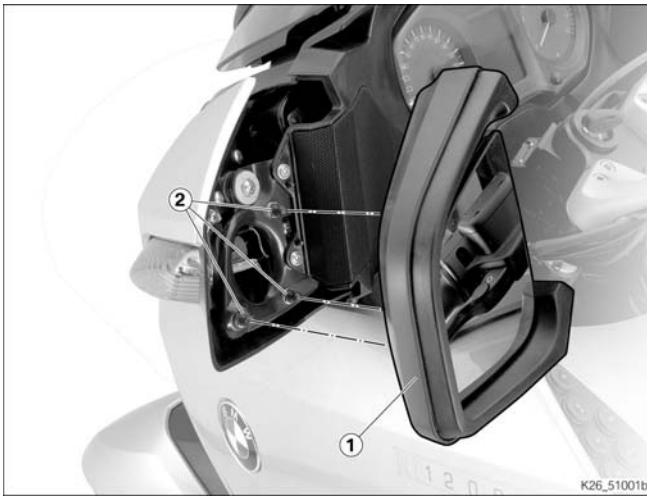
- Install screws (1).

(-) Installing mirrors



Attention

Nature: The mirrors can easily work loose from



their anchoring if the rubber holders or snap-fit studs are greased.

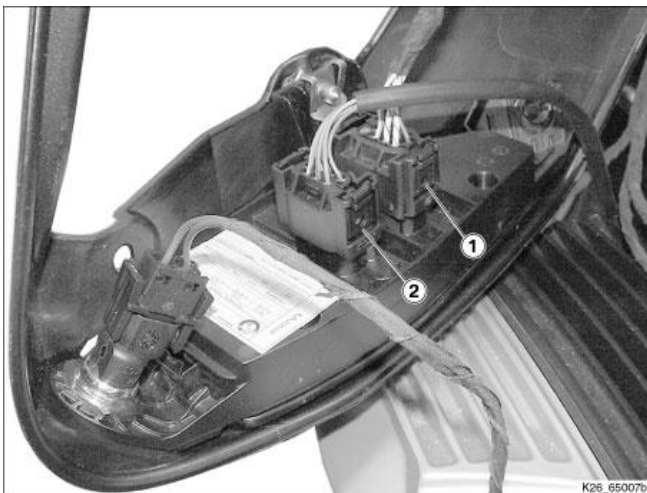
Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

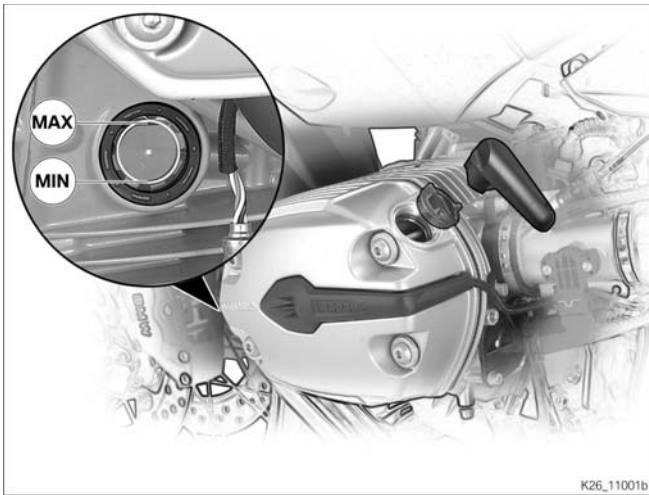
Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.




- Hold the panel in position.
- Install screws (1).



(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **17 22 035 Replacing oil cooler line, feed**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

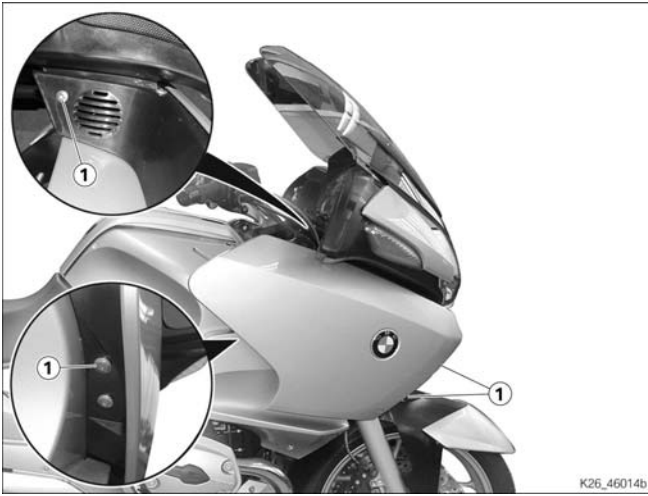


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



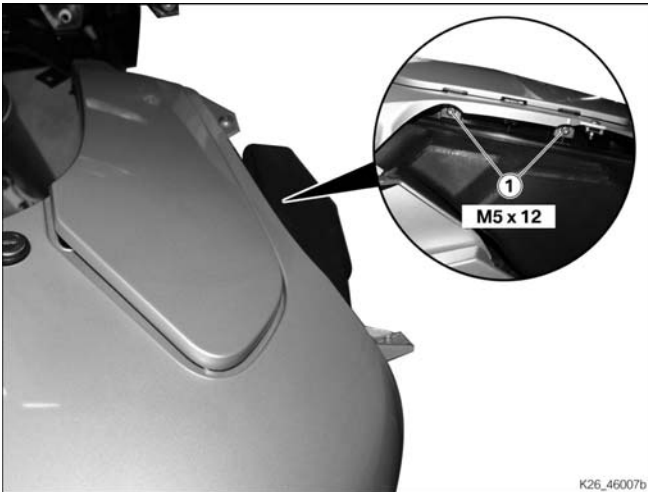
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



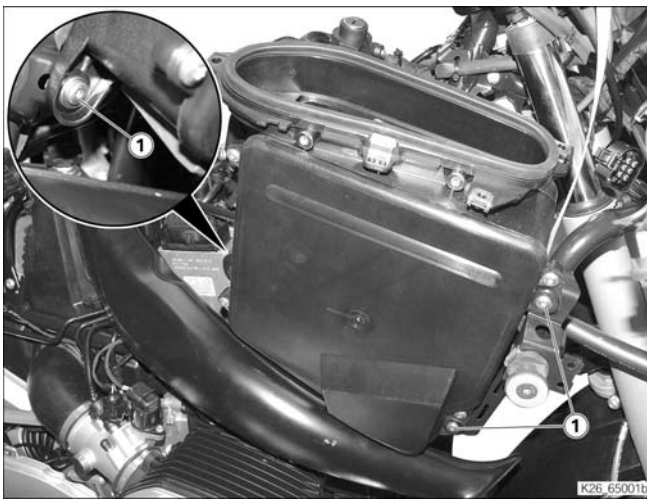
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



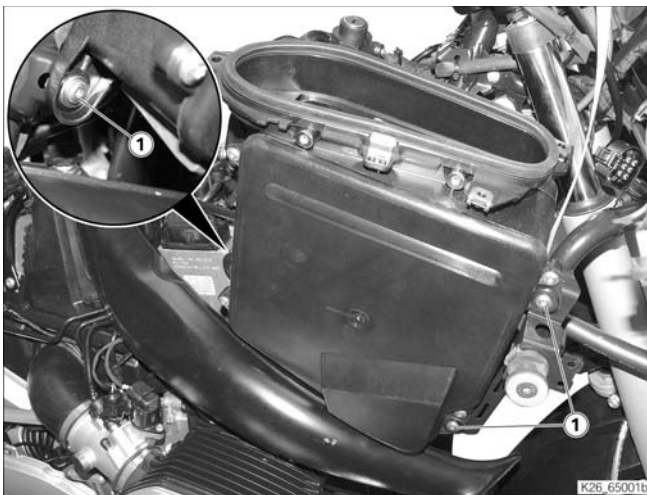
(-) Removing stowage compartment

- Remove screws (1).
- Remove the stowage compartment.



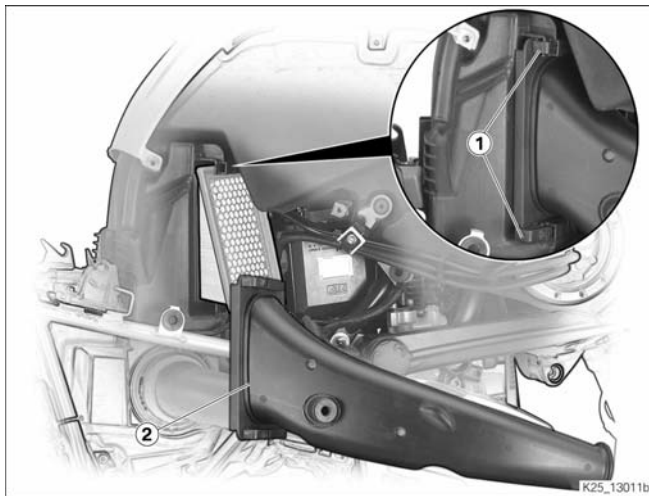
Variant, Radio with CD player

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



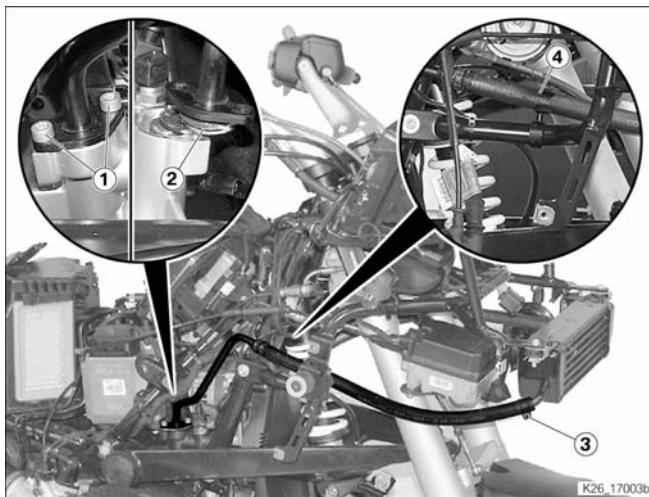
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



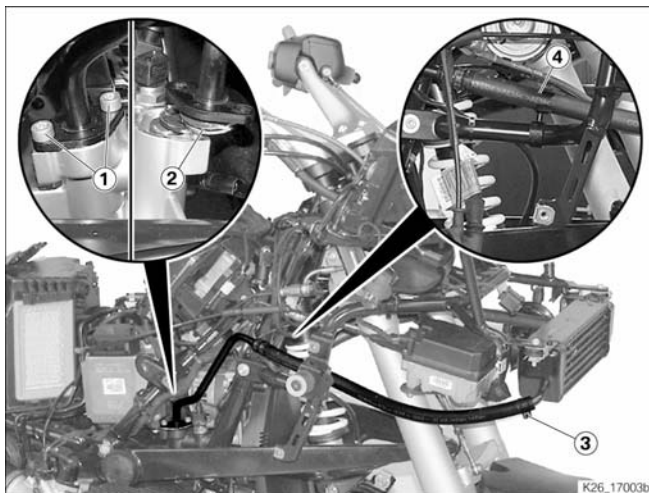
(-) Removing oil cooler line, feed

- Remove screws (1) from the crankcase.
- Catch escaping engine oil in a suitable container.
- Open hose clamp (3) on the oil cooler and disconnect the oil cooler line.
- Unclip the oil cooler line from hose holder (4).
- Carefully manoeuvre the oil cooler line clear of the frame.
- Remove sealing ring (2).



(-) Installing oil cooler line, feed

- Install the oil cooler line.
- Connect the oil cooler line to the oil cooler.
- Check sealing ring (2) for damage. Replace the sealing ring if it is damaged.
- Push the thermostat into the crankcase and install the oil cooler line with screws (1) and sealing ring (2).

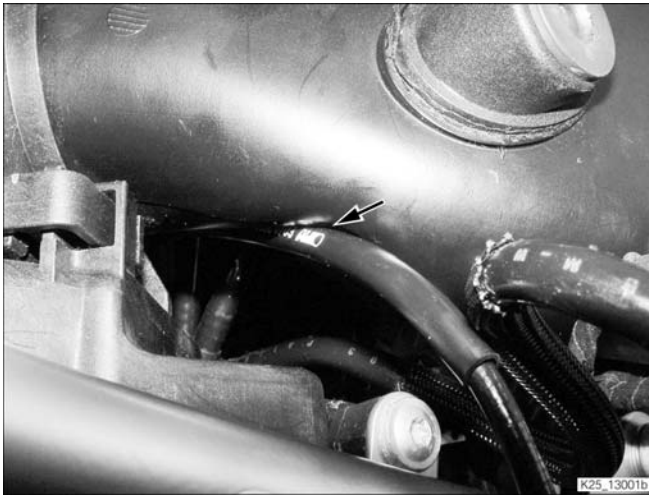
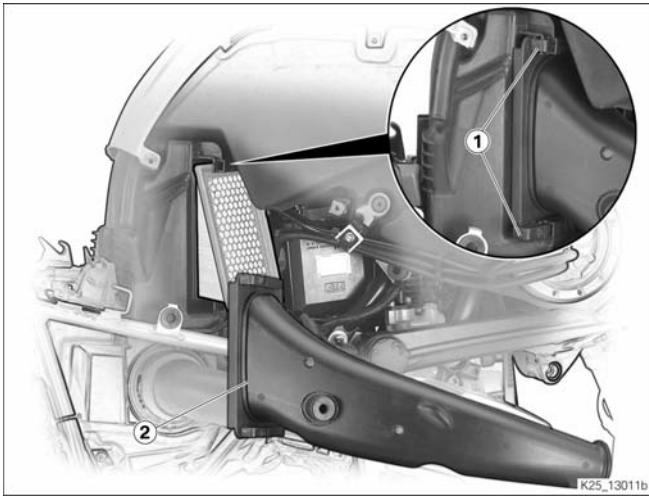


Tightening torques	
Oil cooler line, flow line, to crankcase, M6 x 16	8 Nm

- Clip the oil cooler line into hose holder (4).
- Close hose clip (3) on the oil cooler.

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Installing stowage compartment



- Place the stowage compartment in position and align it correctly.
- Install screws (1).

Variant, Radio with CD player

- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).



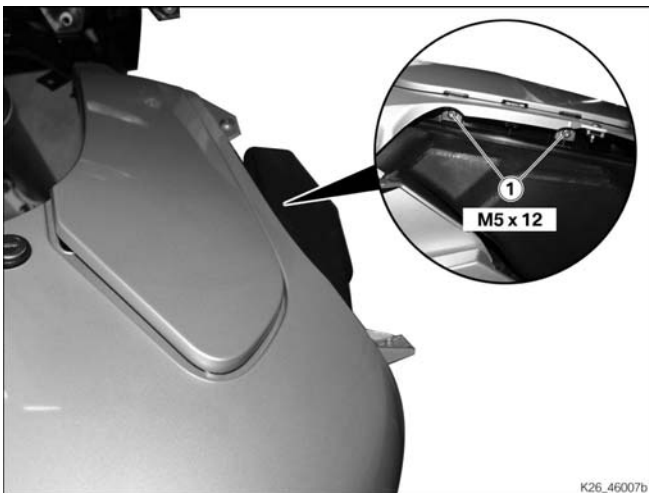
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



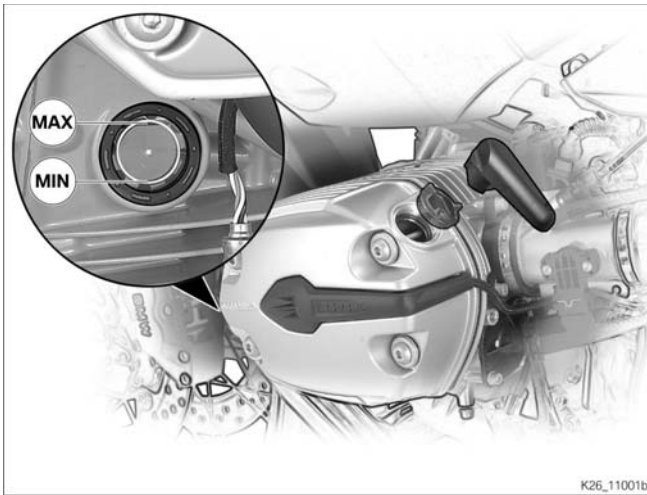
Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



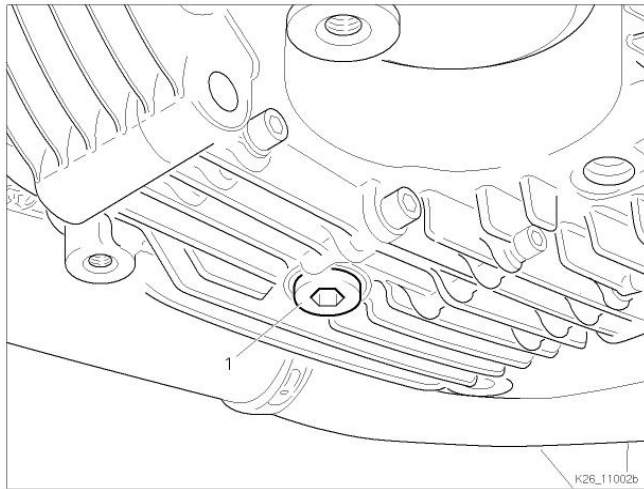
(-) Correcting engine oil level

- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

 Technical data			
Oil level, engine		Maximum = top ring mark on sight glass	
	Consumables/lubricants		
	Engine oil, 20W-50		
		Minimum = bottom ring mark on sight glass	

 **17 22 050 Replacing oil cooler line, return**

(-) Draining engine oil



Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the engine.
- Remove oil drain plug (1) and drain the oil.
- Dispose of used oil in an environmentally friendly manner.
- Remove the old sealing ring from the drain plug.

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



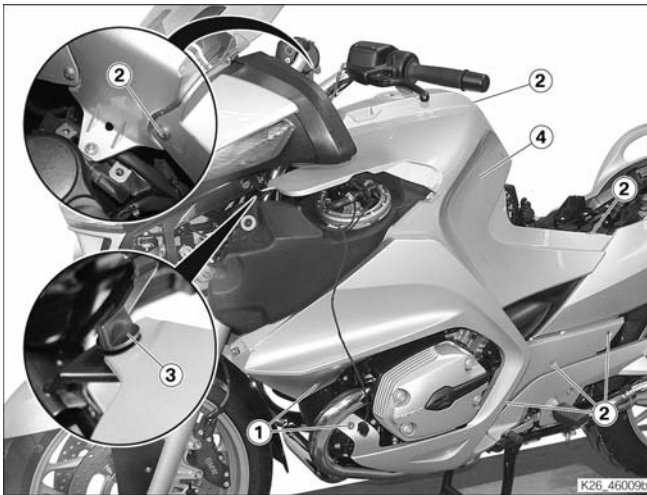
- Remove trim panel.
- (-) Removing tank rail**

- Remove screws (1).
- Remove tank rail.



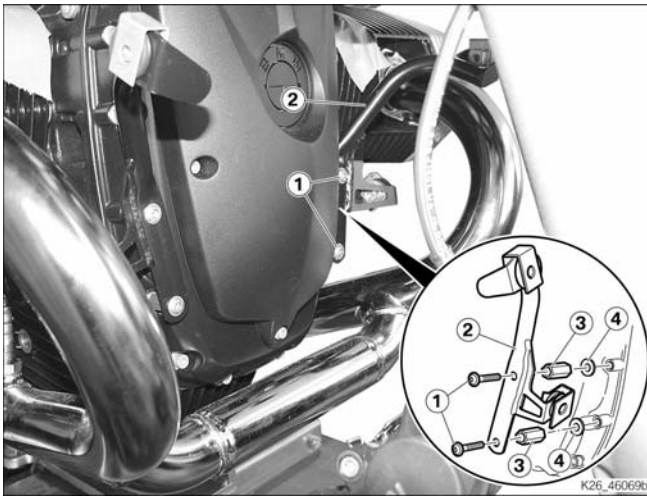
(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



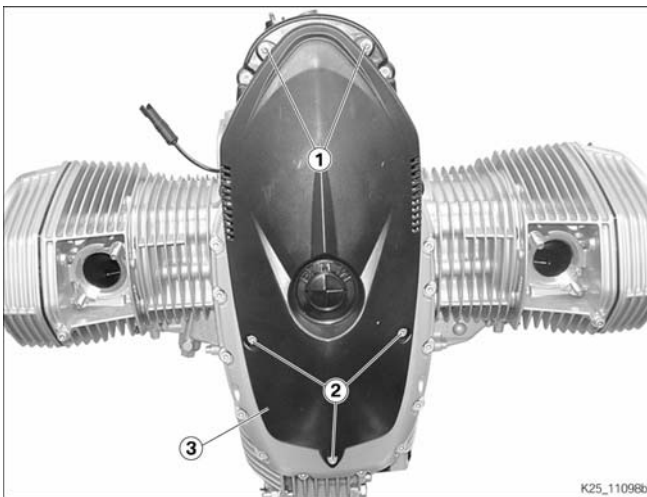
(-) Removing left fairing bracket

- Remove screws (1).
- Remove fairing bracket (2) with sleeves (3) and washers (4).



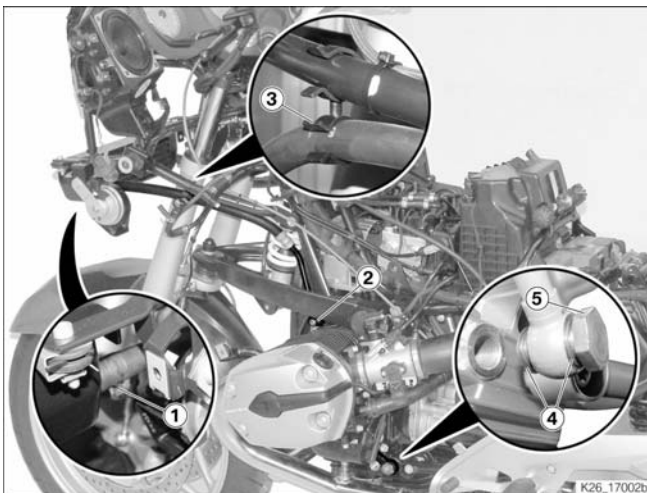
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



(-) Removing oil cooler line, return

- Remove banjo bolt (5) with sealing rings (4) from the crankcase.
- Catch escaping engine oil in a suitable container.
- Remove screw (2) from the engine block.
- Open hose clamp (1) on the oil cooler and disconnect the oil cooler line.
- Unclip the oil cooler line from hose holder (3).



! Attention

Nature: Components can be damaged by hard or sharp-edged objects.

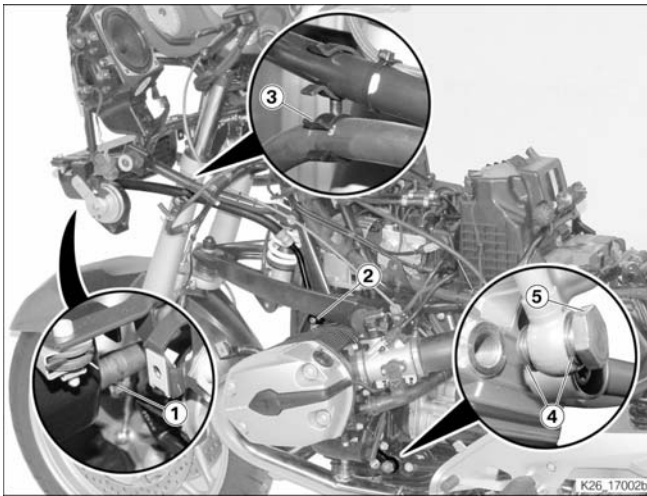
Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the oil cooler line.

(-) Installing oil cooler line, return


! Attention

Nature: Components can be damaged by hard or sharp-edged objects.




Avoidance: Avoid scratching the components; use masking tape if necessary.

- Position the oil cooler line and thread it in.
- Connect the oil cooler line to the oil cooler.
- Replace sealing rings (4).
- Secure the oil cooler line with banjo bolt (5) and sealing rings (4).

 Tightening torques		
Banjo bolt	35 Nm	

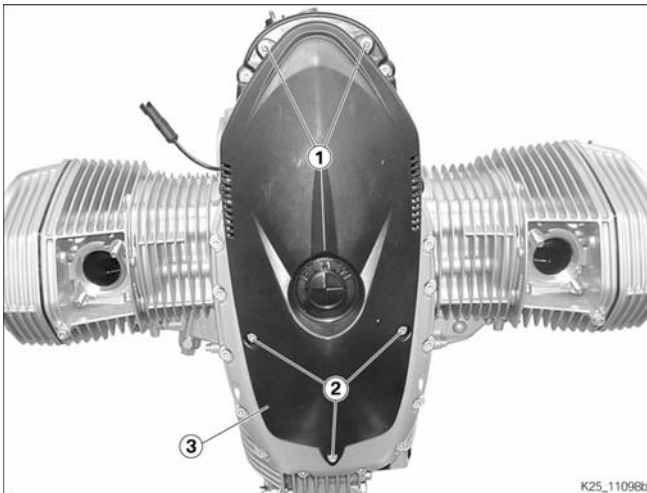
- Secure the oil cooler line to the crankcase with screw (2).


 Tightening torques		
Fastener for oil cooler line, return line, M6 x 12	5 Nm	

- Close hose clip (1) on the oil cooler.
- Clip the oil cooler line into hose holder (3).

(-) Installing belt guard

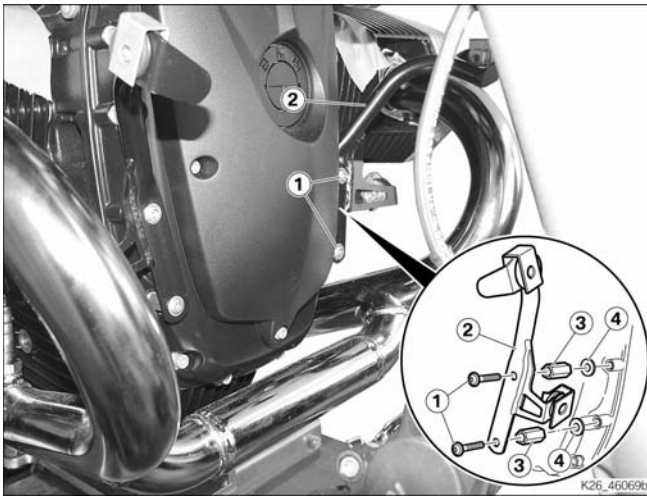
- Install belt guard (3) and secure with screws (1) and (2).



 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

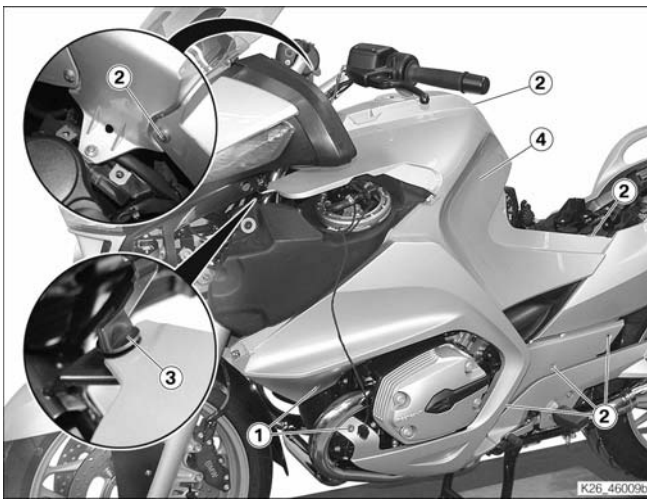
(-) Installing fairing bracket on left

- Hold fairing bracket (2) with sleeves (3) and washers (4) in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing tank rail

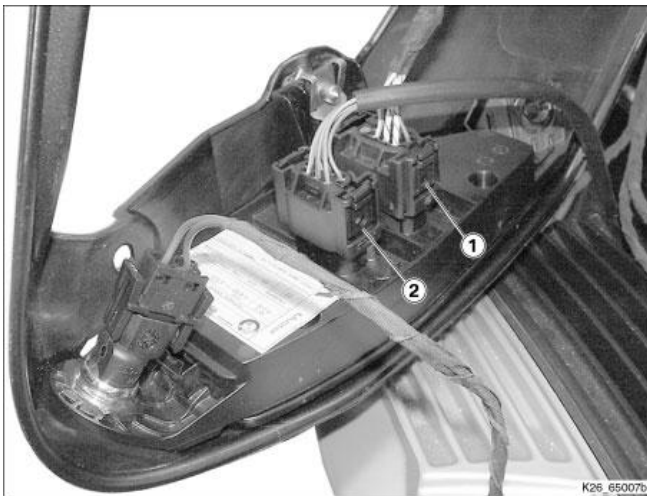
- Fit tank rail.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



K26_65007b

- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).




Variant, Seat heating

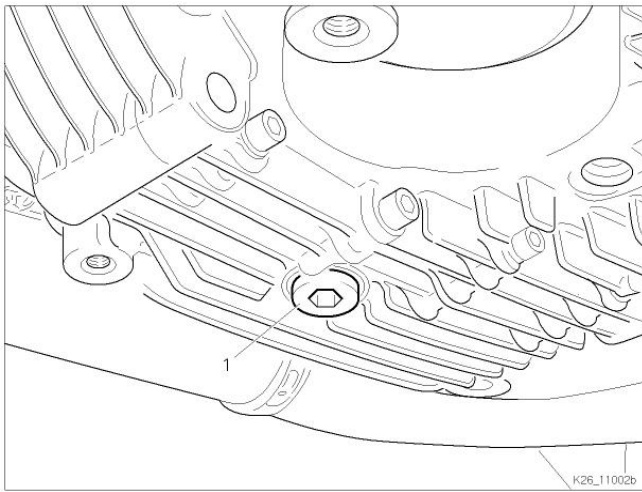
- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



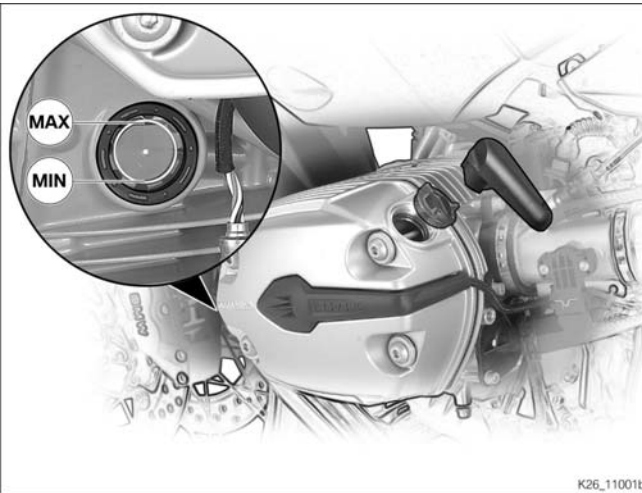
(-) Pouring engine oil into engine

- Replace the sealing ring of oil drain plug (1).
- Screw in oil drain plug.

 Tightening torques	
Oil drain plug, M16 x 1.5	Initial torque, 23 Nm



K26_11002b



K26_11001b

	Final torque, 32 Nm	
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- Open oil filler plug using spanner from toolkit.
- Pour engine oil into the engine until the level reaches the MAX mark.

Technical data		
Oil capacity, engine	with filter change Difference between Min. / Max. marks	max. 4 l 0.5 l
Consumables/lubricants		
Engine oil, 20W-50		

Consumables/lubricants		
Engine oil, 20W-50	Engine oil	81 22 9 407 685

(-) Correcting engine oil level

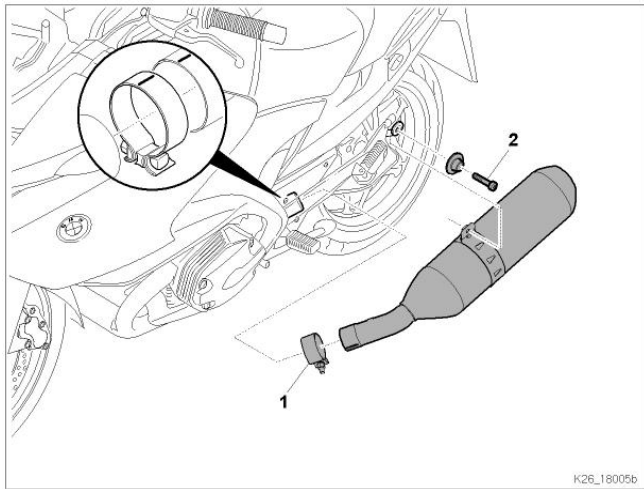
- After completing all work, wait at least 5 minutes after heating the engine to operating temperature in the trial run/road test before checking the engine oil level.
- Set the engine oil level to the MAX mark.

Technical data		
Oil level, engine		Maximum = top ring mark on sight glass
Consumables/lubricants		
Engine oil, 20W-50		



		Minimum = bottom ring mark on sight glass	
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18 11 100 Replacing exhaust elbow



(-) Removing silencer

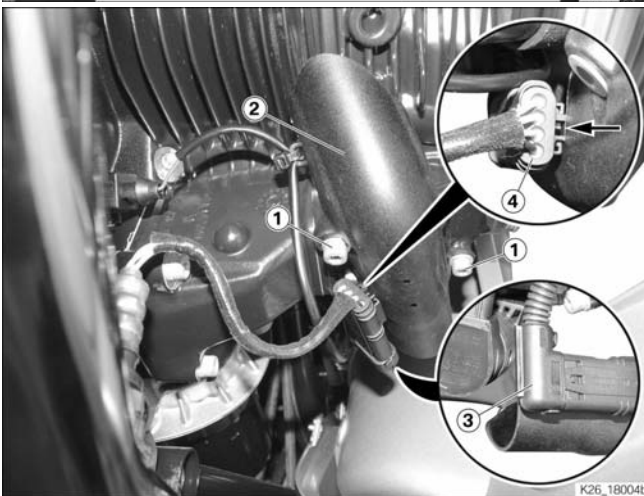
- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

(-) Removing exhaust elbow



► Disconnecting both oxygen sensor plugs

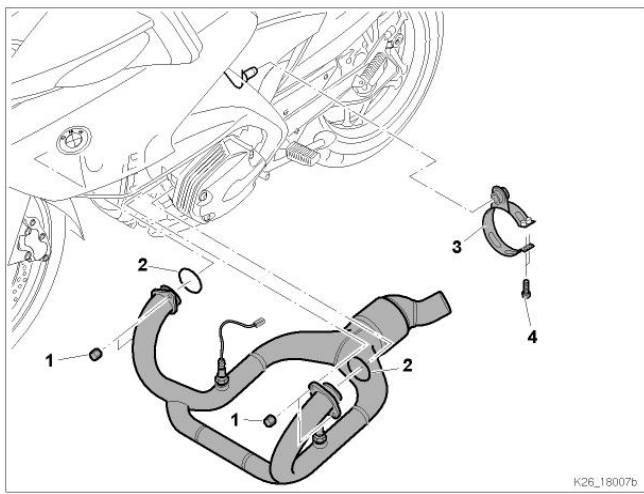
- Undo front screw (1) from both bottom sections of the fairing.



- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.



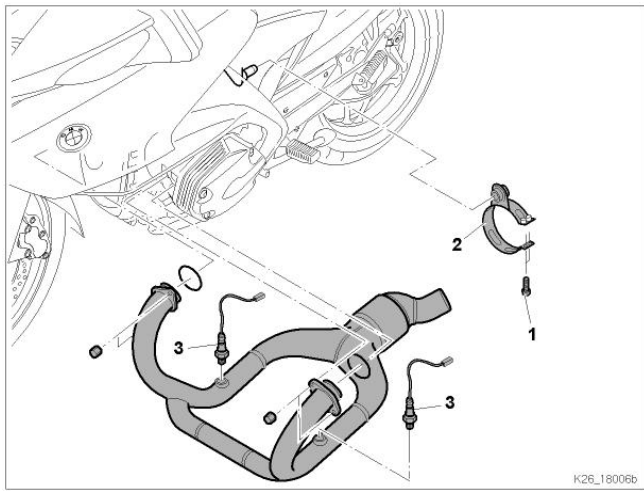
- Remove nuts (1) from the manifold on left and right.



- Remove screws (4) and fully bend open clamp (3).
- Remove manifold by pulling forward.
- Remove gaskets (2) on left and right.

(-) Replacing exhaust elbow

► Disassembling exhaust manifold



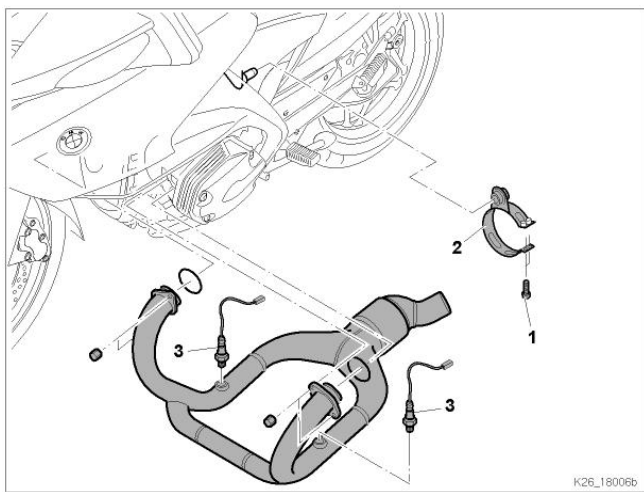
- Remove oxygen sensors (3) with socket (No. 11 7 020) .




- Remove the old manifold and install a new manifold.


► Assembling exhaust manifold

- Clean the threads.
- Grease threads of oxygen sensors.



 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Install oxygen sensors and tighten with socket (No. 11 7 020) .

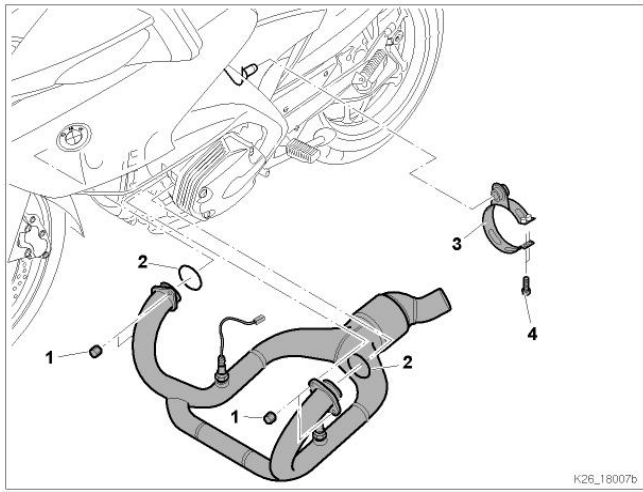
 Tightening torques		
Oxygen sensor to exhaust	45 Nm	


elbow, M18 x 1.5 Optimoly TA		
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(-) Installing exhaust elbow

- Replace seals (2), **apply** thin layer of grease and fit in cylinder head.




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

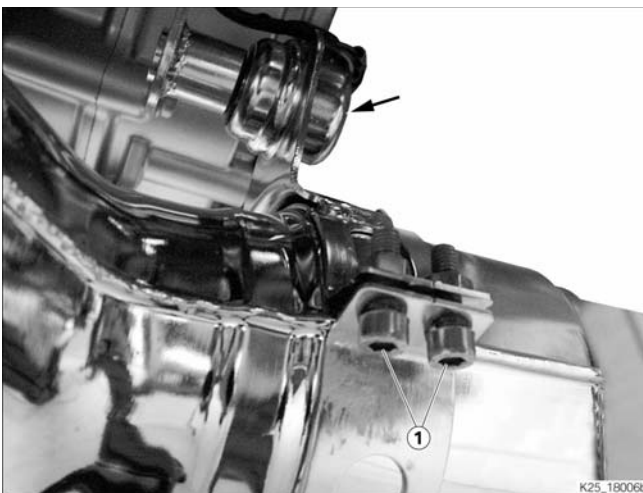
- Secure left and right manifolds with nuts (1) hand-tight on cylinder head.
- Grease rubber mount and inner surface of clamp (3).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slide clamp (3) onto the exhaust manifold from behind and engage the clamp on the bracket.
- Tighten nuts (1).

 Tightening torques		
Manifold to cylinder head, Acorn nut M8	21 Nm	

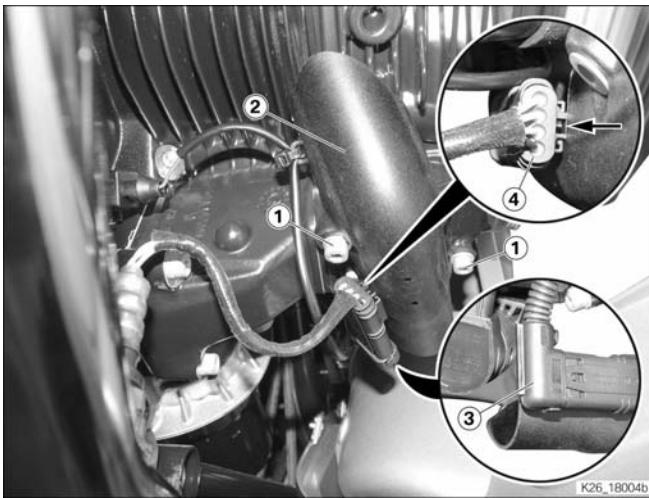
- Align the clamp (arrow) on the manifold and tighten screws (1).




 Tightening torques		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	

► Securing both oxygen sensor plugs

- Secure plug housing (4) of oxygen sensors on ignition

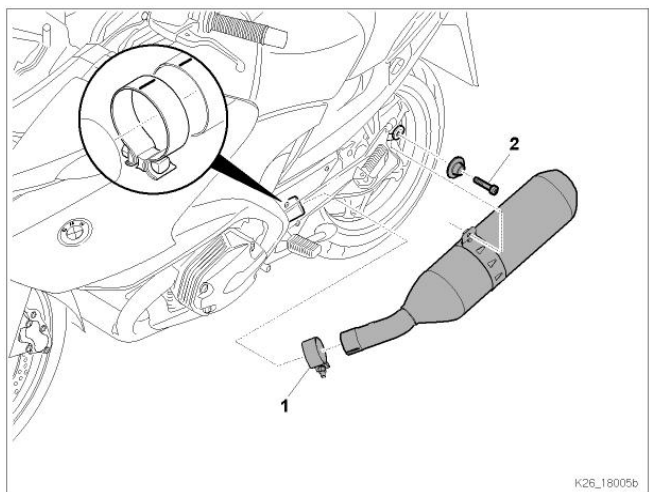


- coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	




- Install front screw (1) in both bottom sections of the fairing.




(-) Installing silencer

- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

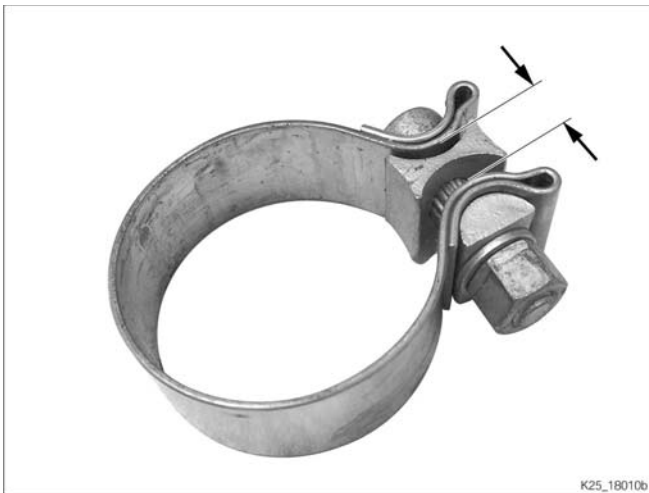
- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**

Test

- Check distance ([arrows](#)) between silencer and rear wheel.



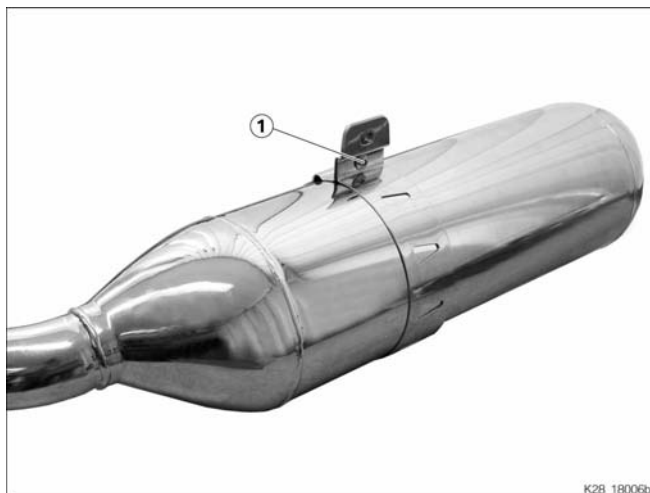
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



! Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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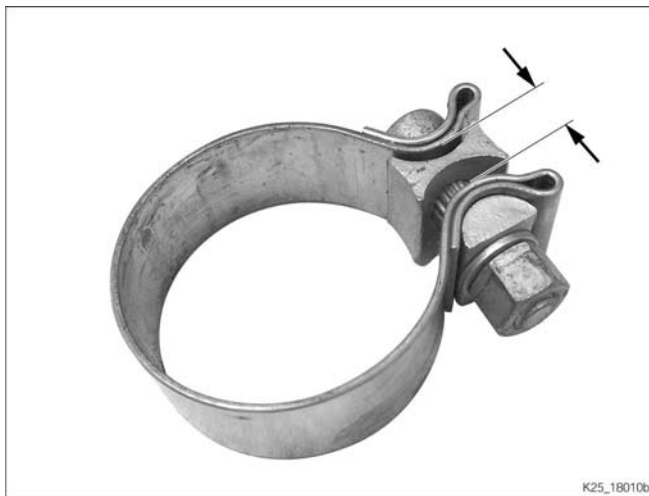


▷ **Checking Torca clamp on silencer**


- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



K25_18010b

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:


- Replace the Torca clamp.



- Once again check distance (*arrows*) between silencer and rear wheel.

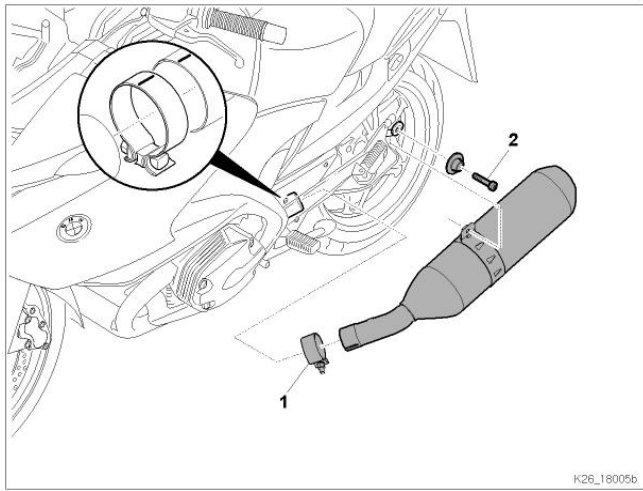


K26_18001b

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

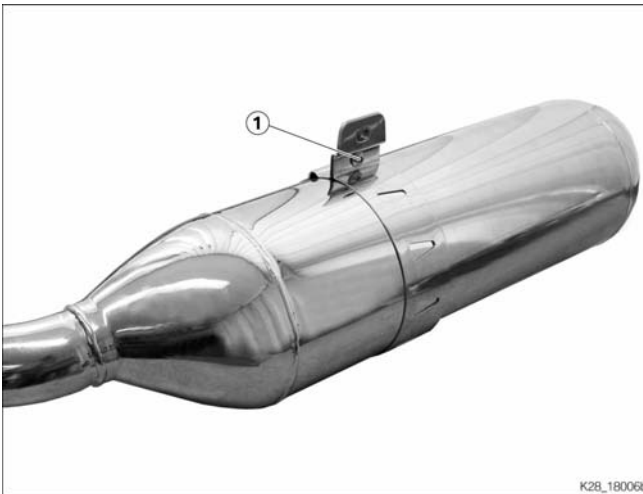


 **18 12 095 Replacing end silencer**




(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



(-) Replacing silencer

- Undo screws (1) and remove clamp.
- Dispose of the old silencer in an environmentally friendly manner.
- Apply a thin coat of grease to screws (1) and the inner face of clamp.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

 **Attention**

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.

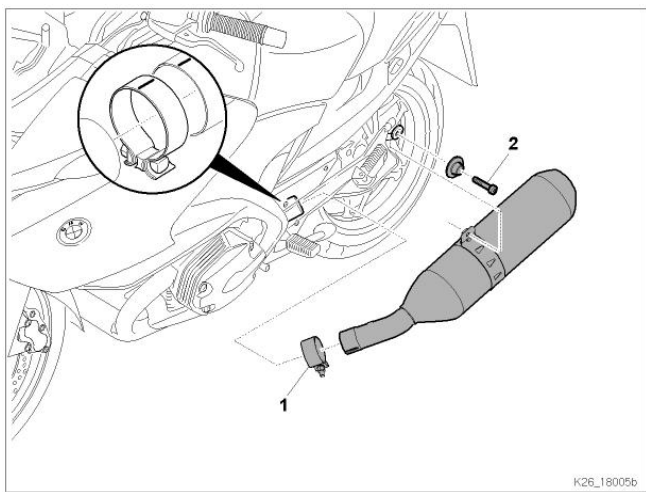
- Provisionally install clamp with screws (1).

 **Note**


The final position of the clamp becomes apparent when the silencer is installed.

► Installing silencer


- Grease the inner face of Torca clamp (1).



K26_18005b


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

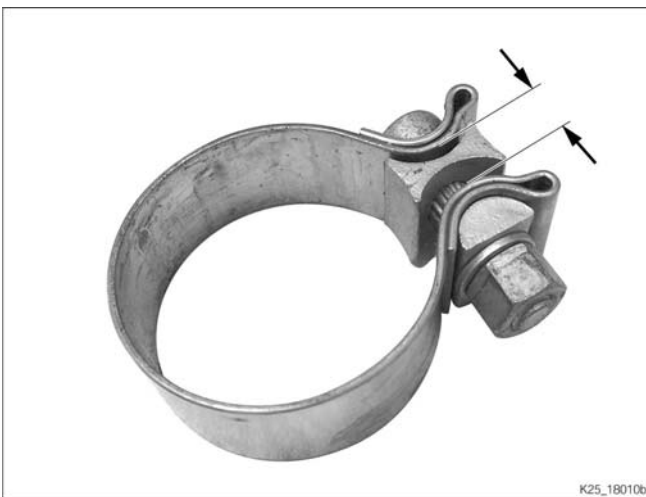
 Tightening torques		
End silencer to footrest support, M8	19 Nm	



K28_18007b

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.




K25_18010b

▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



▷ **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.



Technical data

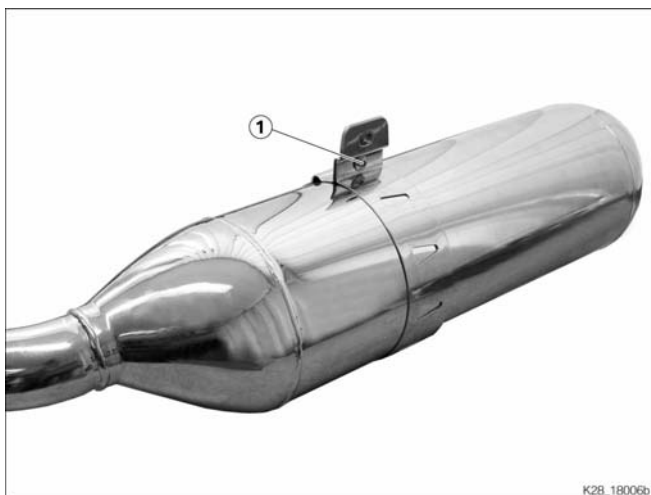
Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.




Consumables/lubricants

Optimoly TA	High-	18 21 9
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	temperature assembly grease	062 599
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- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




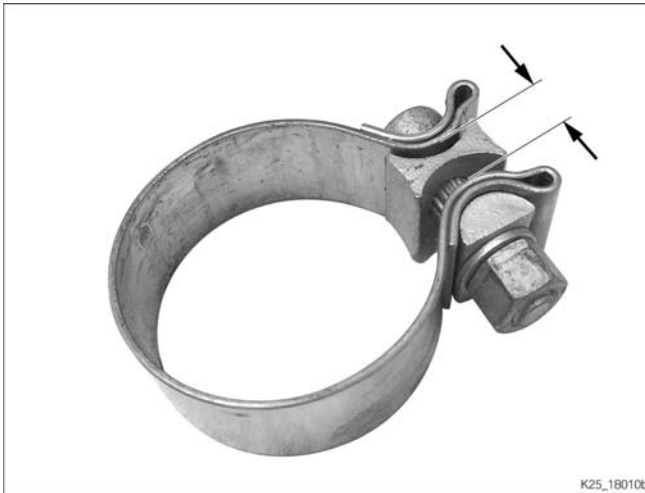
▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	



K25_18010b


Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.

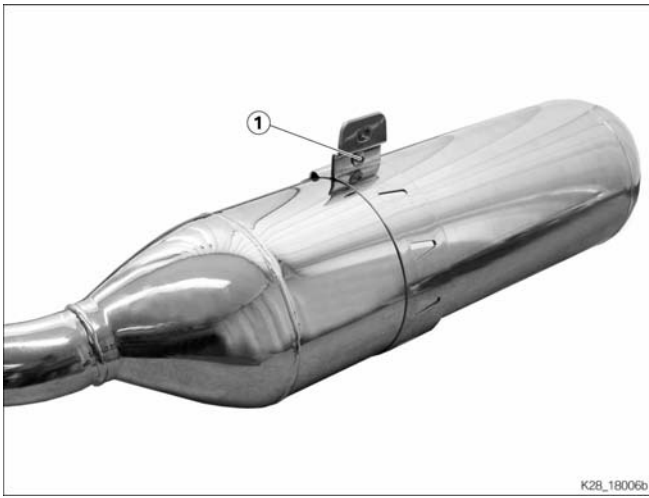
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



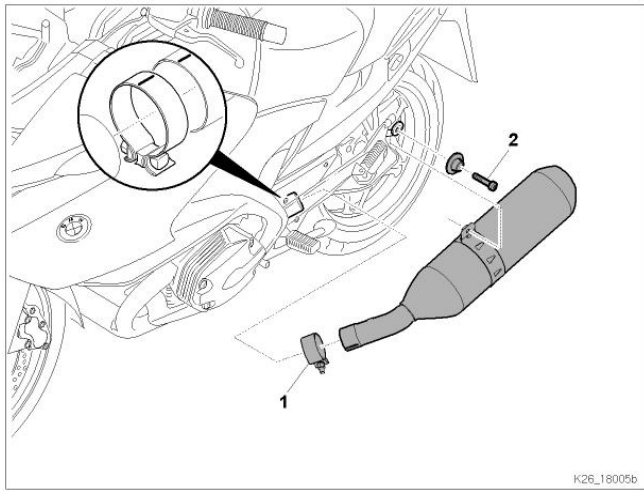
K26_18001b



- Align clamp and tighten screws (1).



18 21 000 Replacing rubber mount for silencer



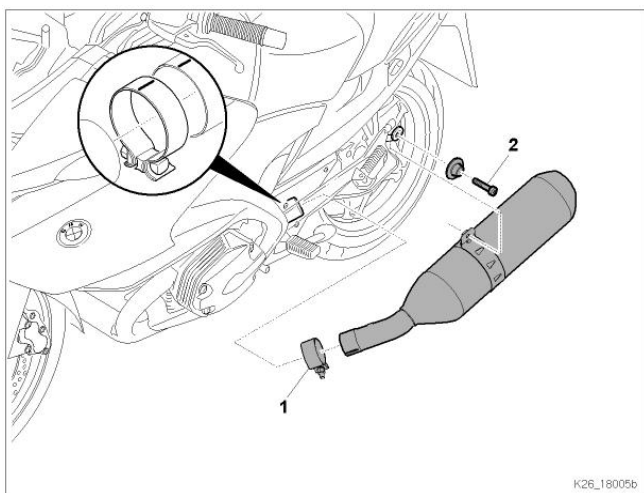
(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.




(-) Replacing rubber mount for silencer

- Remove rubber mount (1) with sleeve (2).
- Install a new rubber mount, making sure that it is installed in the correct position.
- Install the sleeve.




(-) Installing silencer

- Grease the inner face of Torca clamp (1).

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

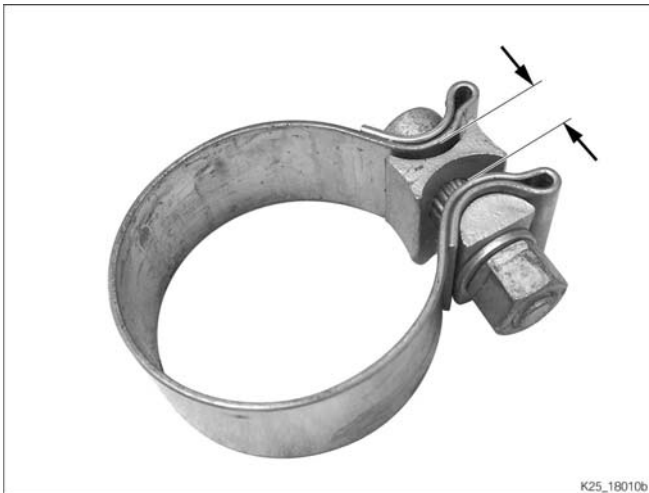
 Tightening torques		



End silencer to footrest support, M8	19 Nm	
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- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:


- Replace the Torca clamp.



► **Checking distance between silencer and rear wheel**

Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

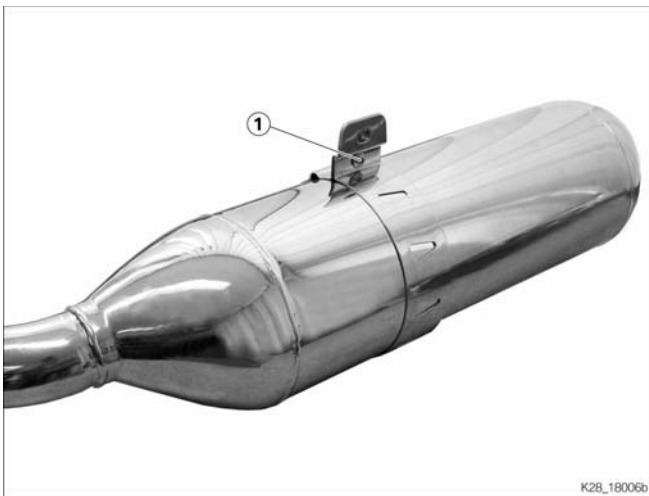


Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



⚠ Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




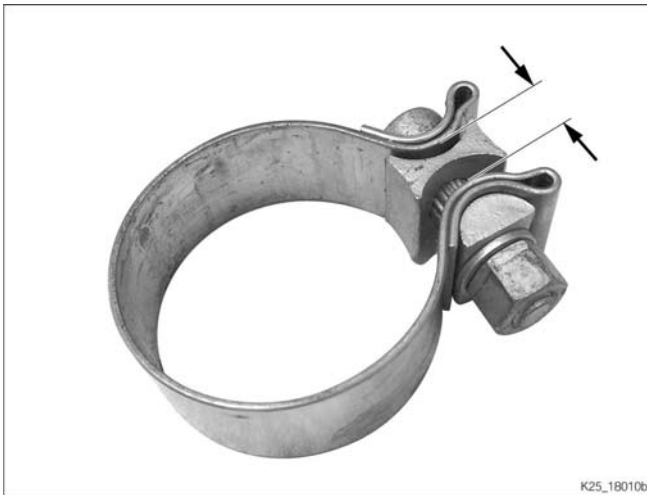
▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.

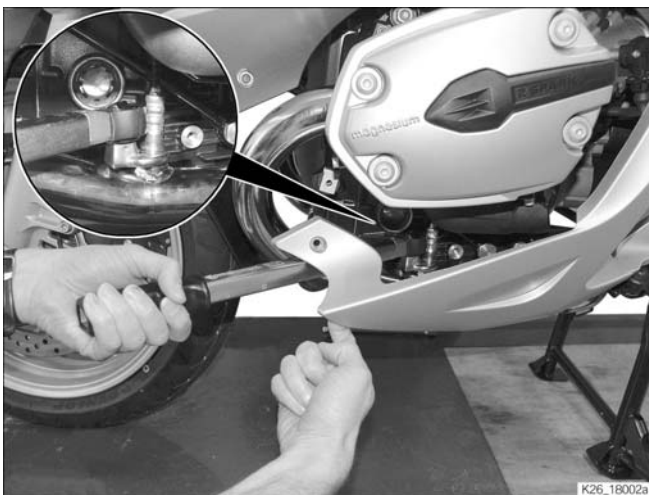
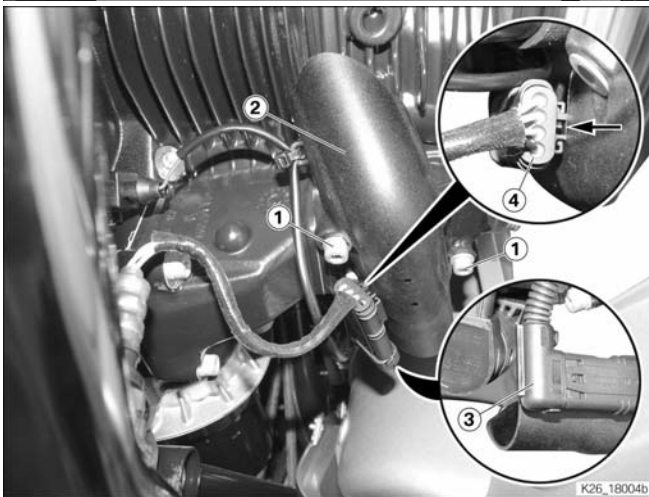


- Once again check distance ([arrows](#)) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



 **18 30 040 Replacing oxygen sensors**




(-) Removing both oxygen sensors

- Undo front screw (1) from both bottom sections of the fairing.


- Remove screws (1).
- Detach cover over secondary spark plugs (2).
- Disconnect plug (3) for oxygen sensors.
- Release catch (arrow) of plug housing (4) and remove plug housing.
- Remove oxygen sensors.

(-) Installing both oxygen sensors

- Clean the threads.
- Grease threads of oxygen sensors.


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

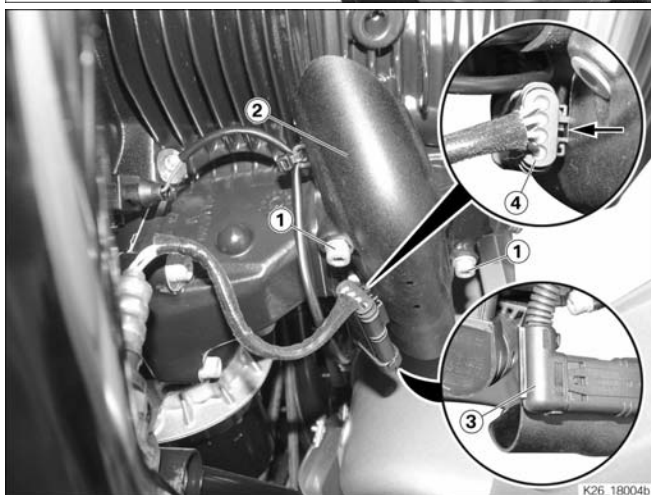
- Install and tighten left oxygen sensor.

 Tightening torques		
Oxygen sensor to exhaust elbow, M18 x 1.5 Optimoly TA	45 Nm	




- Install and tighten right oxygen sensor.

 Tightening torques		
Oxygen sensor to exhaust elbow, M18 x 1.5 Optimoly TA	45 Nm	



- Secure plug housing (4) of oxygen sensors on ignition coil cover (2), making sure the catch (arrow) locks in position.
- Connect plug (3) for oxygen sensors.
- Secure ignition coil cover (2) with screws (1).

 Tightening torques		
Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	



- Install front screw (1) in both bottom sections of the fairing.

21 21 000 Removing and installing or replacing clutch

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_46016a

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



K26_52002b

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



K26_52001b

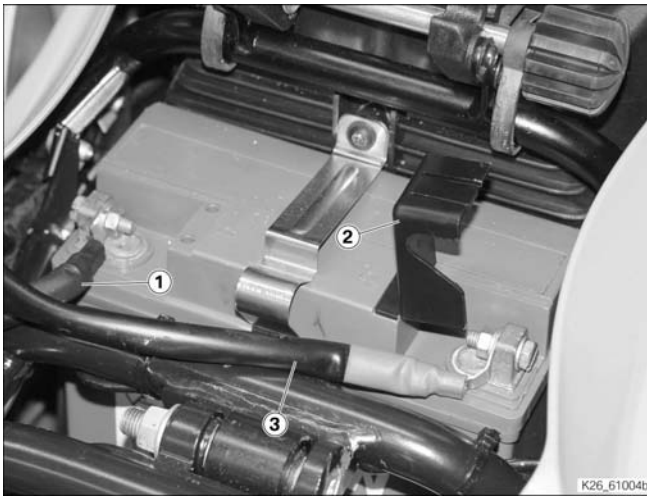
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

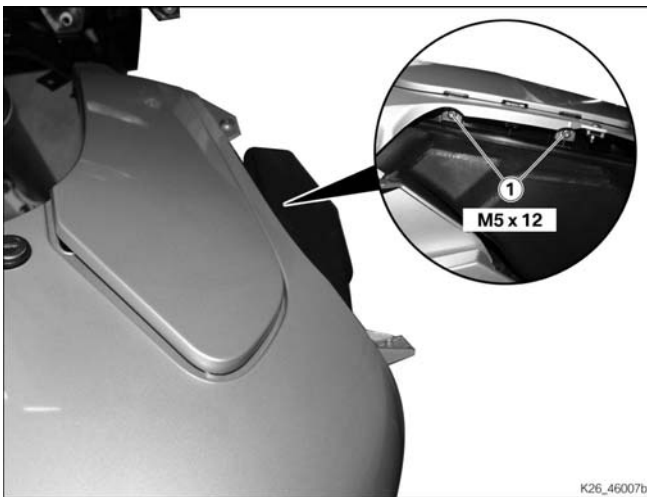
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



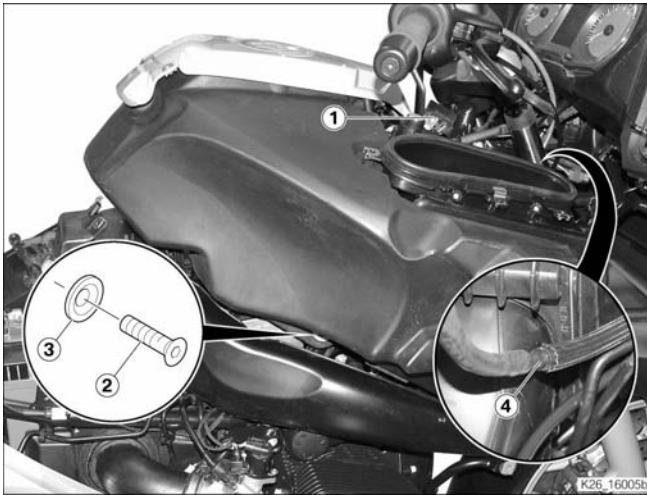
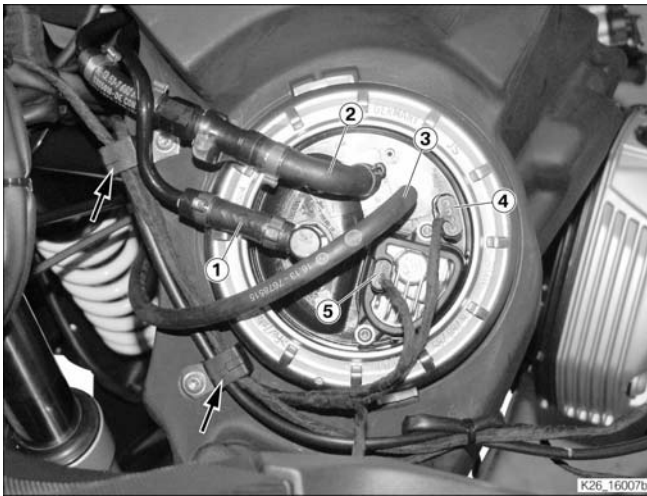
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

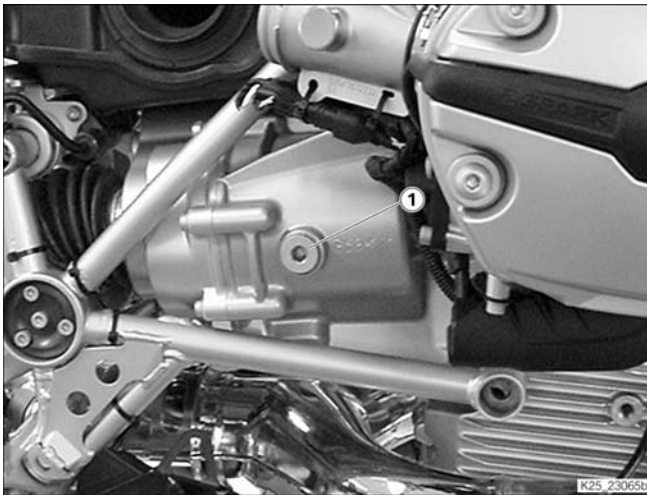


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Draining gearbox oil



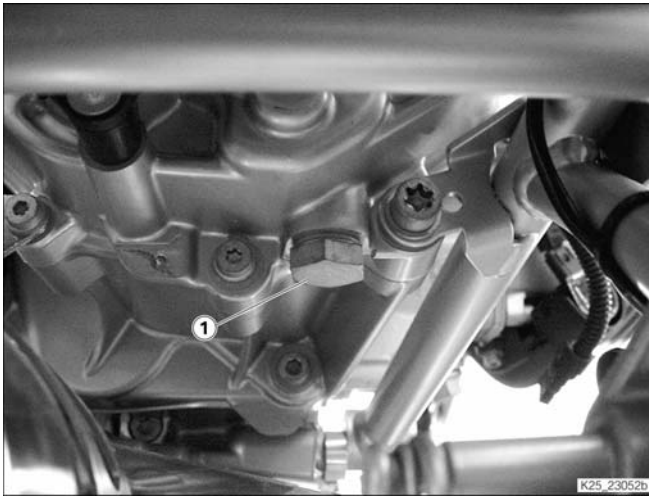
Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the gearbox.
- Remove oil filler plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.

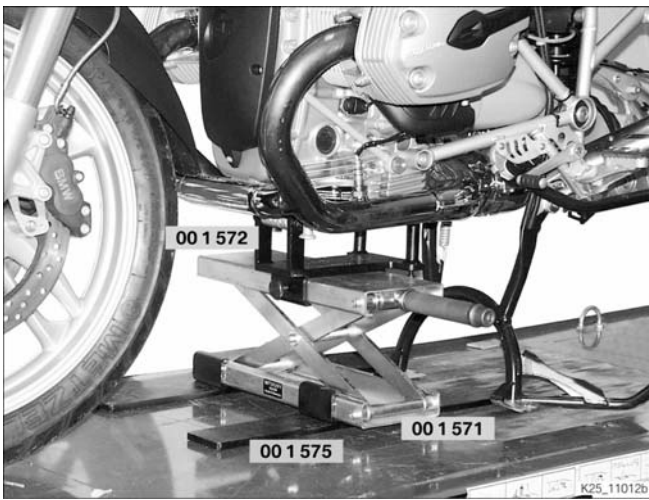
- Remove drain plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.
- Remove all chips of metal from the drain plug.
- Fit a new sealing ring to the oil drain plug and install and tighten the plug.



Tightening torques

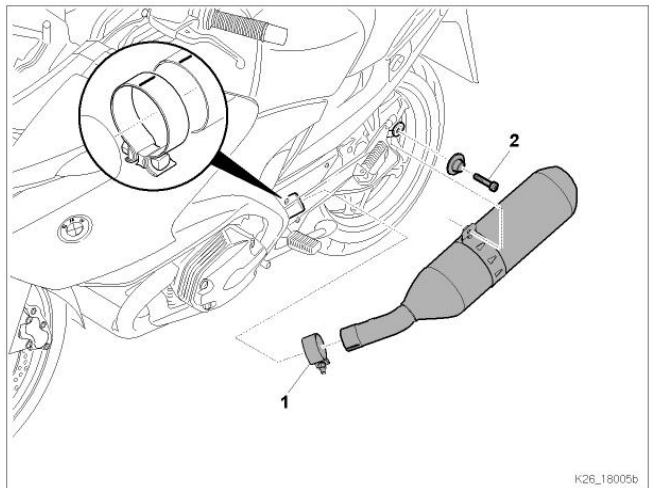
Oil drain plug, gearbox	30 Nm	
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(-) Installing engine stand



- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

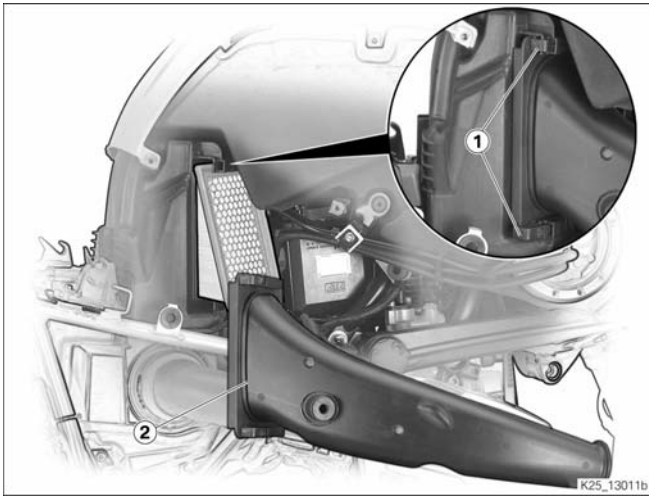
(-) Removing silencer



- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

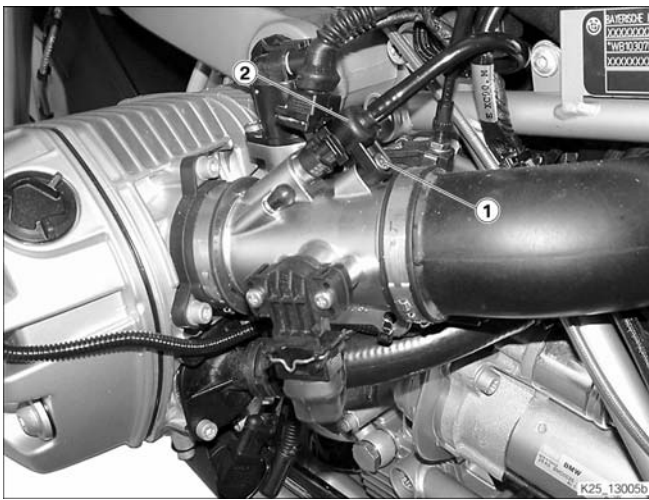
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



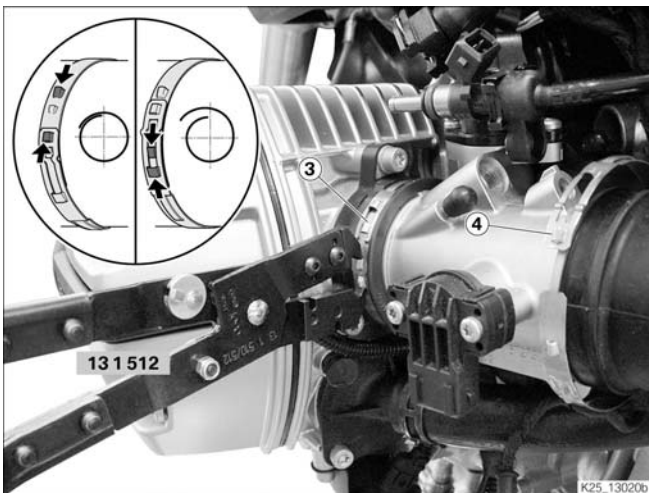
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.

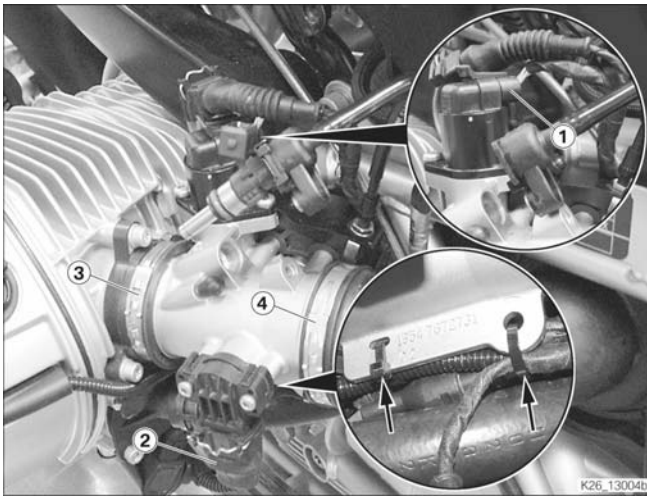


(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
-



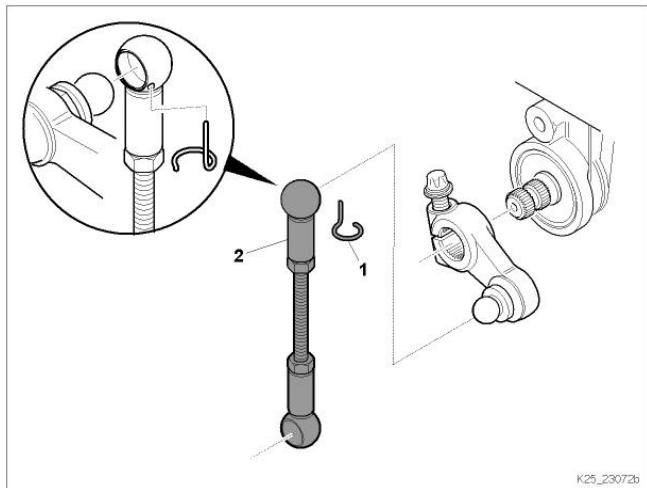
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

(-) Securing throttle valve stub with cable divider



- Tie up throttle valve stub and cable divider with cable tie (arrow).

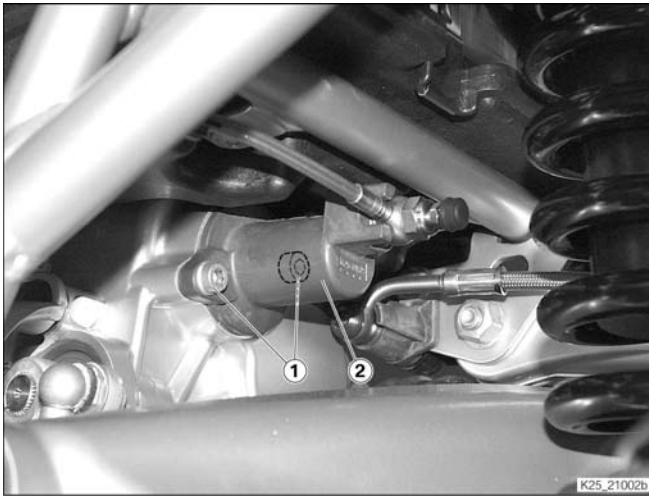
(-) Disengaging selector rod from shift lever



- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.

(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
-

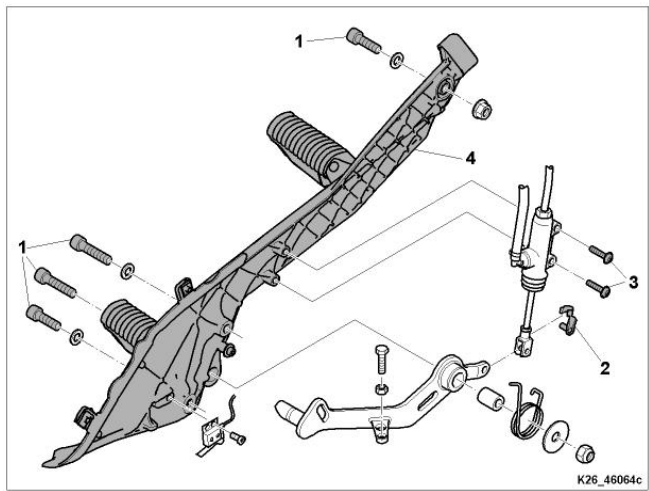


- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.


(-) Removing right footrest plate



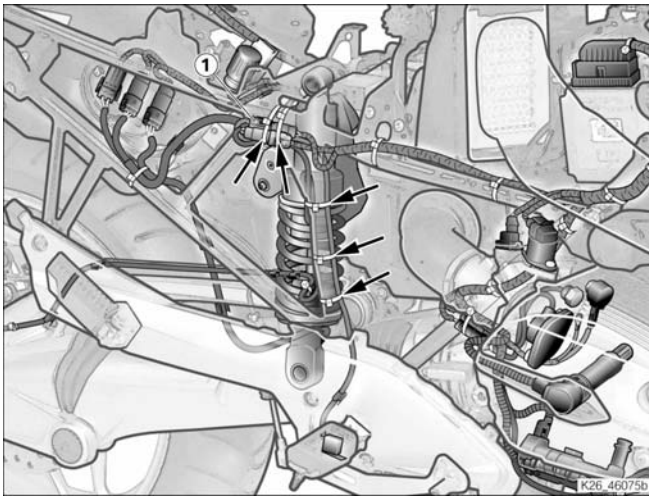
- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.

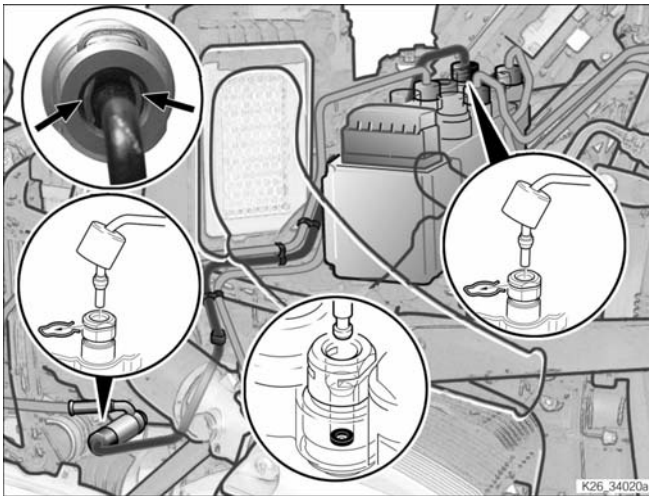
 Technical data			
Release temperature, screws for rear brake master cylinder		100 °C	

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.



(-) Disconnecting brake pipe for rear wheel circuit from pressure modulator

- Push the protective cap up.
- Remove the spring clip.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap the area around the connector in a cloth.
- Open the retaining clips, lift the brake pipe out of the pressure modulator and catch escaping brake fluid with a cloth.
- Seal the open end of the brake pipe to prevent brake fluid from dripping.

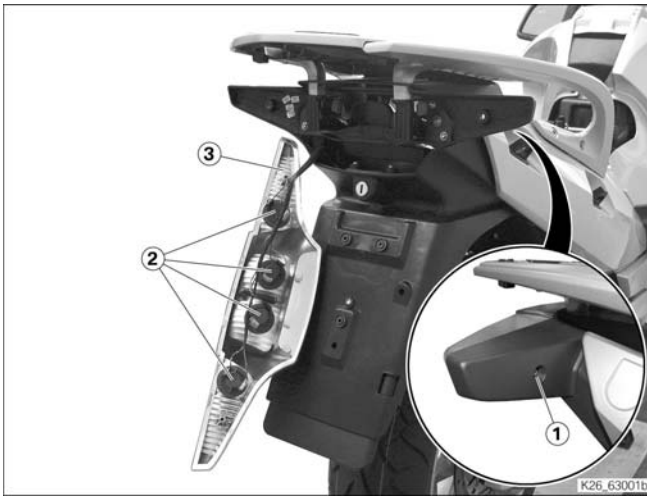


Note

Use the protective cap from a bleed screw to seal the brake pipes.

(-) Removing rear-light unit

- Remove screws (1).



- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).

(-) Disengaging wiring harness at rear

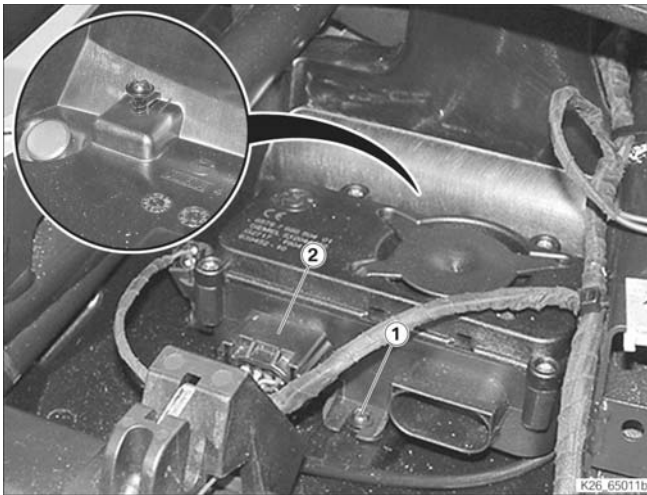
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



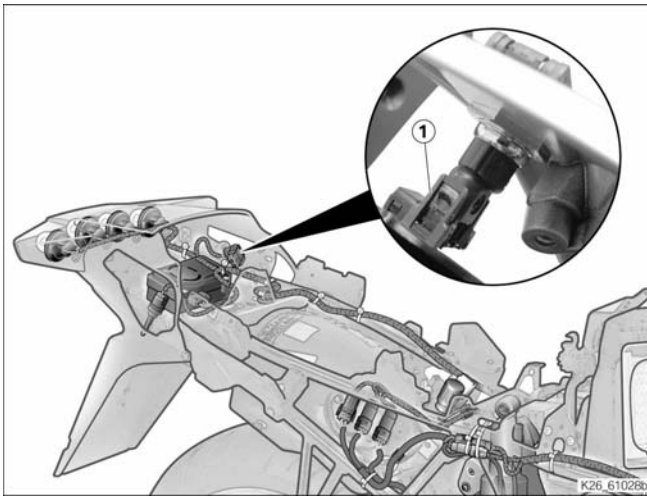
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

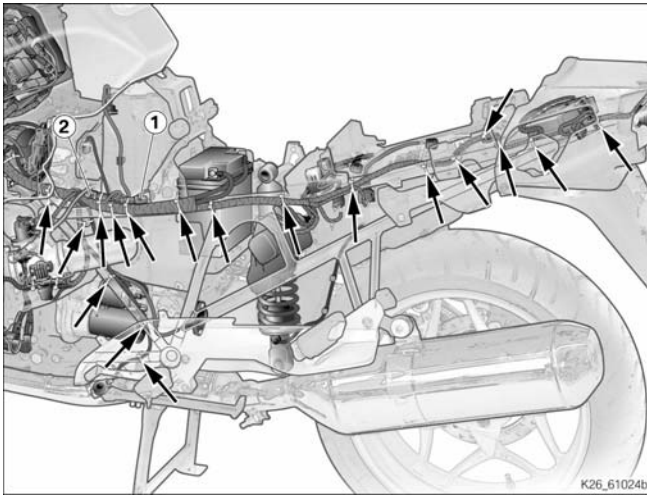


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.

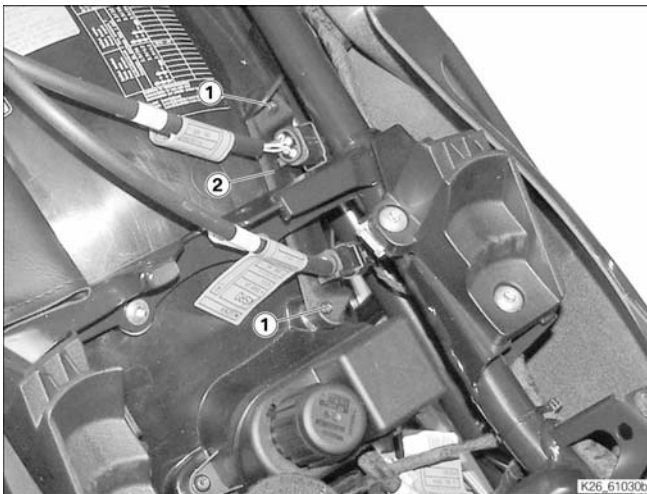


- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.

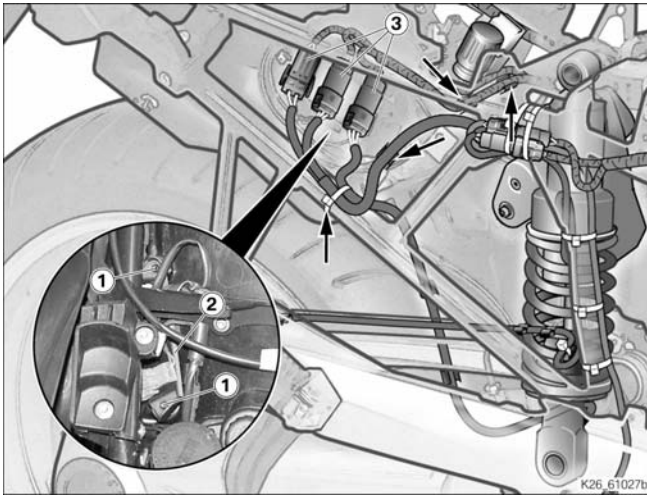
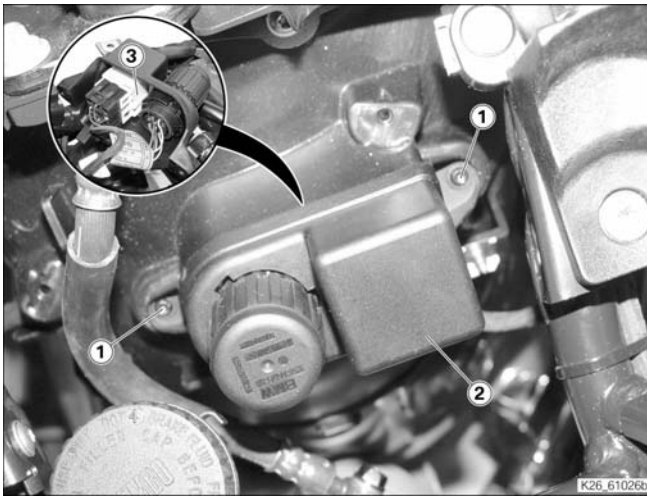


Variant, Seat heating

- Remove screws (1).
- Pass holder (2) forward with the cables.

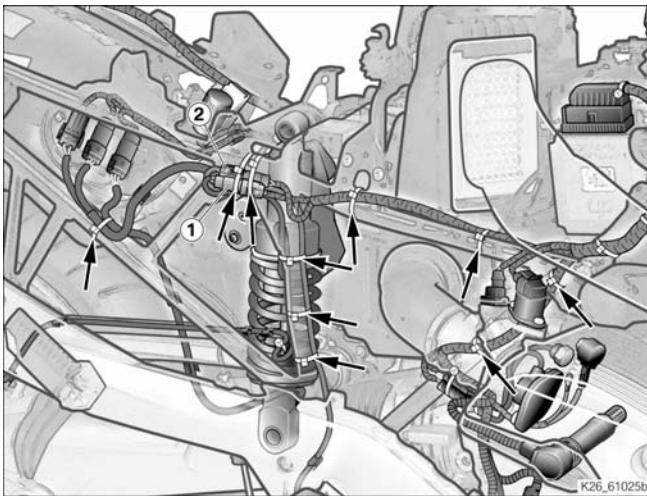


- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.



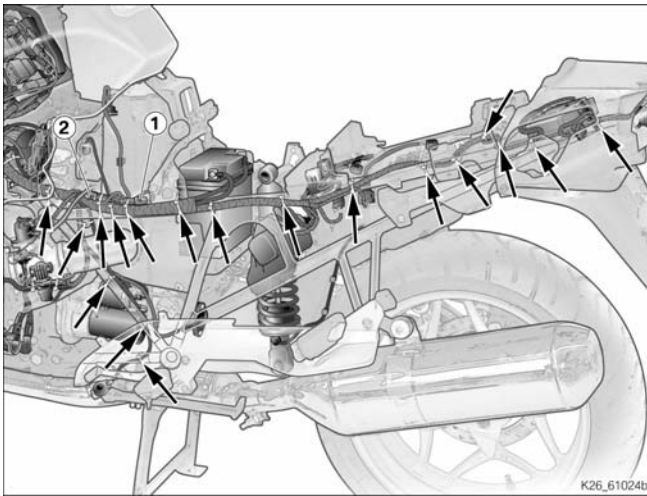
Variant, ESA

- Remove screws (1).
- Pass holder (2) forward with the cables.
- Disconnect plug (3) of the spring strut.



- Disconnect plug (1) of the speed sensor.

- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.



(-) Removing rear section of motorcycle

- Open hose clip (1).
- Disconnect the hose from the intake air silencer.

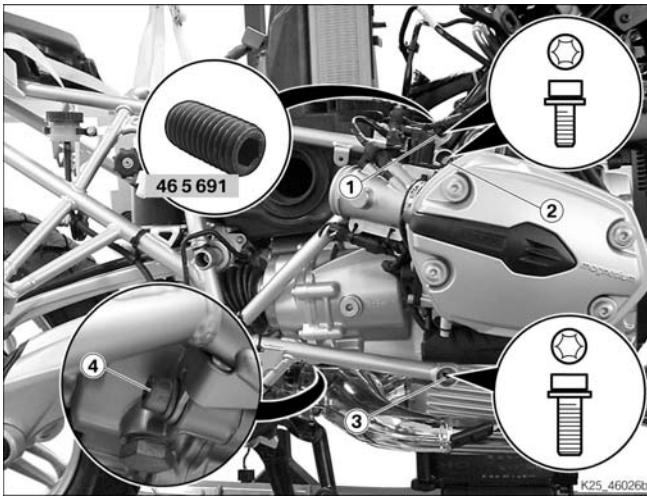


- Secure the front wheel on the lifting platform.
- Using straps, secure the rear section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.



► Releasing threaded fastener on rear frame

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.



⚠ Attention

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

Apply masking tape to the part of the swinging arm that could be damaged.

- Slacken screw (4), but do not remove it at this point.

▷ Pressing universal shaft off gearbox output shaft

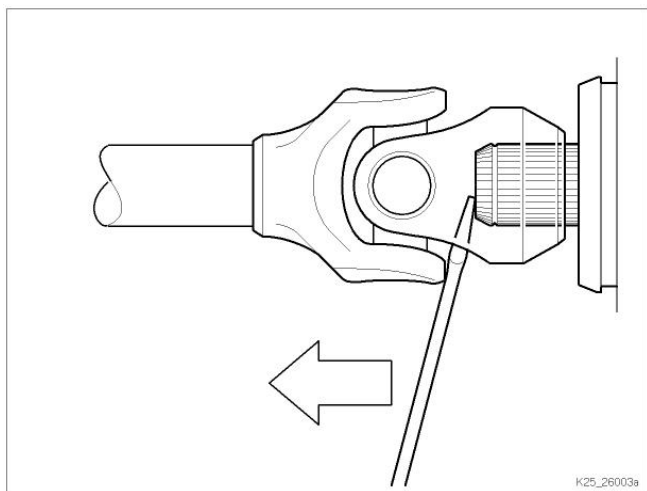
- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.



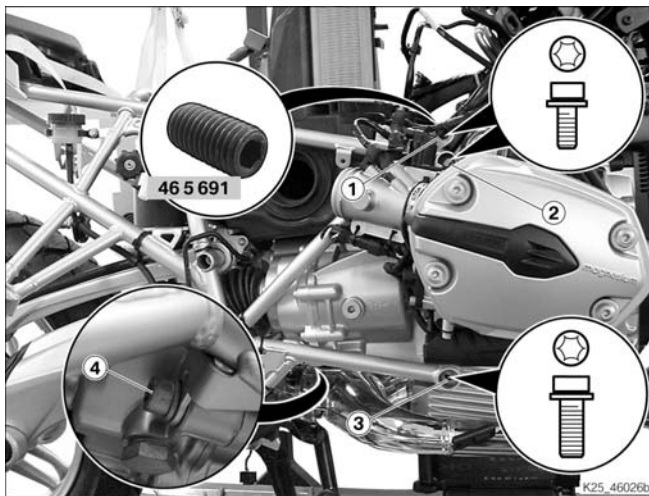
- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the shaft in this position.
- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.

📄 Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- ◁**
- Remove screw (4).



- Thread the fuel-tank breather hose out of the rear frame.
- Disconnect the fuel pressure regulator from the intake air silencer.
- Using crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) , carefully lift the rear section clear of the motorcycle, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.

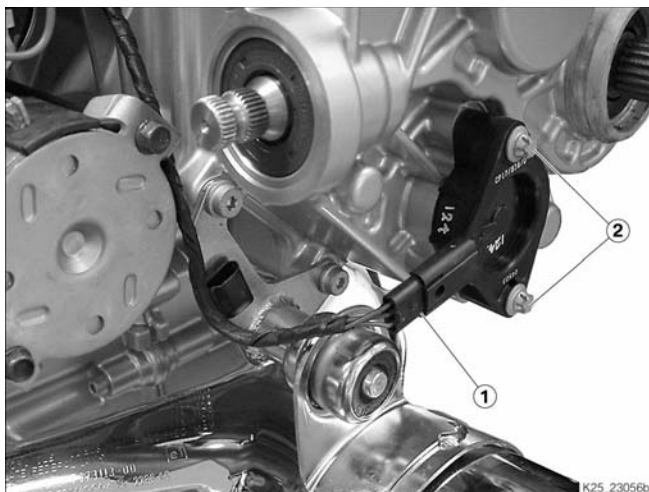


Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Pass the control-circuit line with the brake master cylinder forward out of the way.
- Carefully set down the rear section where it will not be damaged.

(-) Removing gearbox potentiometer



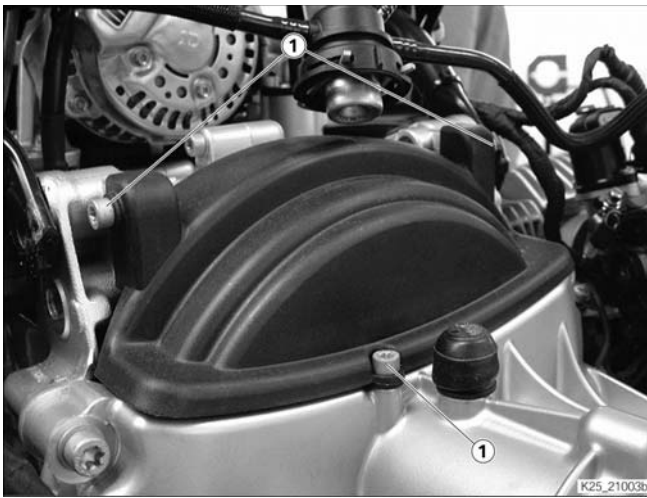
- Disconnect plug (1) of the gearbox potentiometer.
- Release the cable from the cable clips.
- Remove screws (2) from the gearbox potentiometer.
- Remove the gearbox potentiometer, noting the O-ring.

(-) Removing starter



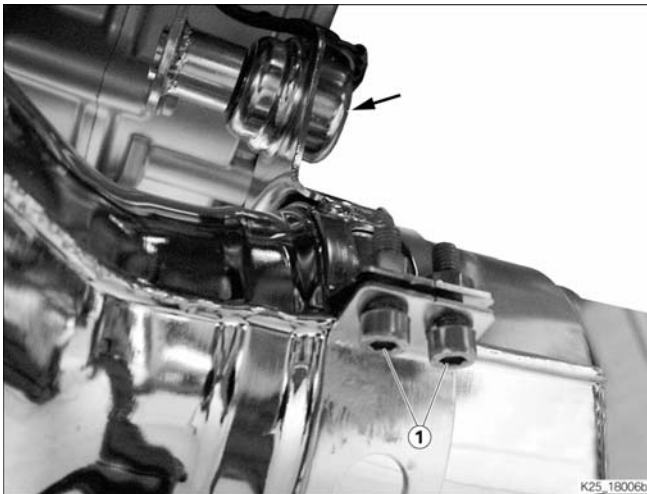
- Disconnect "starter positive" cable (1) (terminal 30).
- Disconnect "starter start signal" plug (2) (terminal 50).
- Remove screws (3).
- Remove the starter.

(-) Removing cover for clutch



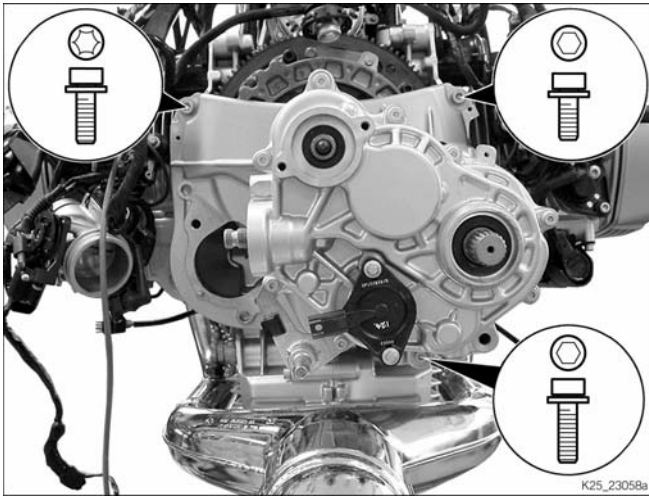
- Remove screws (1).
- Carefully slip the clutch cover to the rear underneath the pressure modulator and remove.
- Install screws to hold the pressure modulator in position.

(-) Removing gearbox



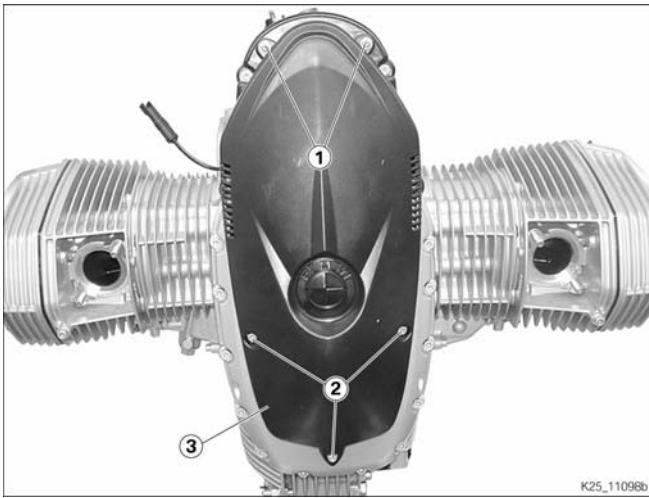
- Remove screws (1) of the clamps on the exhaust manifold.
- Pull clamp (arrow) off the bracket.

- Remove 3 screws.
- Pull the gearbox straight to the rear to remove.
- Keeping it straight to ensure that oil does not escape through the breather, place the gearbox on a smooth, level surface.



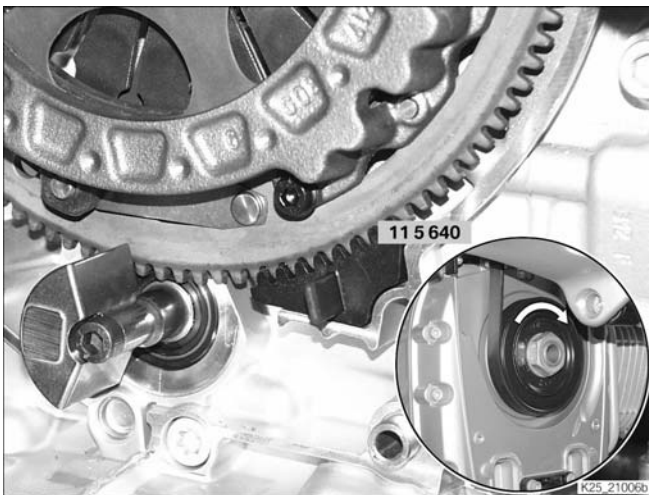
(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).

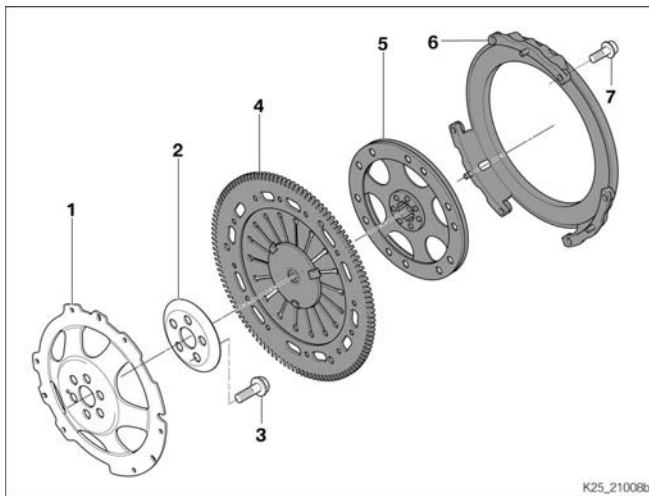


(-) Removing clutch

- By means of the belt pulley, turn the engine in the normal direction of rotation until the engine locking device can be inserted.
- Insert engine locking device (No. 11 5 640) .



- Working in diagonally opposite sequence, loosen screws (7) in stages.
- Remove engine locking device (No. 11 5 640) .
- Remove the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6).



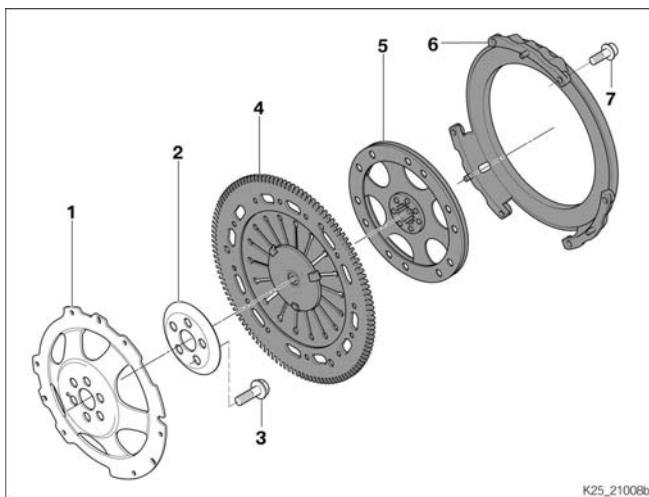
K25_21008b

(-) Checking clutch for foreign matter

- Remove housing cover (6) from thrust plate (4) and remove clutch plate (5).

Test

- Check the friction faces of thrust plate (4) and housing cover (6) for foreign matter.




K25_21008b

Result: Oil or grease on friction faces.

Measure:

- Clean and degrease the friction faces.

 Consumables/lubricants		
Brake cleaner	Cleaners	83 11 9 407 848

Test

- Check clutch plate (5) for foreign matter.

Result: Oil or grease on clutch plate.

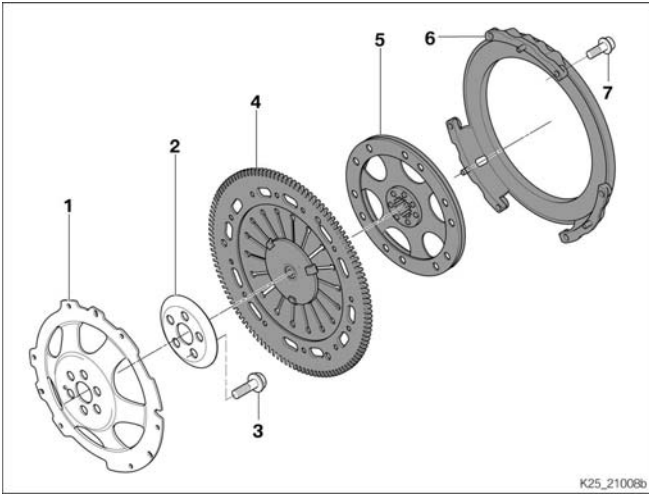
Measure:

- Replace clutch plate (5).

=> Checking clutch for wear (clutch removed) (Position: 21 21 600)

(-) Installing clutch


- Install the thrust plate together with diaphragm spring (4), clutch plate (5) and housing cover (6) in clutch housing (1).



Note

The clutch components are all precision-balanced. It is not necessary to check for identification marks when assembling.

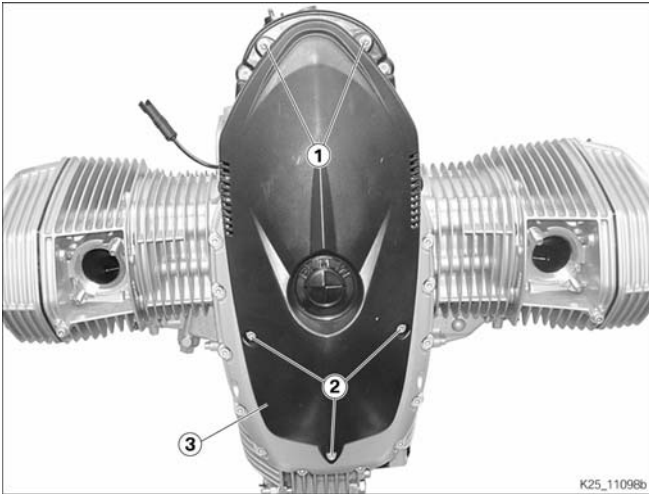
- Insert screws (7).
- Use centering pin for clutch (No. 21 2 673) to centre the clutch plate.
- Insert engine locking device (No. 11 5 640) .
- Install screws (7) and tighten in correct tightening sequence.


 Tightening torques		
Never re-use the original screws, M6 x 20, in diagonally opposite sequence and stage by stage	12 Nm	

- Remove engine locking device (No. 11 5 640) and centering pin for clutch (No. 21 2 673) .

(-) Installing belt guard


- Install belt guard (3) and secure with screws (1) and (2).



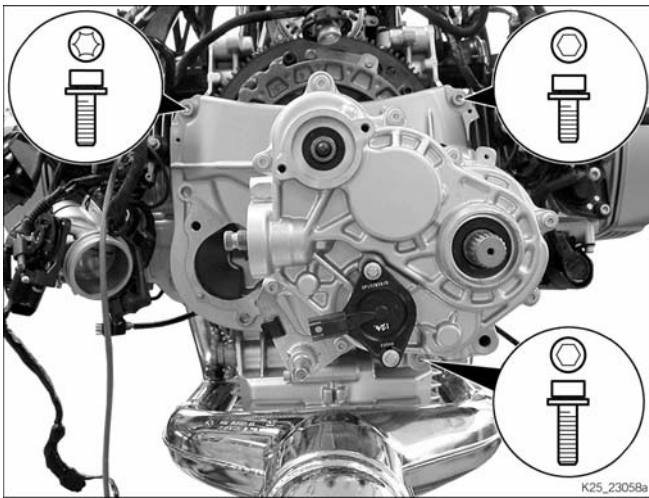
 Tightening torques		
Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	

(-) Installing gearbox

- Remove dirt and old lubricant from the splines of the clutch hub and the gearbox input shaft.
- Lubricate the splines of the clutch hub and the gearbox input shaft.

 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

- Position the gearbox with the gearbox input shaft just




introduced into the hub of the clutch plate.



Note


You will find it easier to introduce the splined end of the gearbox input shaft into the clutch hub if you engage a gear and turn the gearbox output shaft.

- Slide the gearbox over the reamed sleeve until it mates with the crankcase.
- Install 3 screws.

 Tightening torques		
Gearbox to engine block, M8 x 35	19 Nm	
Gearbox to engine block, M8 x 70	19 Nm	
Gearbox to engine block, M8 x 50	19 Nm	

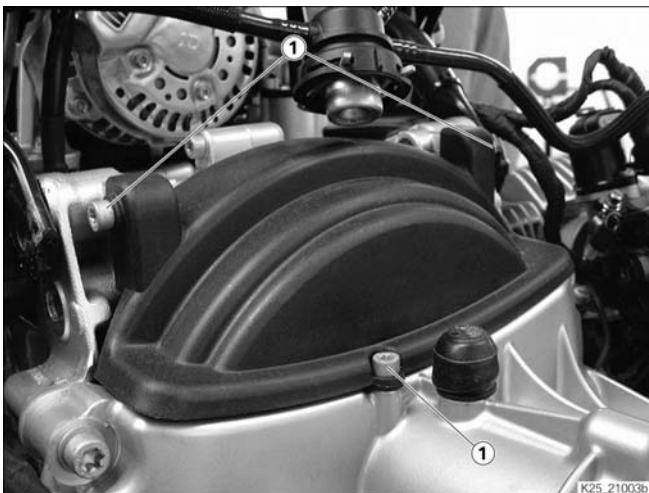



- Slip the exhaust clamp onto the holder on the gearbox and align it with the exhaust.
- Tighten screws (1).

 Tightening torques		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	

(-) Installing cover for clutch

- Remove screws (1).
- Carefully fit clutch cover under the pressure modulator and align.
- Install screws (1).




 Tightening torques		
Clutch cover to engine, M6 x 16	8 Nm	


(-) Installing starter



- Install the starter.
- Install screws (3).

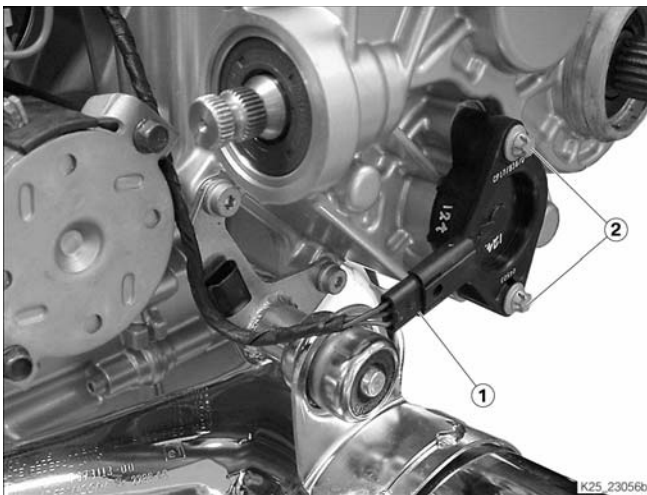
 Tightening torques		
Starter with gearing to engine, M8 x 60	19 Nm	

- Connect "starter positive" cable (1) (terminal 30).


 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).

(-) Installing gearbox potentiometer




- Install the gearbox potentiometer, noting the O-ring.
- Install screws (2).

 Tightening torques		
Gear potentiometer to gearbox	9 Nm	

- Connect plug (1) to the gearbox potentiometer.
- Clip the cable into the cable clips.

(-) Installing rear section of motorcycle

- Remove dirt and old lubricant from the splines of the gearbox output shaft.
- Lubricate the splines of the gearbox output shaft.

 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

- Carefully manoeuvre the rear section of the motorcycle into position at the front section, making sure that the wiring harness is correctly positioned.
- Mate the universal shaft with the gearbox output shaft and align the rear frame with the anchorages.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have




to be disassembled in order to permit reinstallation of the universal shaft.

- Carefully turn the rear wheel to check that the universal shaft is still correctly positioned.
- Position the fuel pressure regulator on the intake air silencer.



► **Securing rear frame to motorcycle**

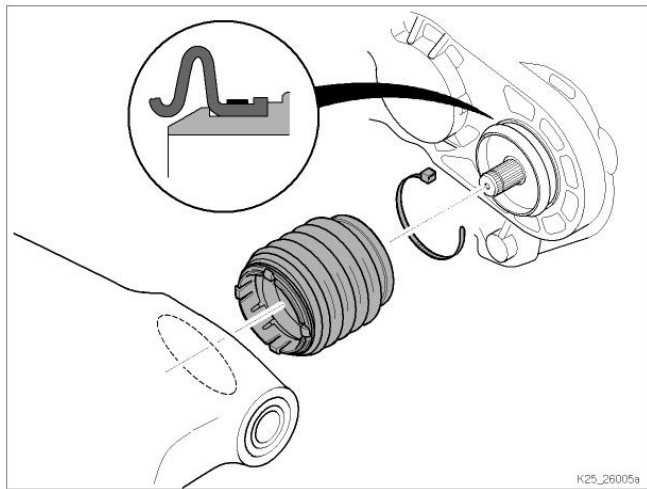
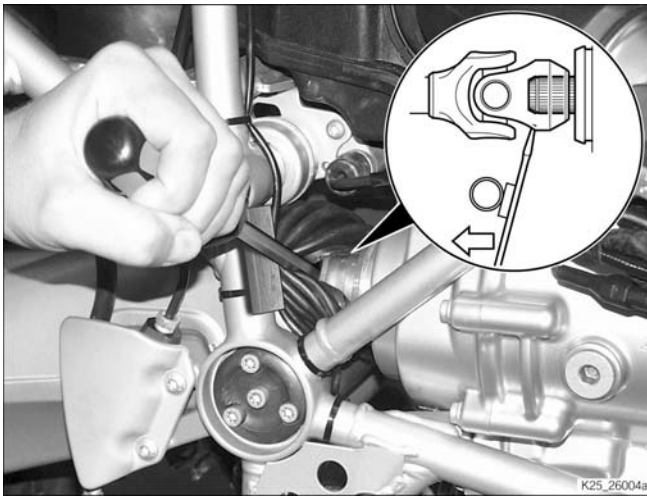
- Install screw (4), but do not tighten it at this point.
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert screws (1) on left and right.
- Tighten screw (4).
- Tighten screws (1), (2) and (3).

 Tightening torques		
Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	



► **Pressing universal shaft onto gearbox output shaft**

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.



Consumables/lubricants

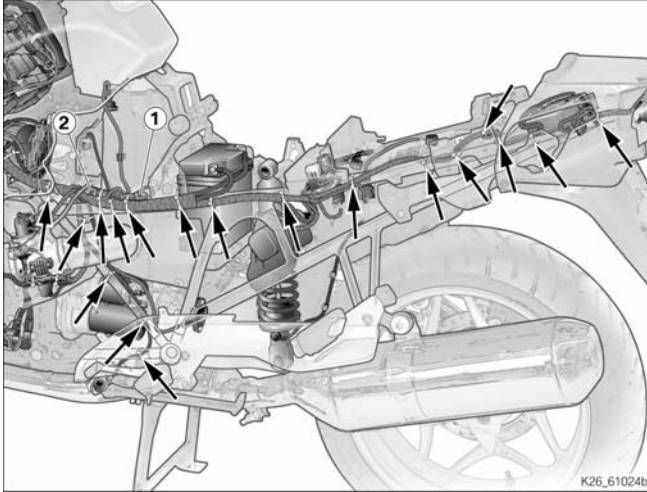
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174
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- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.

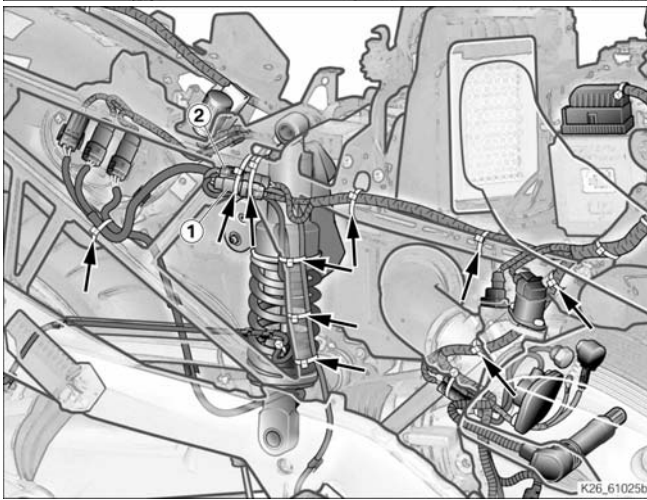
- ◀
- Release the straps securing the front wheel and disengage crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) with the straps from the rear section of the motorcycle.
- Release the control-circuit line complete with the brake master cylinder and pass it through to the rear.
- Route the fuel-tank breather hose into position along the rear frame.
- Connect the hose of the crankcase breather to the intake air silencer.
- Slide hose clamp (1) into position.



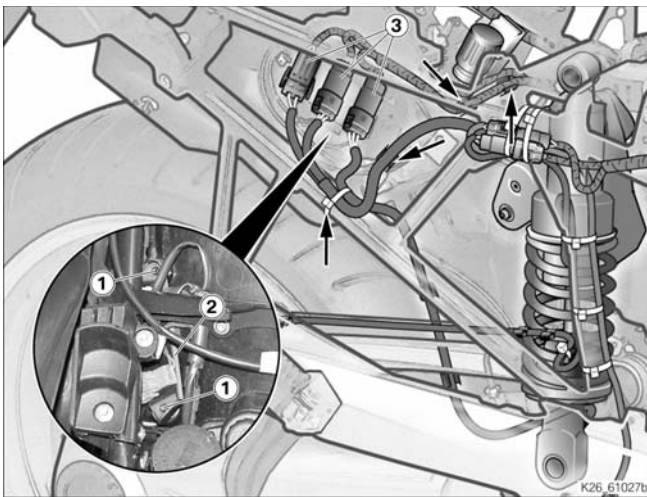
(-) Securing wiring harness at rear



- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.



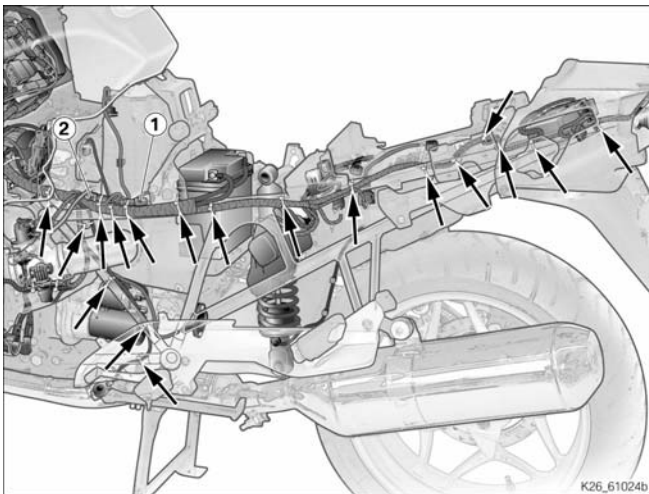
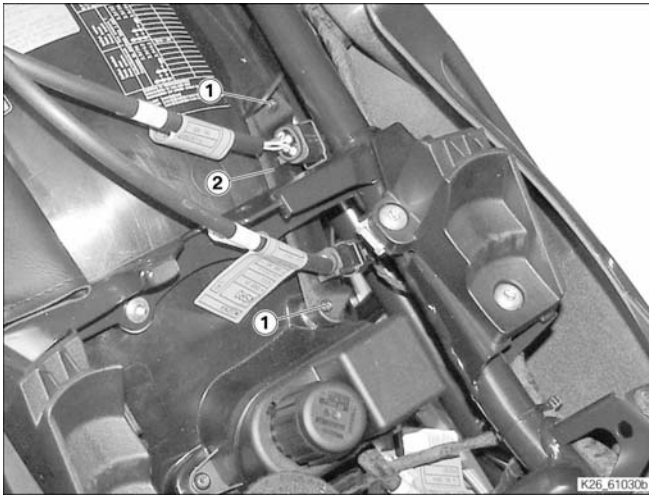
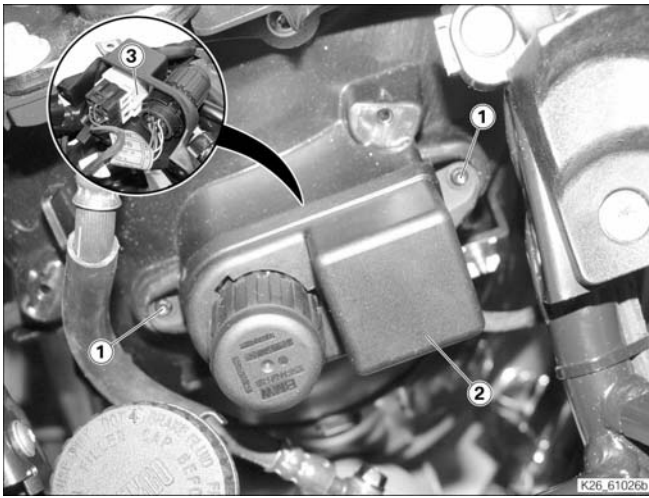
- Connect plug (1) of the speed sensor.



Variant, ESA

- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Secure holder (2) with screws (1).

- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).



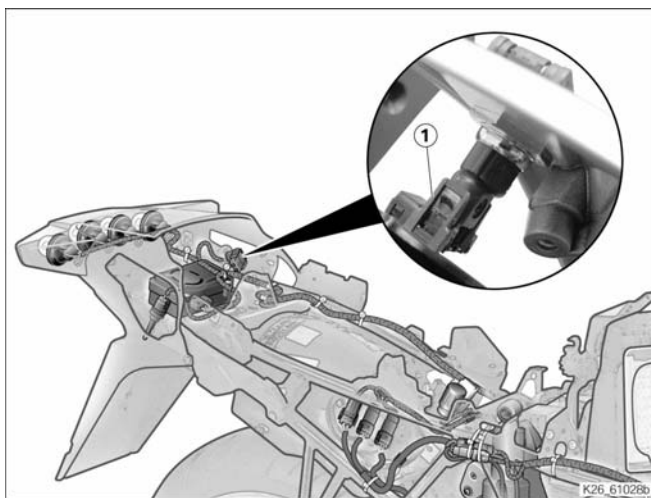
Variant, Seat heating

- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

- Secure the wiring harness to the rear frame with cable ties (arrows).

Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



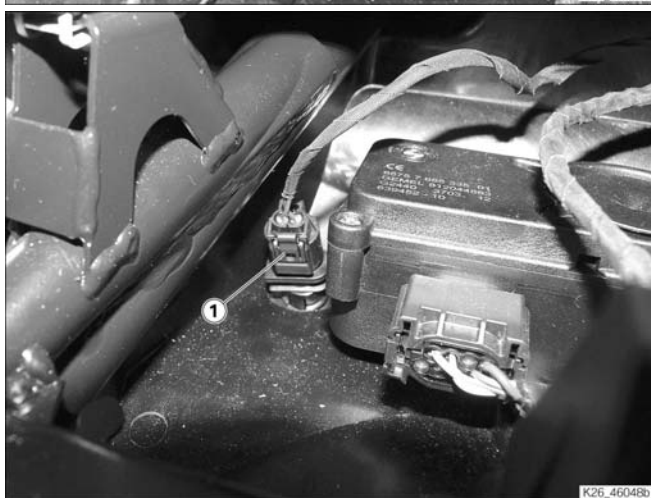
Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



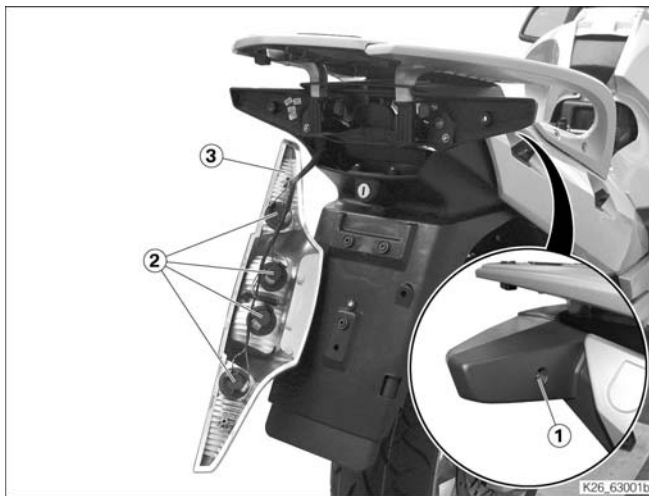
Variant, On-board computer

- Connect plug (1) of the temperature sensor.

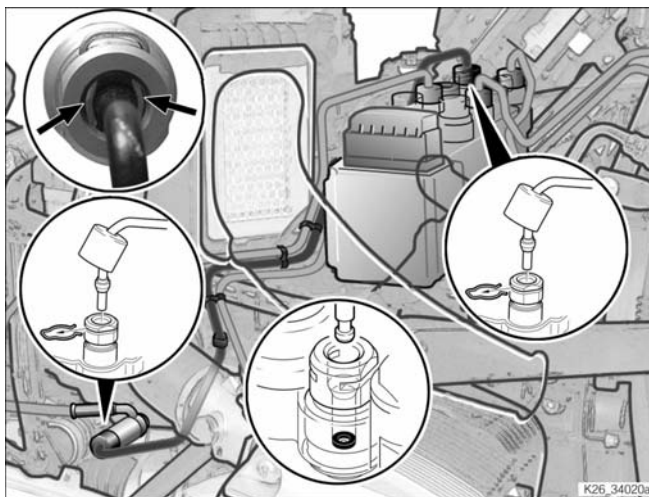


(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



(-) Connecting brake pipe for rear wheel circuit to pressure modulator



Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.



Warning

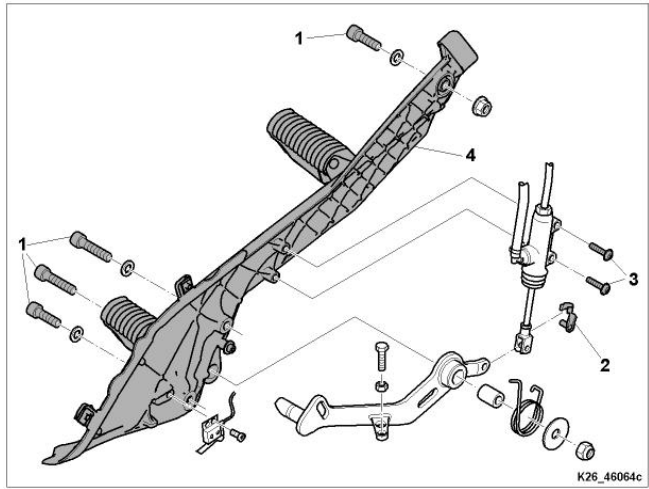
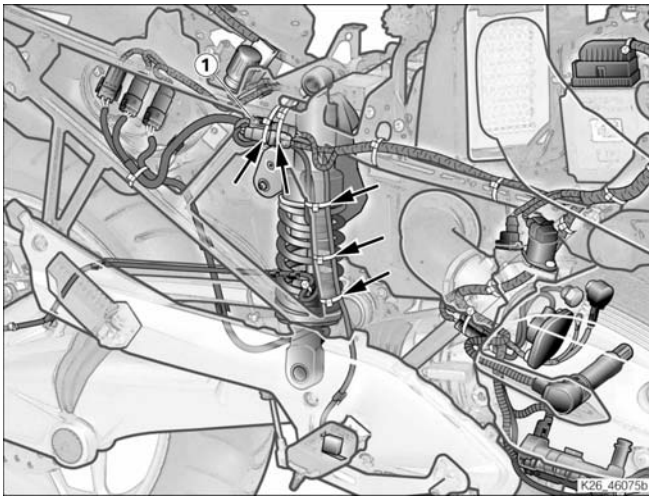
Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.


- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Installing right footrest plate


- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

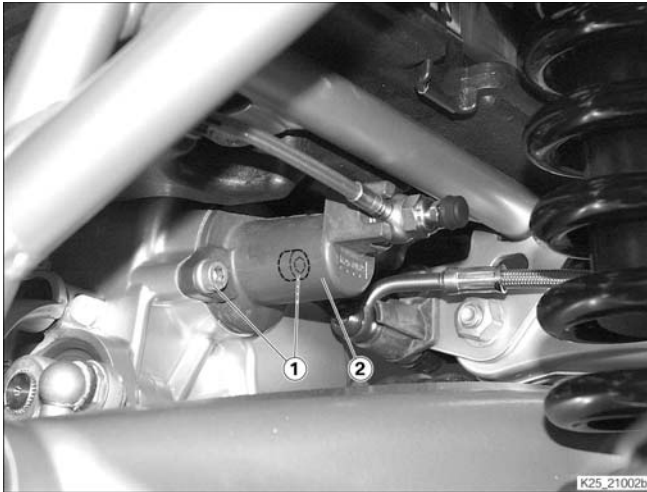
- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	




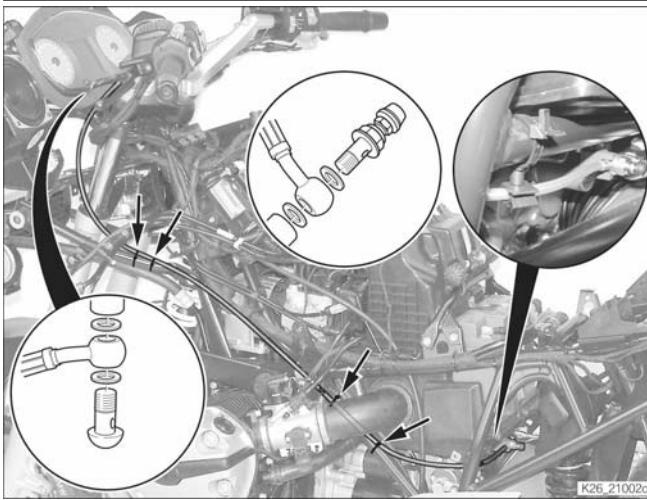
- Install screws (1) holding bottom section of fairing.

(-) Installing clutch slave cylinder



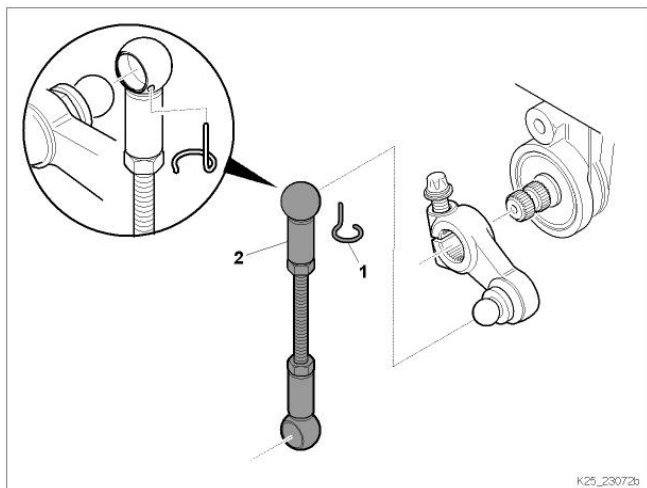
- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.

 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	




- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.

(-) Securing selector rod to shift lever



- Grease the ball head of the shift lever and the ball socket of selector rod (2).

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

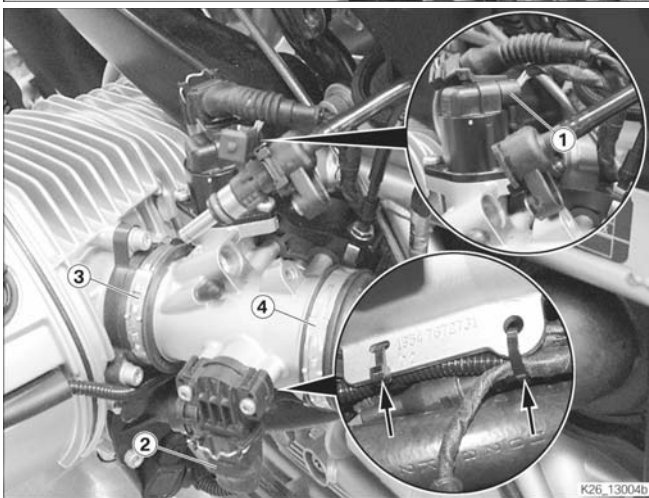
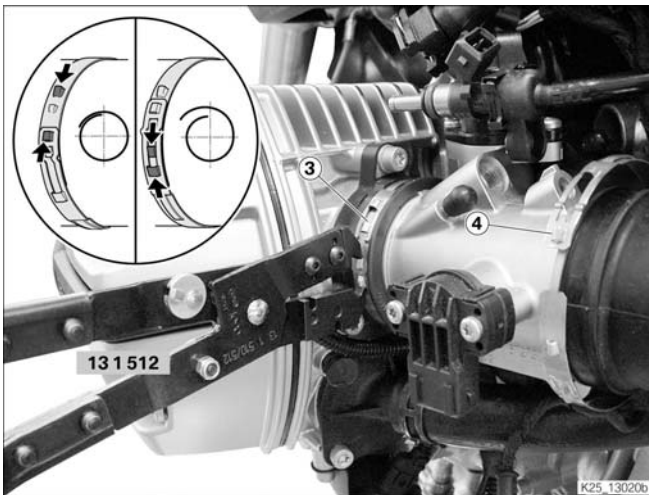
(-) Releasing throttle valve stub with cable divider

- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.



(-) Installing throttle-valve stub

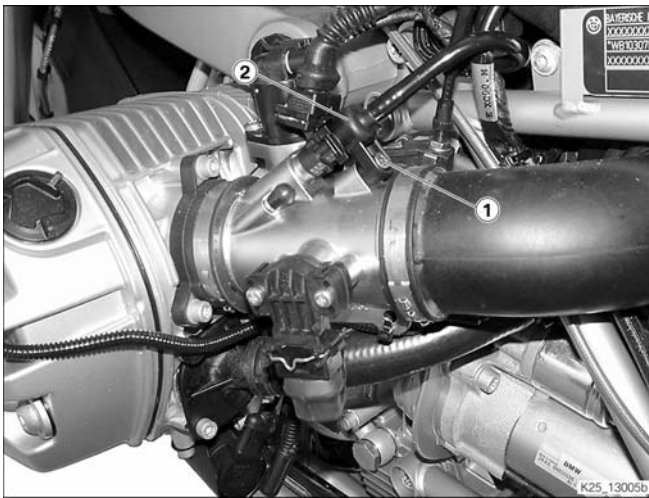
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .




- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing right and left injection valves

- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure

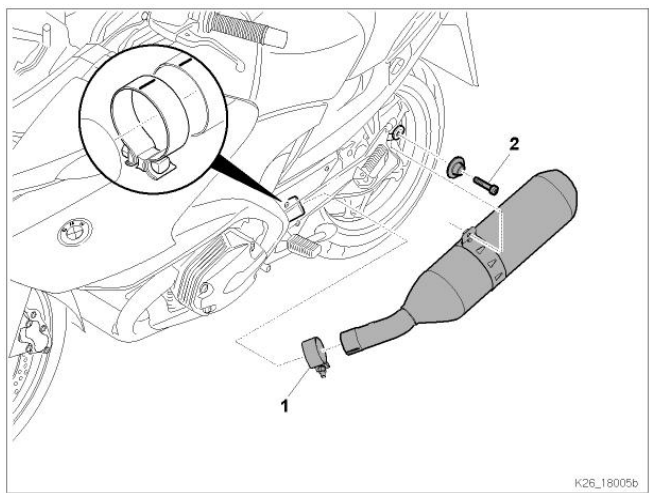


with screws (2).


 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.


(-) Installing silencer



- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

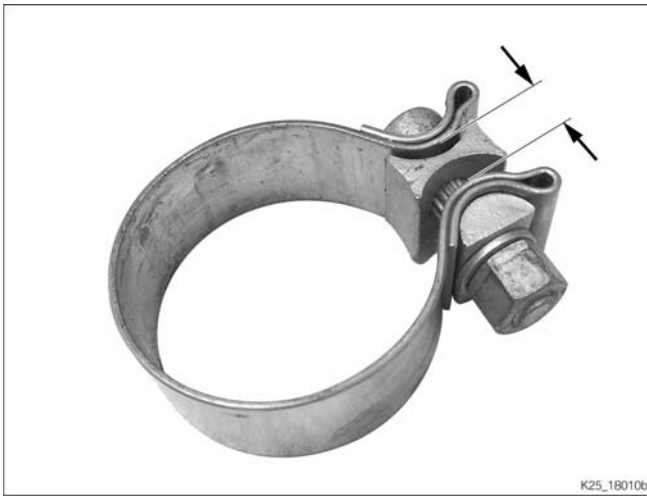
- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


► Checking Torca clamp on silencer

- Tighten the Torca clamp.



Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

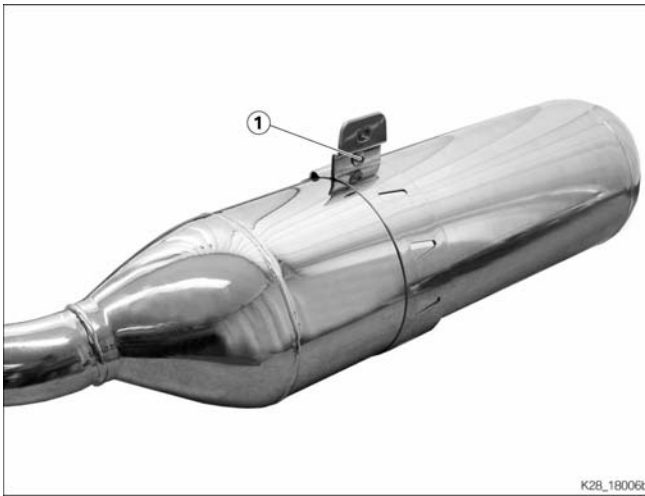


Attention


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.


Open the clamp far enough and grease it lightly.




- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

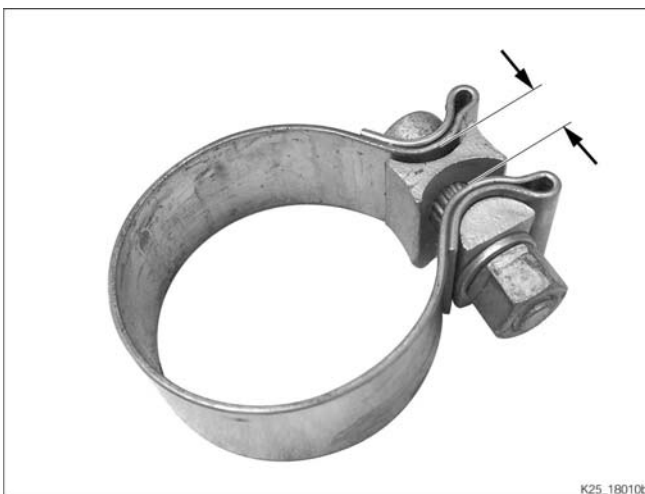



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.



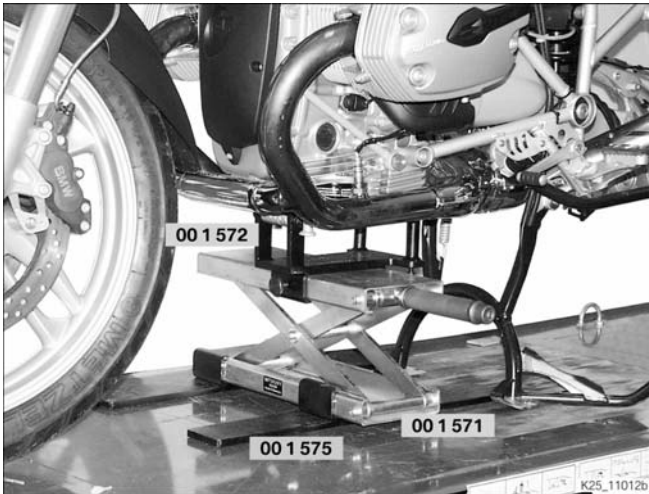
Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



(-) Filling gearbox with oil to correct level

Precondition

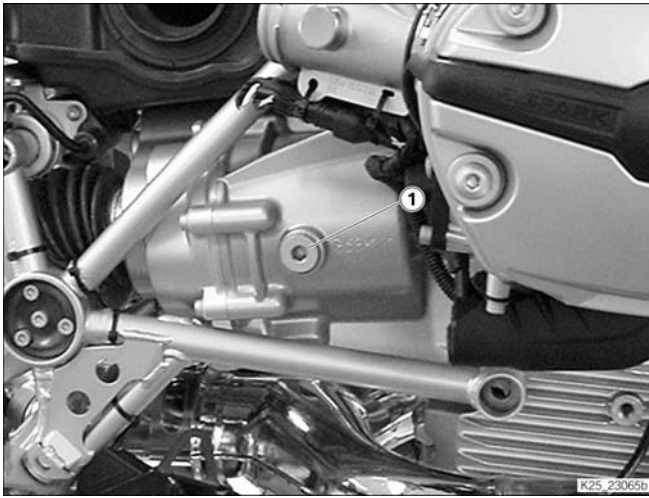
- Drain plug is installed.
- ▶ 
- Using a funnel of similar instrument, pour the correct quantity of gearbox oil into the gearbox.




Technical data

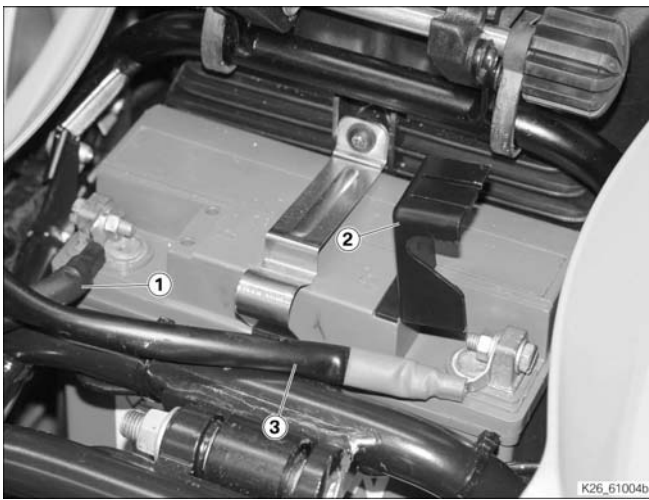
Oil capacity, gearbox	To bottom edge of thread of filler opening	0.9 l	
Consumables/lubricants			
Brand name hypoid-gear lubricant SAE 90 API GL 5			

- Fit a new sealing ring to oil filler plug (1) and install



and tighten the plug.

 Tightening torques		
Oil filler plug, gearbox	30 Nm	



(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means

that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

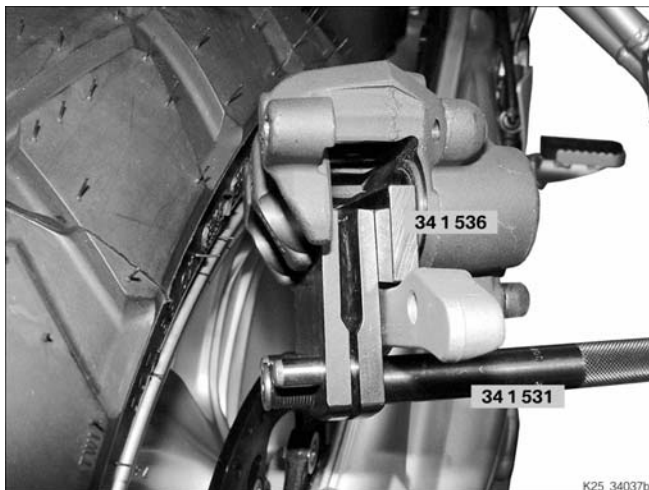
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



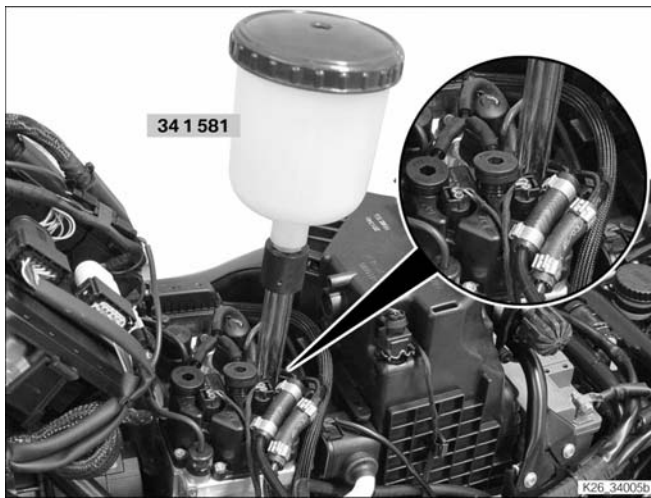
Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.




- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.

- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be

covered by the fluid.

- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.



Tightening torques

Rear brake caliper bleed screw	10 Nm	
--------------------------------	-------	--

- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.

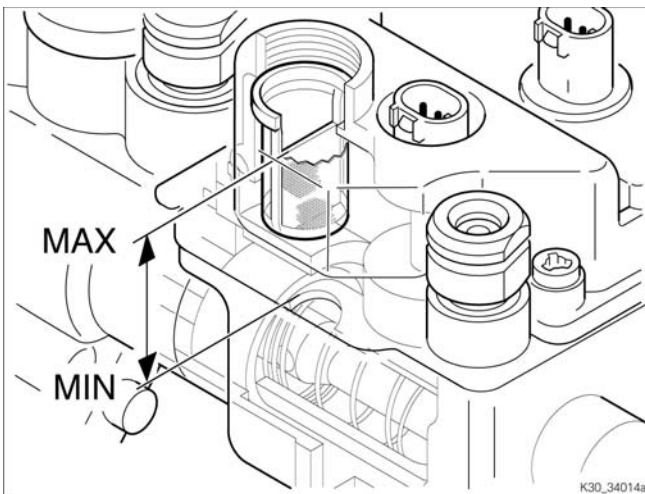


Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the **(MAX)** mark.



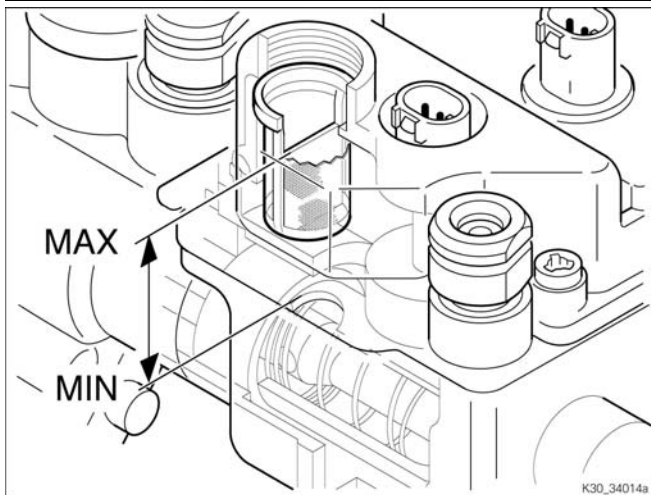
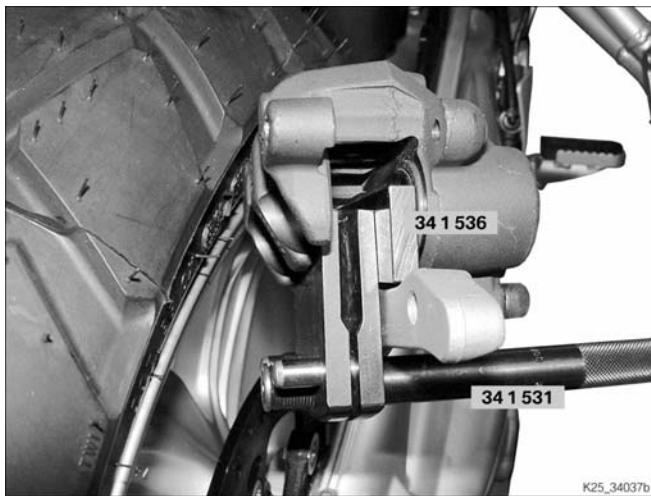
► Instructions for filling rear wheel circuit reservoir

- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536), in the rear brake caliper.




Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.



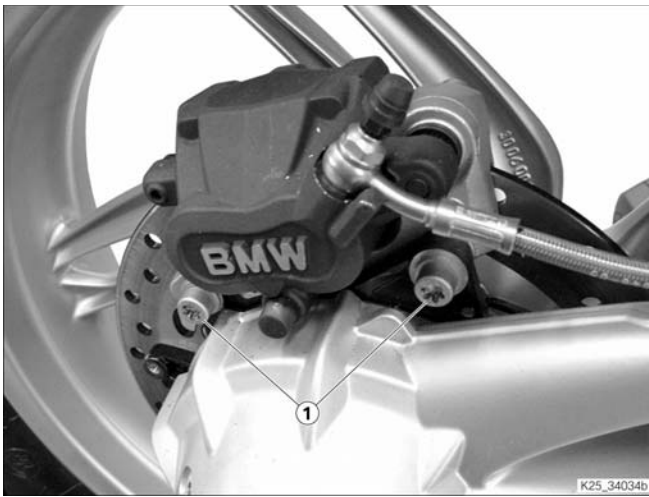
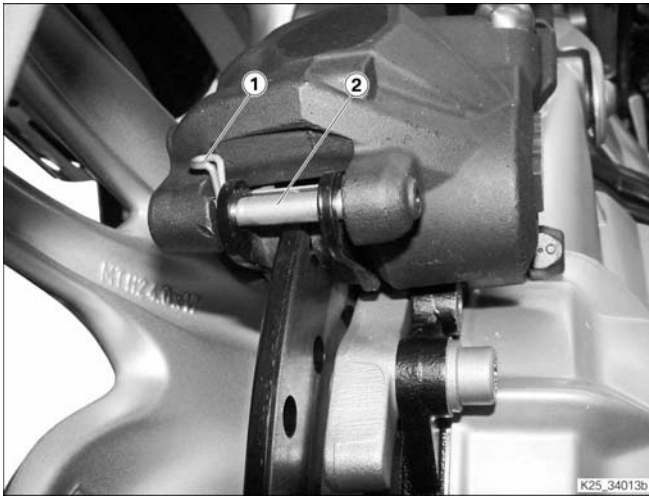
Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.

- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897


- Hand-tighten the cap of the rear wheel-circuit reservoir.
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary
- ▷ **Installing rear brake pads**
 - Check that spring (1) is correctly seated and installed right way round.
 - » Arrow points in direction of travel.

- Install the brake pads.
- Manually install retaining pin (2).



▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

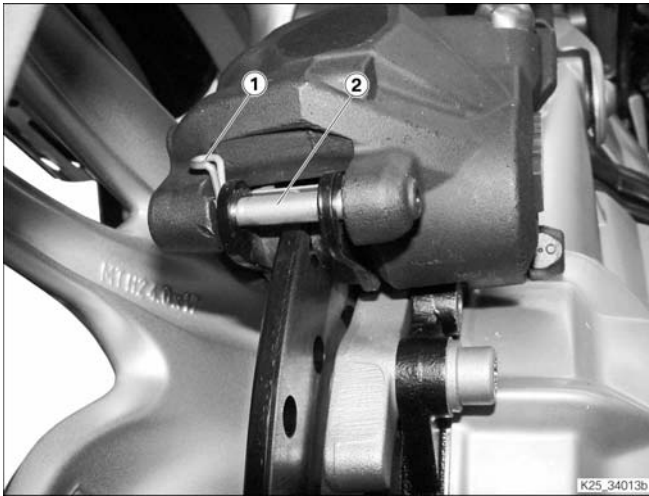
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



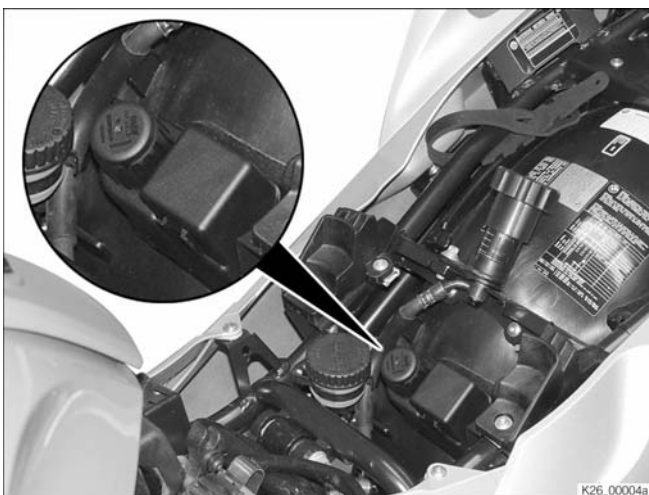
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Performing bleed test with the BMW Motorrad diagnostic system



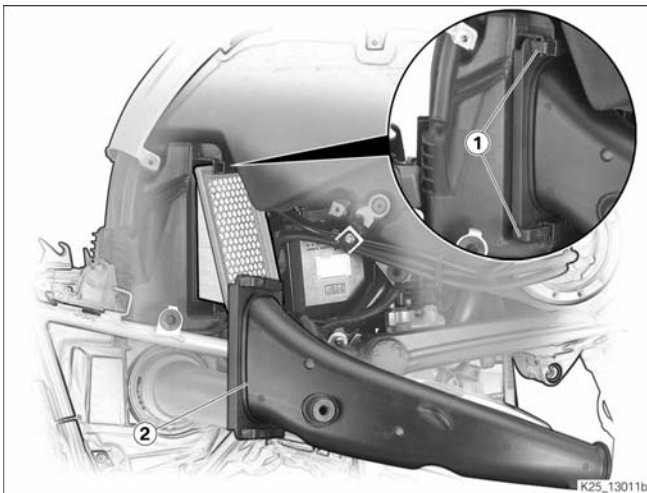
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

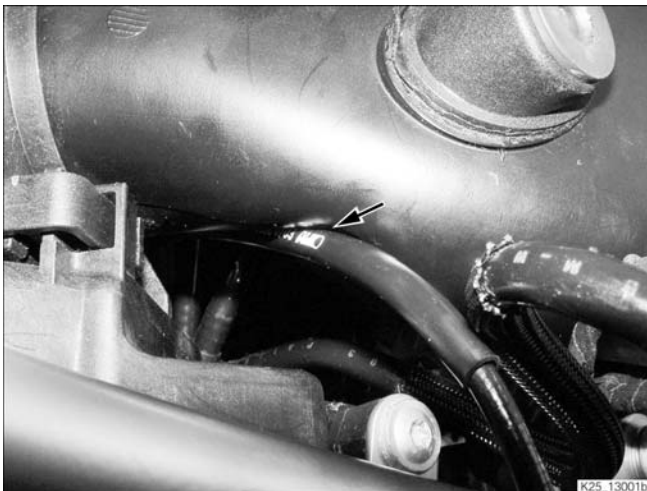
Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

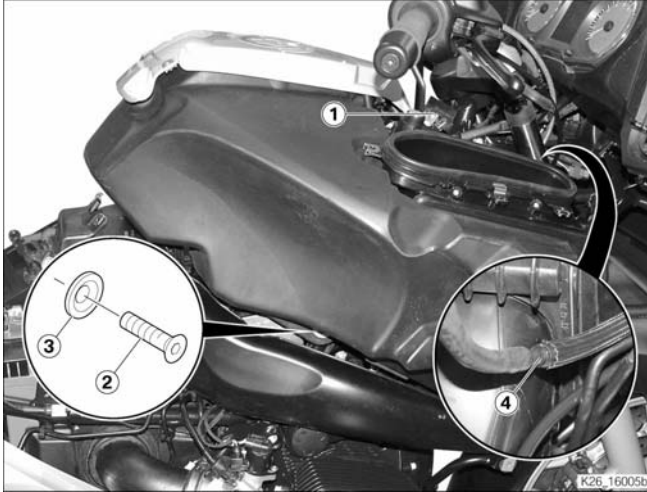
(-) Installing intake air pipe



- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.




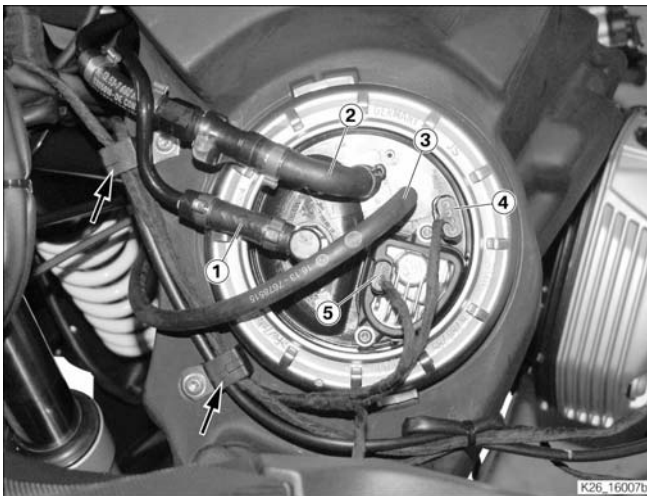
- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.



(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.

Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
---	--	------------	--

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

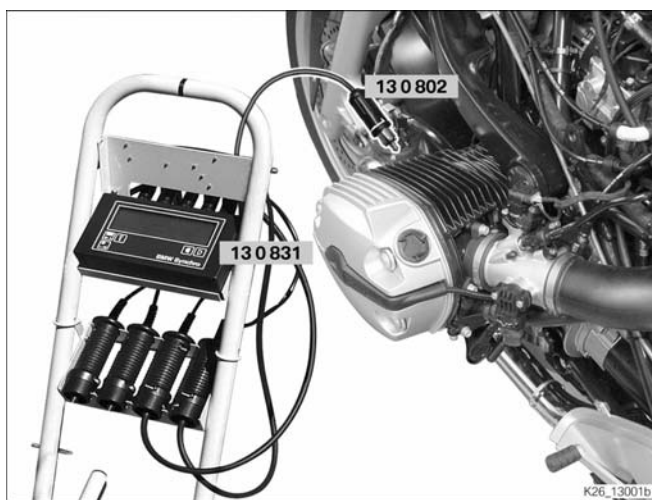
► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the



motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

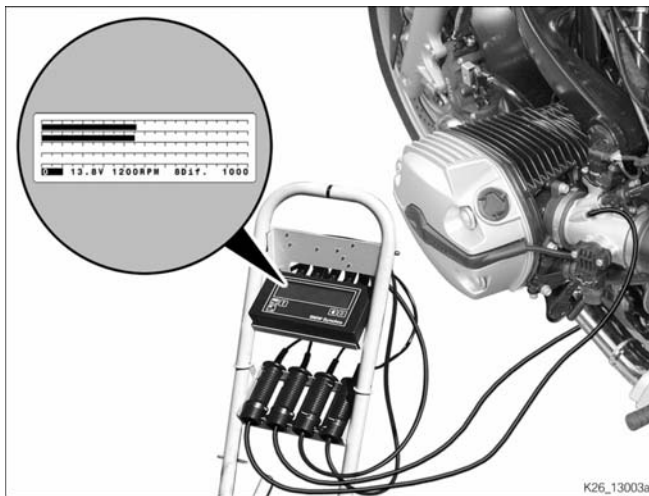
► 1. Checking idle

Test



Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the



system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

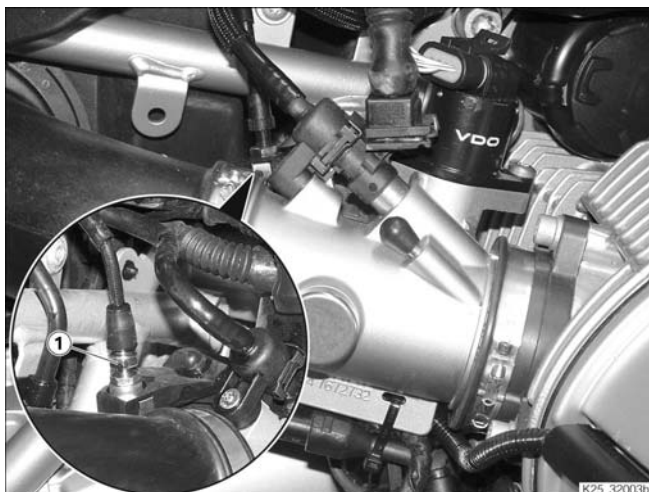
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not


change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

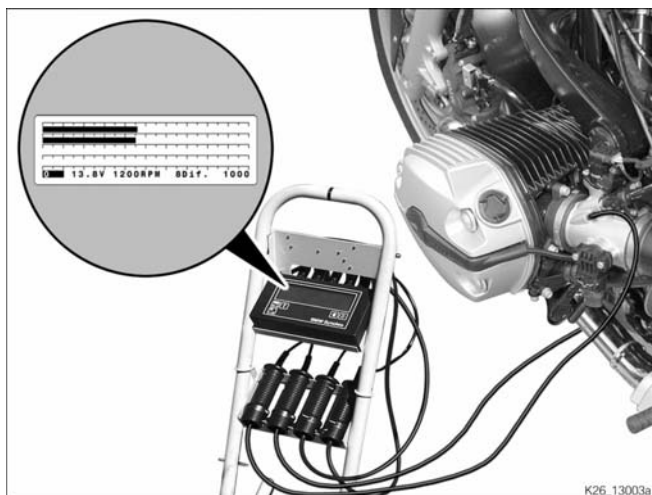
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 -	max. 15 mbar	

	1800 min ⁻¹		
--	---------------------------	--	--

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



▶ **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

-
- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

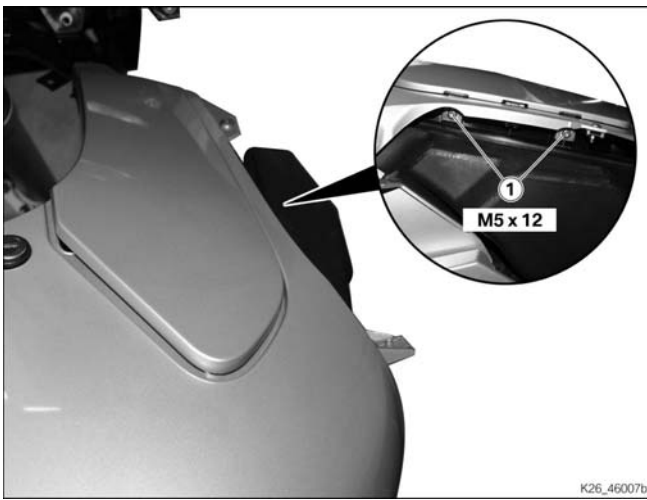
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



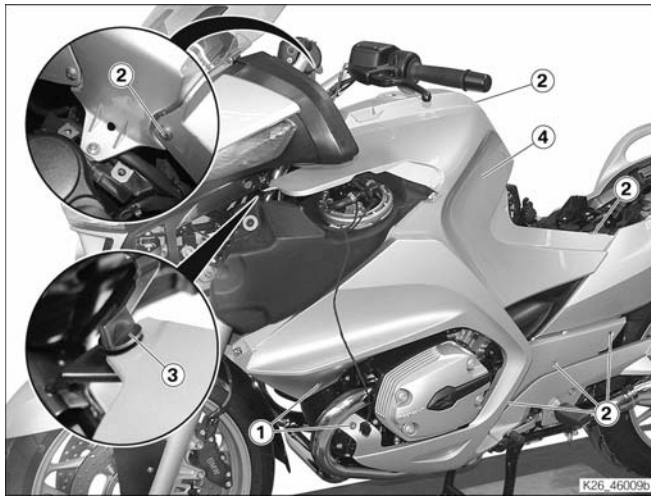
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



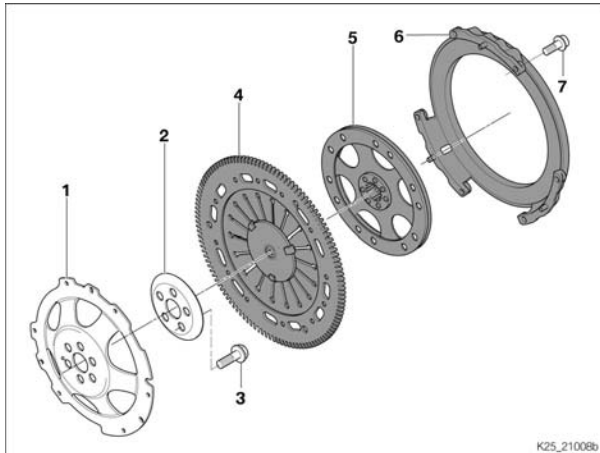
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 21 21 600 Checking clutch for wear (clutch removed)

(-) Checking clutch for wear

- Remove housing cover (6) from thrust plate (4) and remove clutch plate (5).




K25_21008b



K25_21011a

Test

- Measure the thickness of clutch plate (5).

 Technical data			
Clutch plate - thickness	Measured with caliper tips	4.4 - 4.6 mm	
Value definition:	pressed by hand		
Wear limit	against rivets of clutch plate		

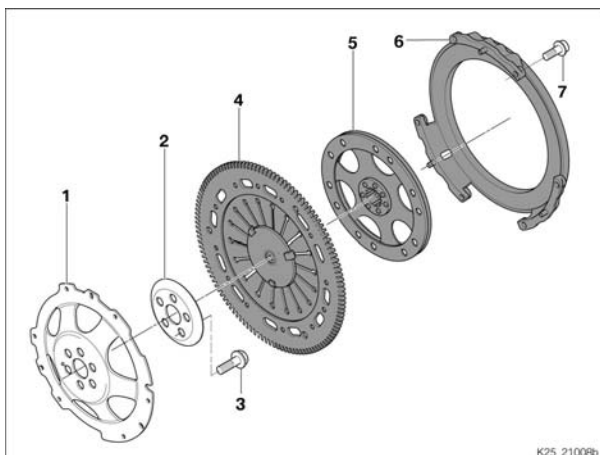
Result: The clutch plate is worn to the wear limit.

Measure:

- Replace clutch plate (5).

Test

- Visually inspect the friction faces of housing cover (6) and thrust plate (4) for signs of wear and scoring.



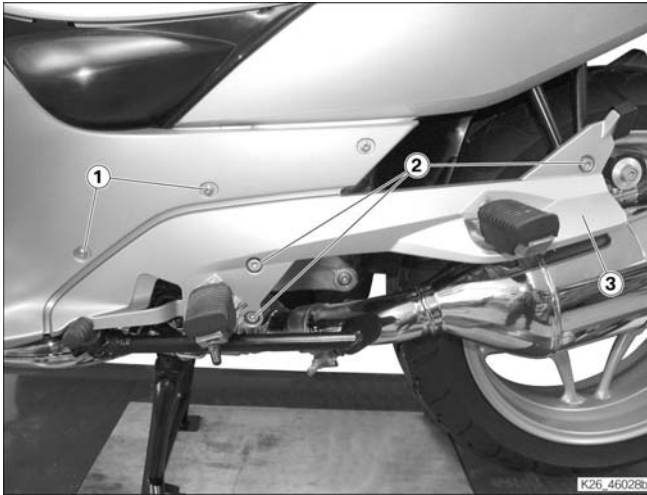
K25_21008b

Result: Deep grooves or signs of wear in the friction faces of the clutch components.

Measure:

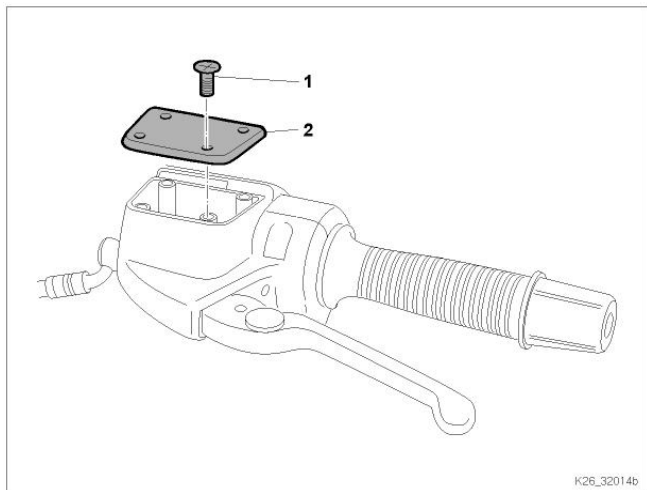
- Replace housing cover (6) and thrust plate (4) as a set together with clutch plate (5).

 **21 52 507 Replacing clutch slave cylinder**



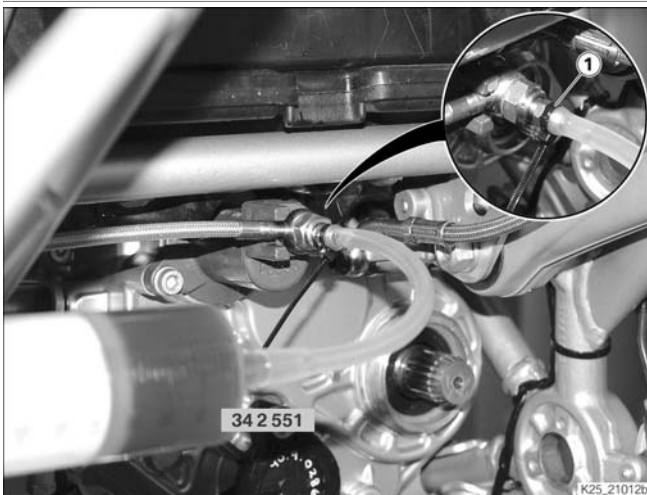
(-) Removing left footrest plate

- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.



(-) Draining clutch

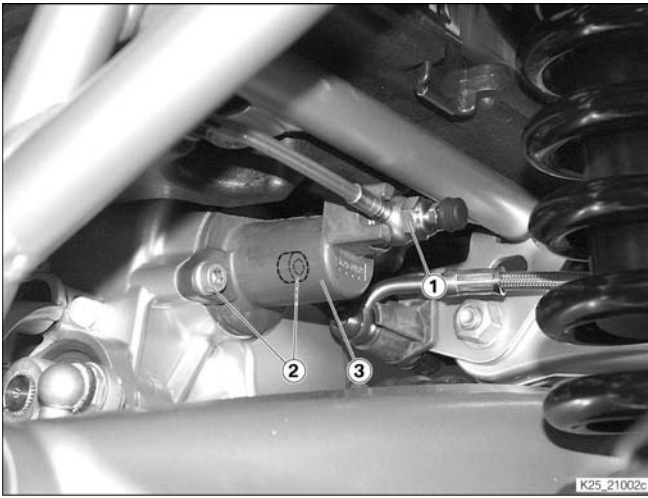
- Undo screws (1) and remove cover (2) from clutch fluid reservoir.
- Use syringe (No. 34 2 551) to empty the clutch fluid reservoir.



- Connect syringe (No. 34 2 551) to bleed screw (1) and secure it with cable ties.
- Back off bleed screw (1).
- Use syringe (No. 34 2 551) to extract hydraulic fluid through bleed screw (1) until the clutch line is empty.
- Tighten bleed screw (1) and disconnect syringe (No. 34 2 551) from the bleed screw.

(-) Removing clutch slave cylinder

- Remove banjo bolt (1).
- Uniformly remove screws (2), making sure the clutch slave cylinder is not tilted (cylinder under spring)

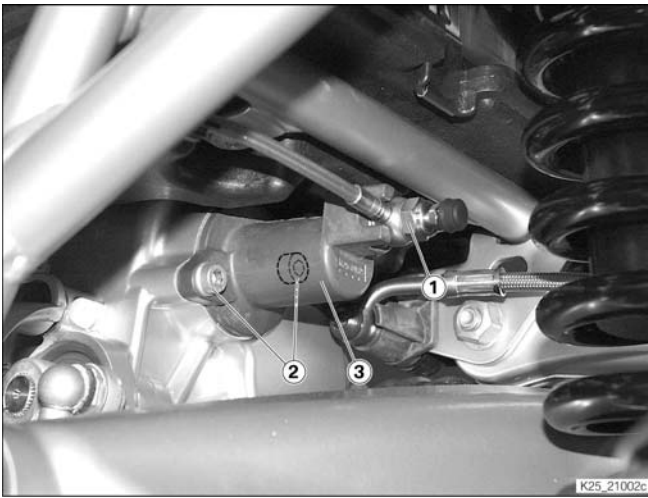



pressure).

- Free clutch slave cylinder (3) from the gearbox and remove it from the rear frame.


(-) Installing clutch slave cylinder

- Place clutch slave cylinder (3) in position on gearbox.
- Uniformly tighten screws (2) making sure the cylinder does not tilt.



 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	


- Fit banjo bolt (1) with new seals.

 Tightening torques		
Banjo bolt with bleeder, M10 x 1	18 Nm	

(-) Filling clutch system

- Fill syringe (No. 34 2 551) with the correct hydraulic fluid.

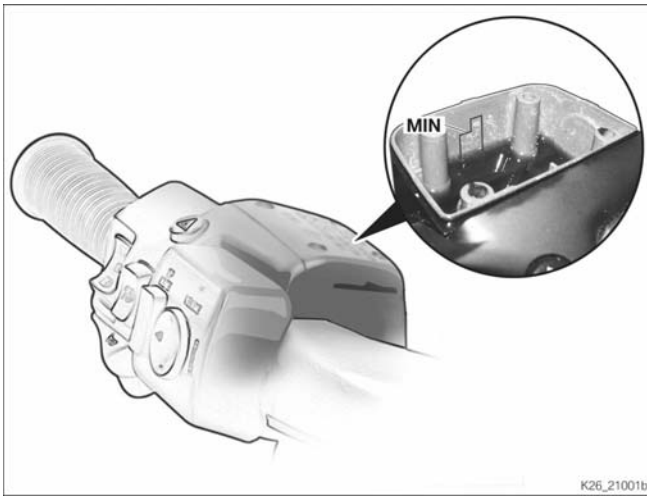


 Consumables/lubricants		
Vitamol V10	Hydraulic clutch systems	21 52 0 392 546

- Connect syringe (No. 34 2 551) to bleed screw (1) and secure it with cable ties.
- Back off bleed screw (1).

- Use syringe (No. 34 2 551) to inject hydraulic fluid into the system through bleed screw (1) until the fluid level in the reservoir is correct.

 Technical data



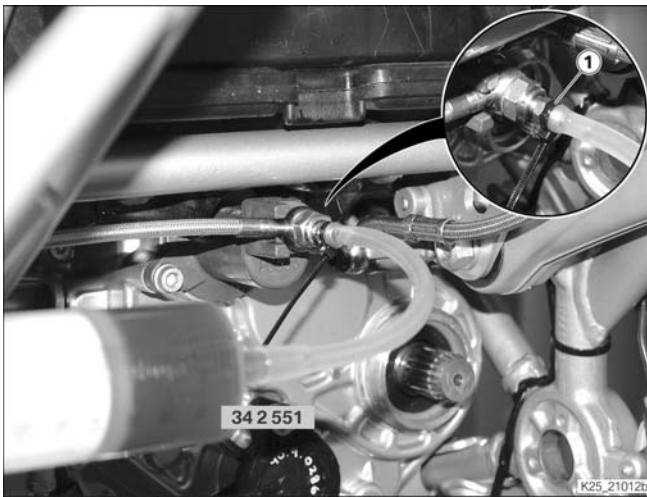
K26_21001b

Clutch fluid - fill level in reservoir with new clutch liner. Motorcycle is supported on centre stand and reservoir is horizontal

To lower mark on reservoir

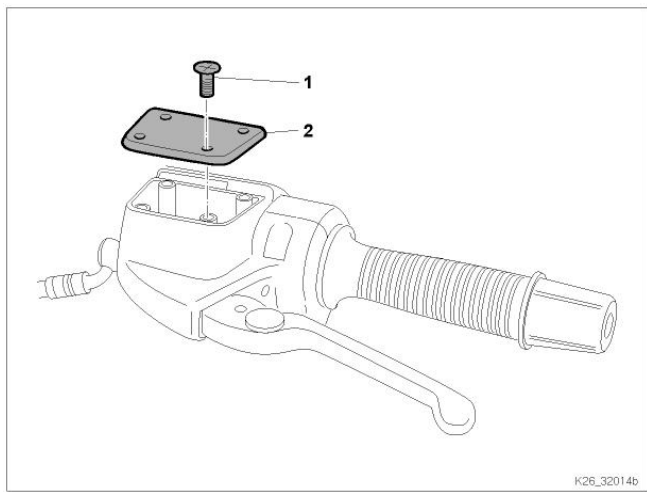
Consumables/lubricants

Vitamol V10



K25_21012b

- Tighten bleed screw (2) and disconnect syringe (No. 34 2 551) from the bleed screw.
- Install dust cap (1).




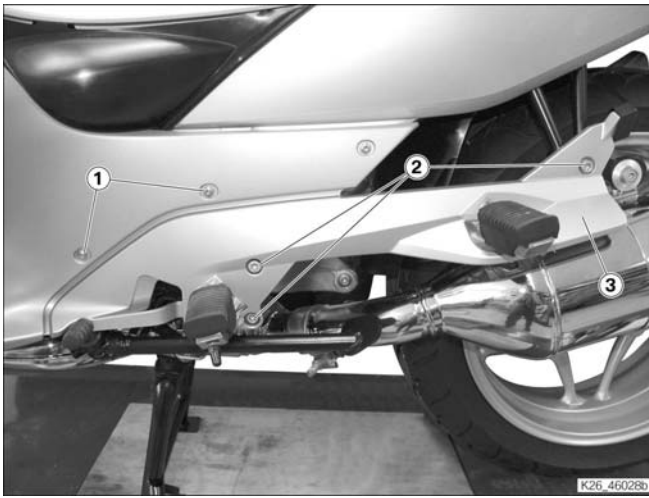
H26_32014b

- Close clutch reservoir with cap (2).
- Install screws (1).

(-) Installing left footrest plate


- Install footrest plate (3).
- Install screws (2).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear,	19 Nm	



M8 x 25		
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

- Install screws (1).

 **21 52 510 Replacing clutch line (handlebar fitting to slave cylinder)**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

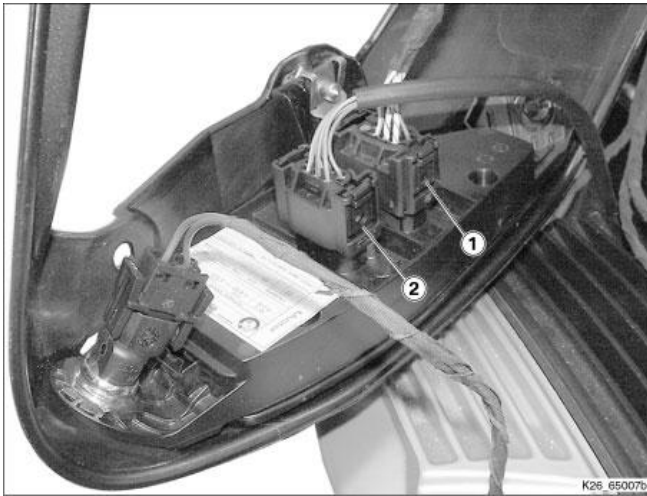


- Disconnect plug (1) from socket.

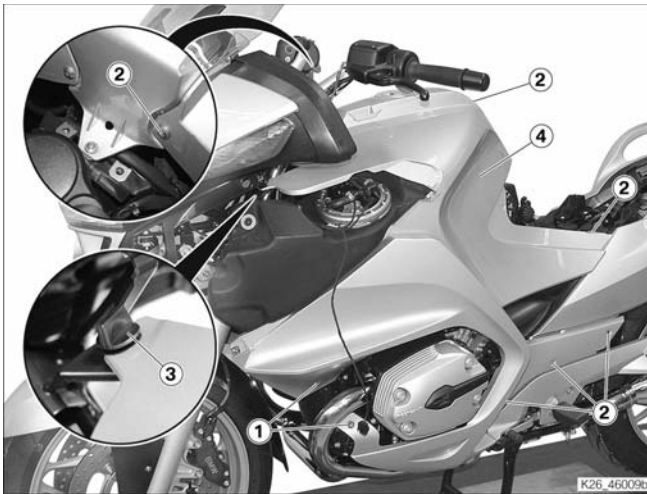


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

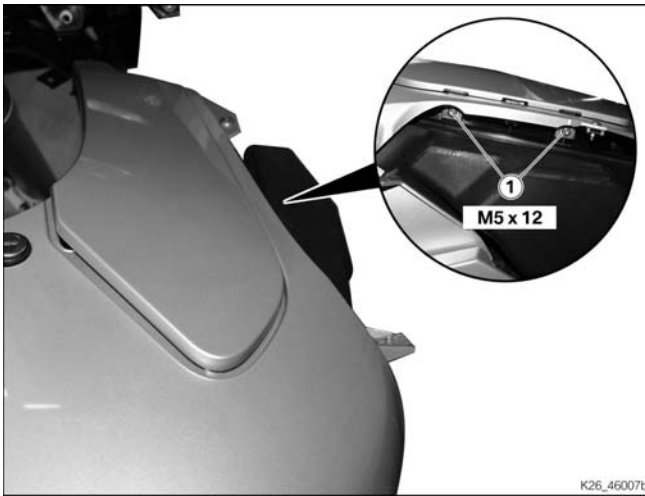
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



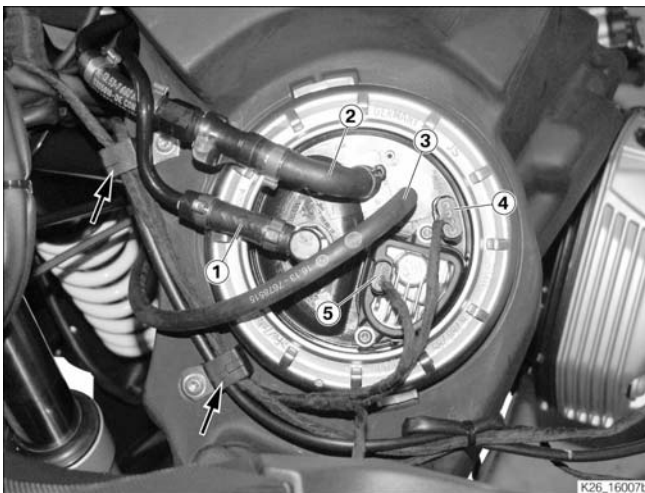
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

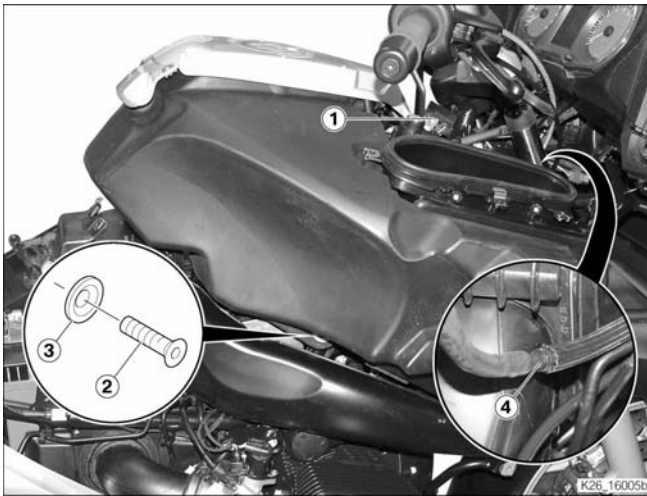


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

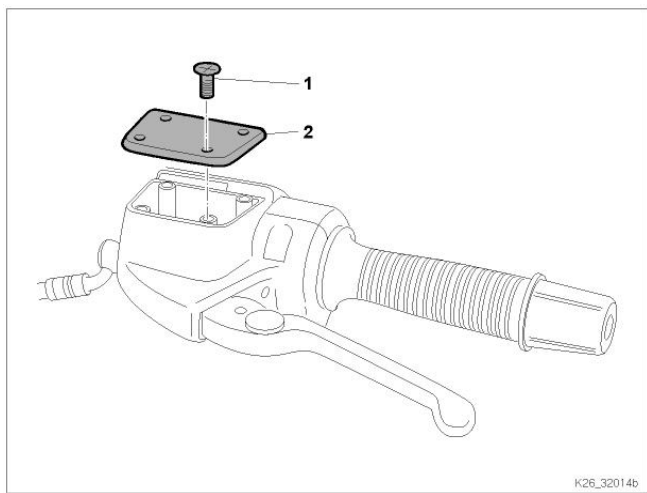


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

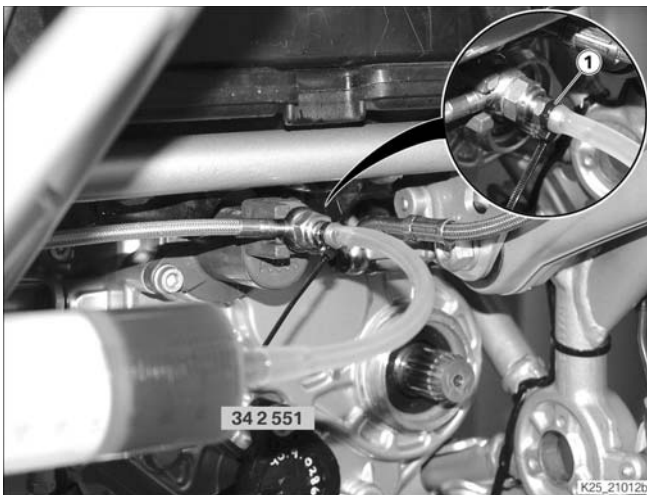


(-) Draining clutch

- Undo screws (1) and remove cover (2) from clutch fluid reservoir.
- Use syringe (No. 34 2 551) to empty the clutch fluid reservoir.

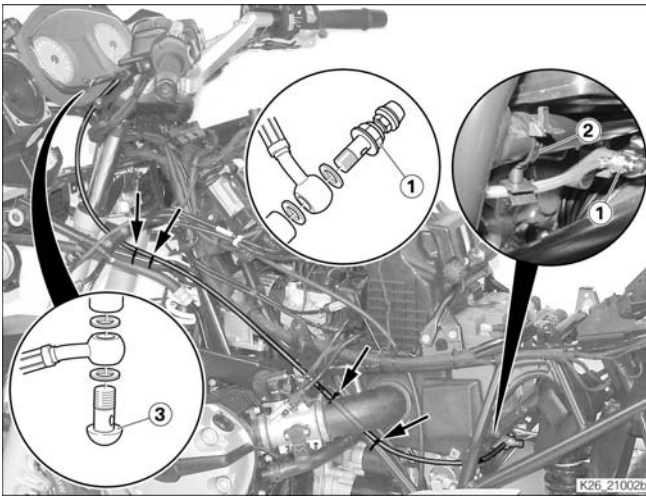


- Connect syringe (No. 34 2 551) to bleed screw (1) and secure it with cable ties.
- Back off bleed screw (1).
- Use syringe (No. 34 2 551) to extract hydraulic fluid through bleed screw (1) until the clutch line is empty.
- Tighten bleed screw (1) and disconnect syringe (No. 34 2 551) from the bleed screw.



(-) Removing clutch line

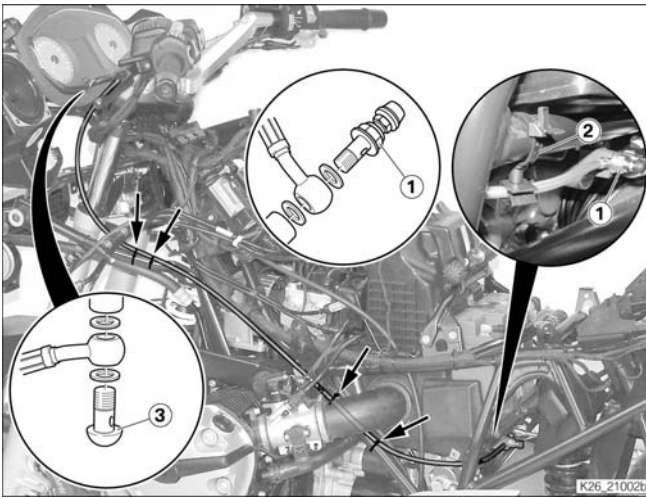
- Remove banjo bolt (1) from clutch slave cylinder and catch the residual fluid in a suitable container.
- Cut through cable tie (arrows) on rear frame and fairing bracket.
- Unclip clutch line at bracket (2).
- Remove banjo bolt (3) at clutch lever fitting.
-




Pull clutch line upward and remove.


(-) Installing clutch line

- Place clutch line in position ensuring correct routing.
- Fit banjo bolt (3) on clutch lever fitting with new seals.



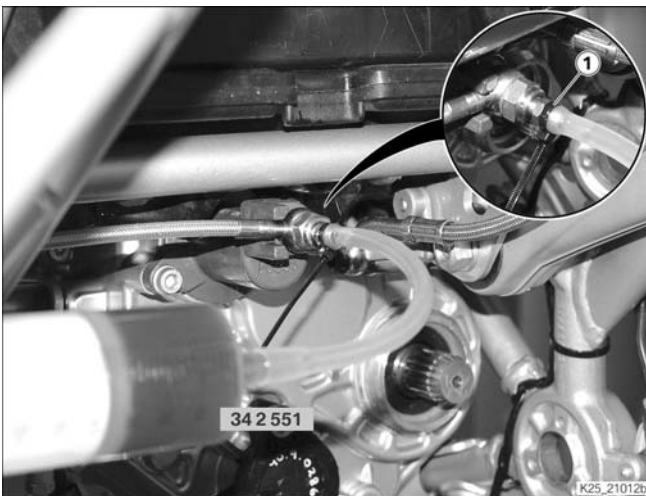
 Tightening torques		
Banjo bolt, M10 x 1	18 Nm	


- Secure clutch line with cable ties (arrows) to rear frame and fairing bracket.
- Clip in clutch line at bracket (2).
- Fit banjo bolt (1) with new seals on clutch slave cylinder.

 Tightening torques		
Banjo bolt with bleeder, M10 x 1	18 Nm	

(-) Filling clutch system

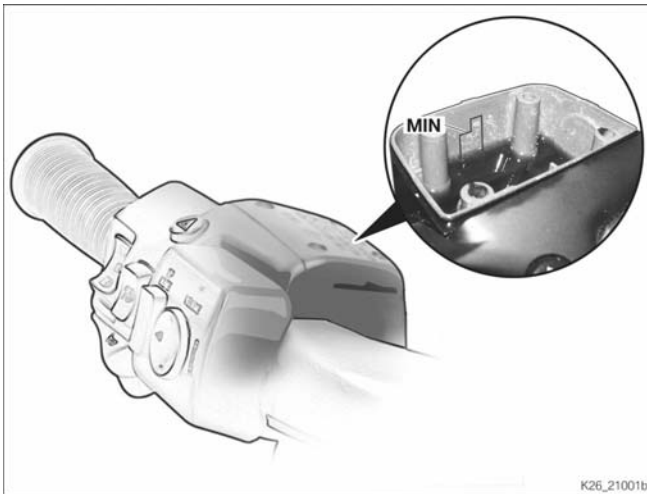
- Fill syringe (No. 34 2 551) with the correct hydraulic fluid.



 Consumables/lubricants		
Vitamol V10	Hydraulic clutch systems	21 52 0 392 546

- Connect syringe (No. 34 2 551) to bleed screw (1) and secure it with cable ties.
- Back off bleed screw (1).

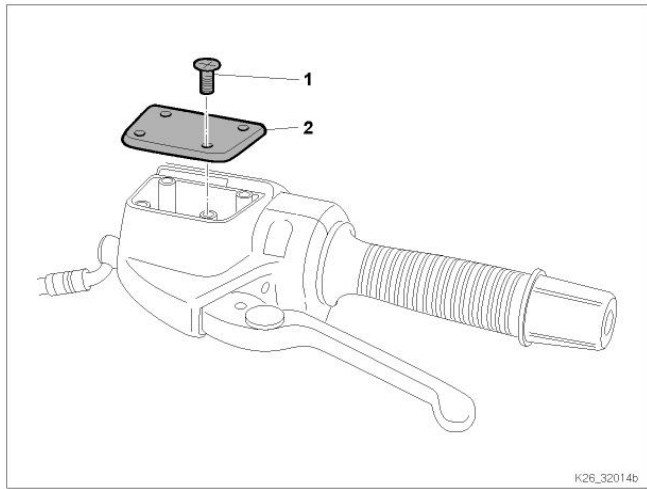
- Use syringe (No. 34 2 551) to inject hydraulic fluid into the system through bleed screw (1) until the fluid level in the reservoir is correct.



K26_21001b



K26_21012b



H26_32014b



Technical data

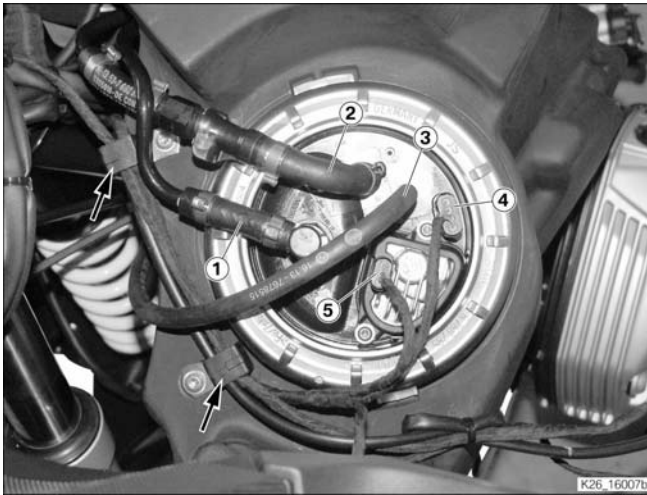
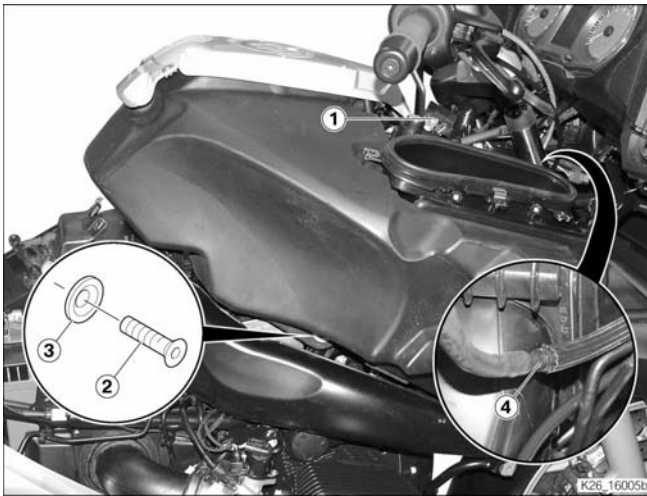
Clutch fluid - fill level in reservoir with new clutch liner. Motorcycle is supported on centre stand and reservoir is horizontal		To lower mark on reservoir	
	Consumables/lubricants		
	Vitamol V10		

- Tighten bleed screw (2) and disconnect syringe (No. 34 2 551) from the bleed screw.
- Install dust cap (1).

- Close clutch reservoir with cap (2).
- Install screws (1).

(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.



Tightening torques

Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

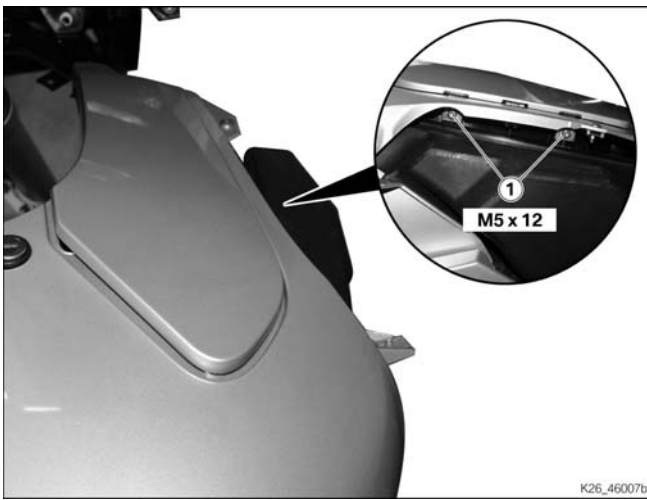
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



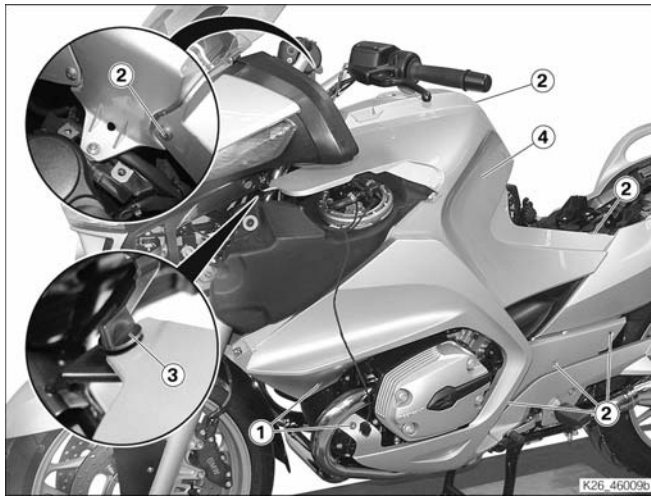
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **23 00 010 Changing gearbox oil**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



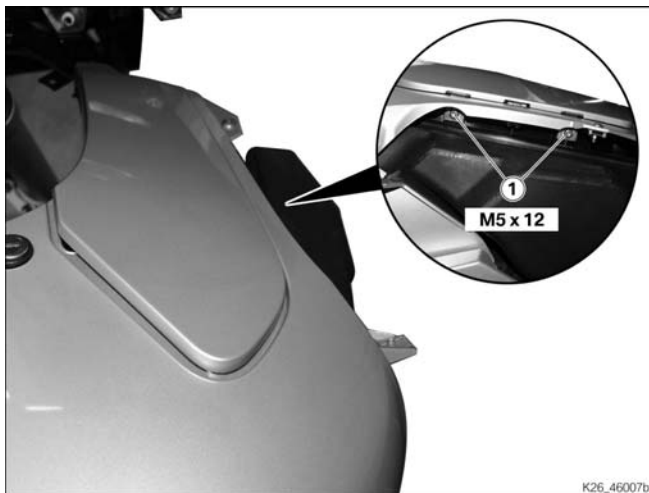
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Changing gearbox oil



Note

Change oil, warmed to normal operating temperature.

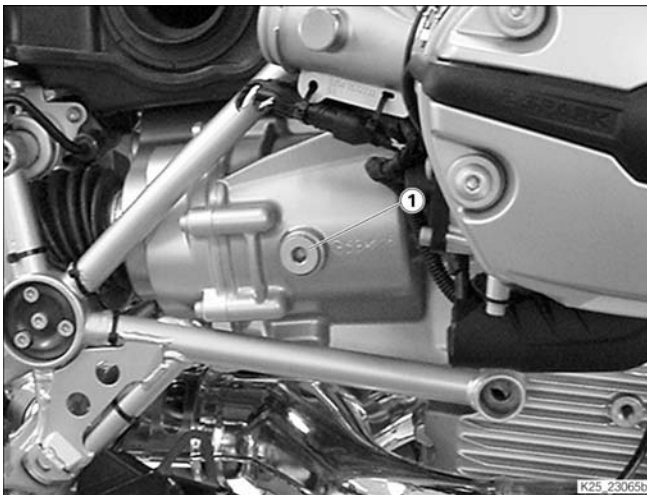
► Draining gearbox oil



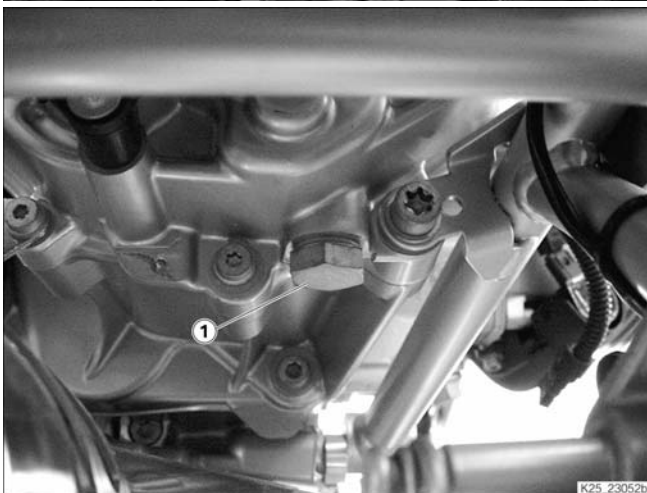
Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.



- Place a suitable tray underneath the gearbox.
- Remove oil filler plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.



- Remove drain plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.
- Remove all chips of metal from the drain plug.
- Fit a new sealing ring to the oil drain plug and install and tighten the plug.



Tightening torques

Oil drain plug, gearbox	30 Nm	
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
► Filling gearbox with oil to correct level

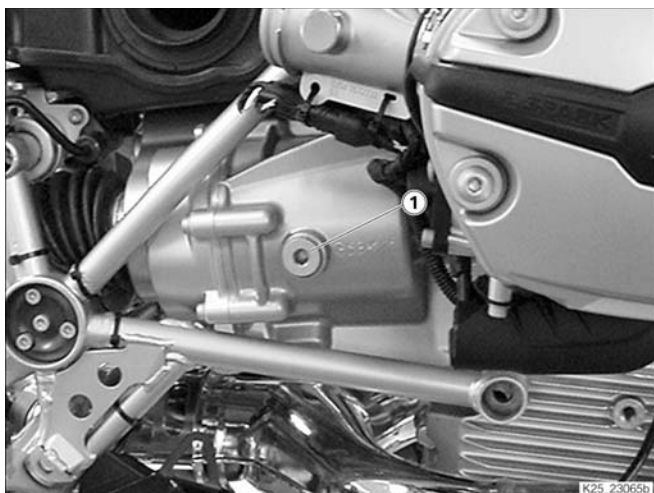
Precondition

- Drain plug is installed.




- Using a funnel of similar instrument, pour the correct quantity of gearbox oil into the gearbox.

 Technical data			
Oil capacity, gearbox	To bottom edge of thread of filler opening	0.9 l	
		Consumables/lubricants	
Brand name hypoid-gear lubricant SAE 90 API GL 5			



- Fit a new sealing ring to oil filler plug (1) and install and tighten the plug.

 Tightening torques		
Oil filler plug, gearbox	30 Nm	

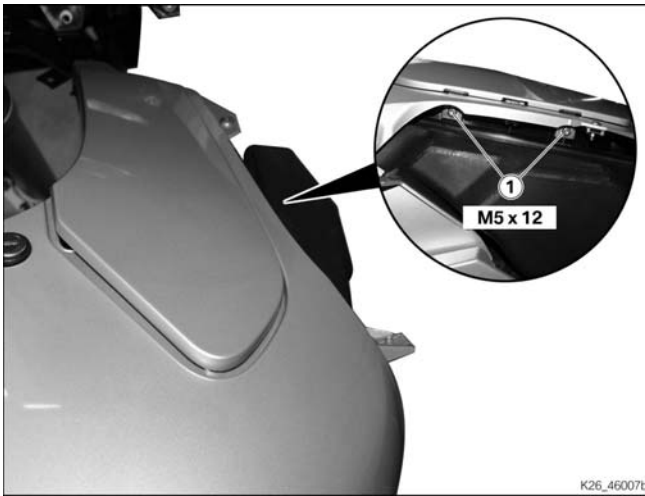
◀ (-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



◀ (-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure



- that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing tank rail



- Fit tank rail.
- Install screws (1).

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **23 00 020 Removing and installing gearbox**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

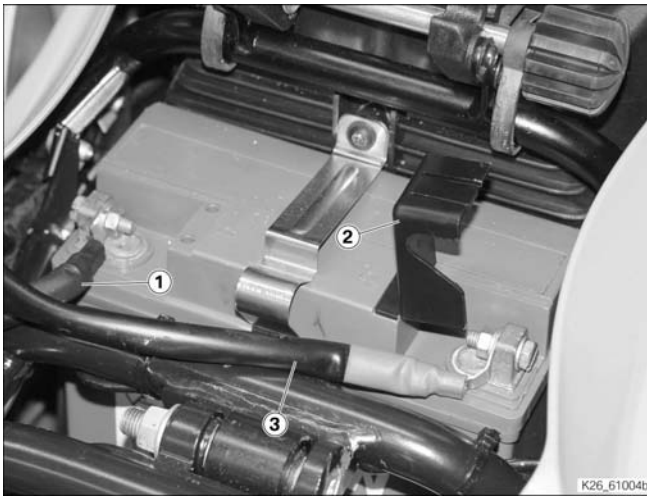
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

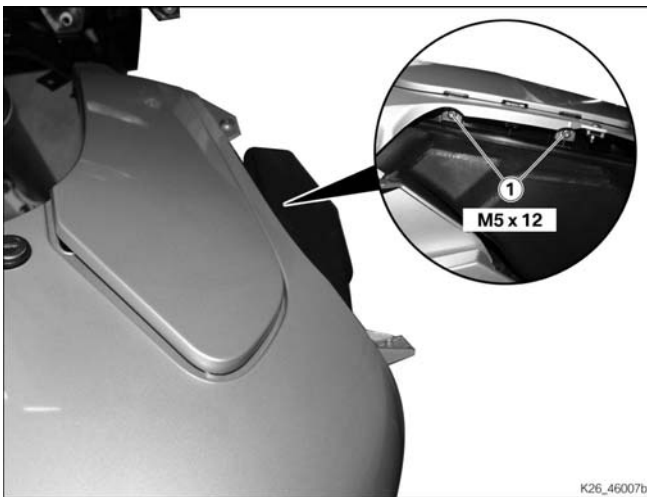
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



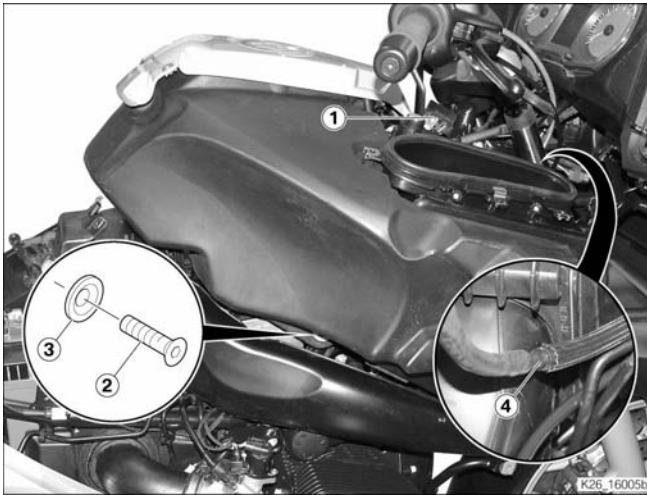
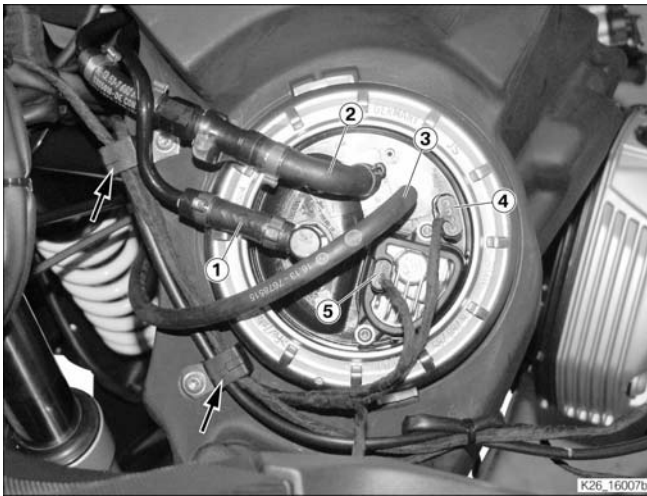
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

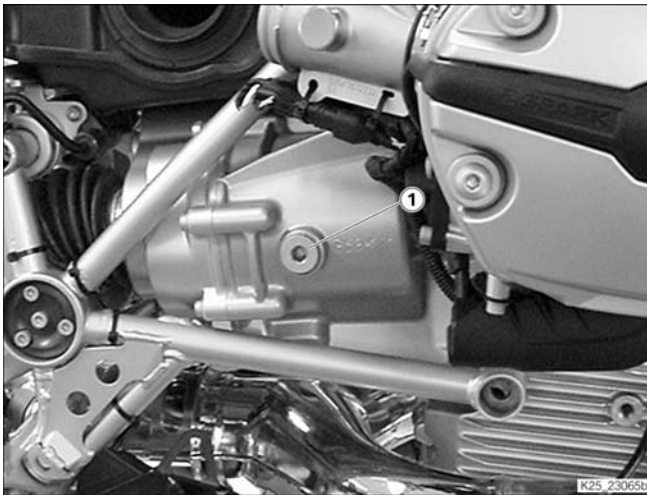


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Draining gearbox oil



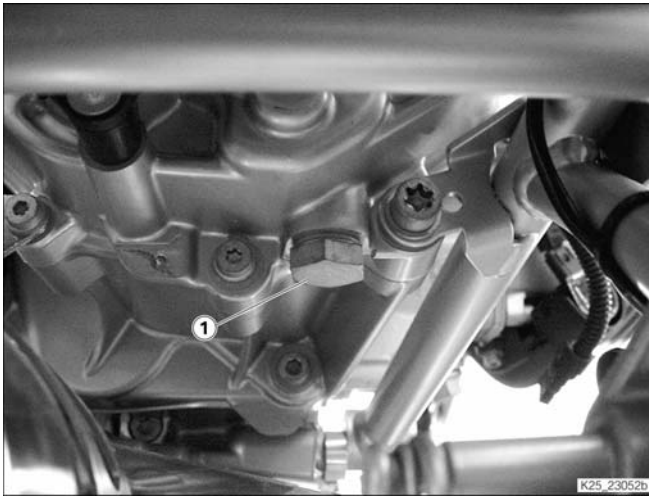
Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the gearbox.
- Remove oil filler plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.

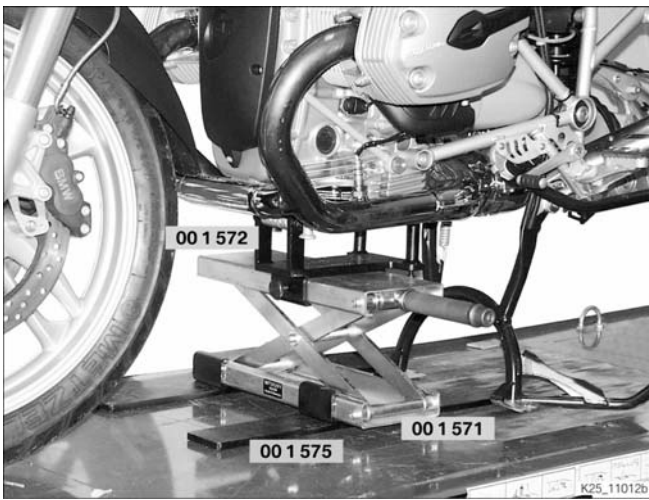
- Remove drain plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.
- Remove all chips of metal from the drain plug.
- Fit a new sealing ring to the oil drain plug and install and tighten the plug.



Tightening torques

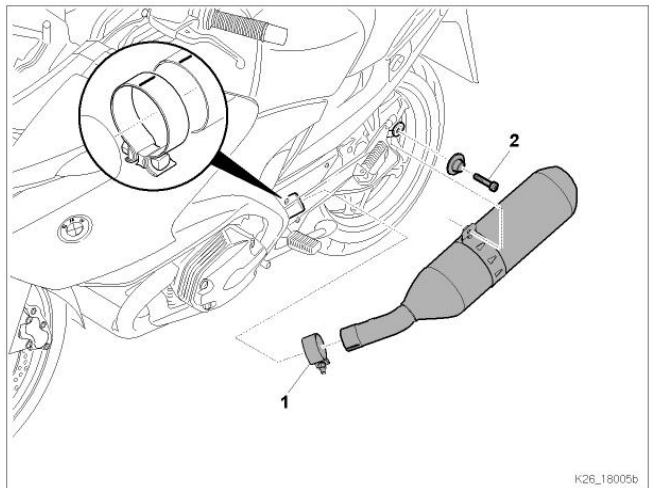
Oil drain plug, gearbox	30 Nm	
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(-) Installing engine stand



- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

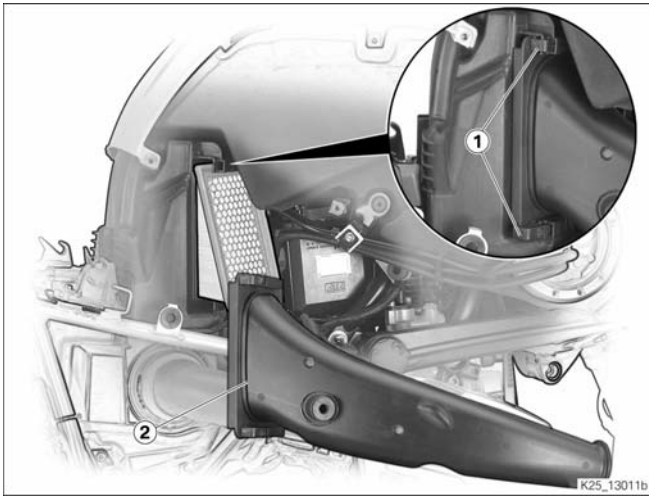
(-) Removing silencer



- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

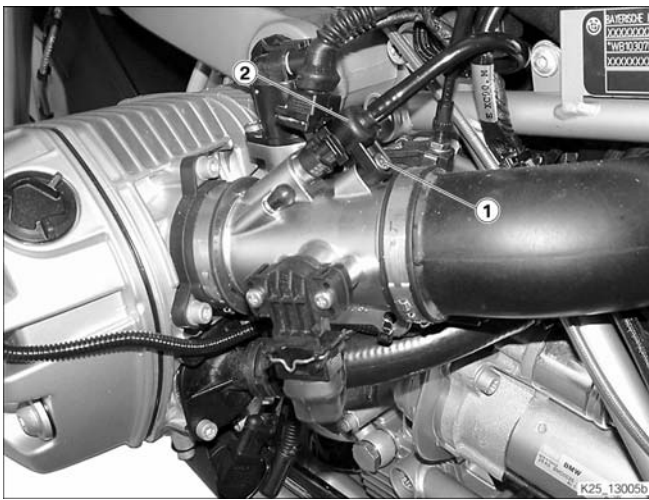
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



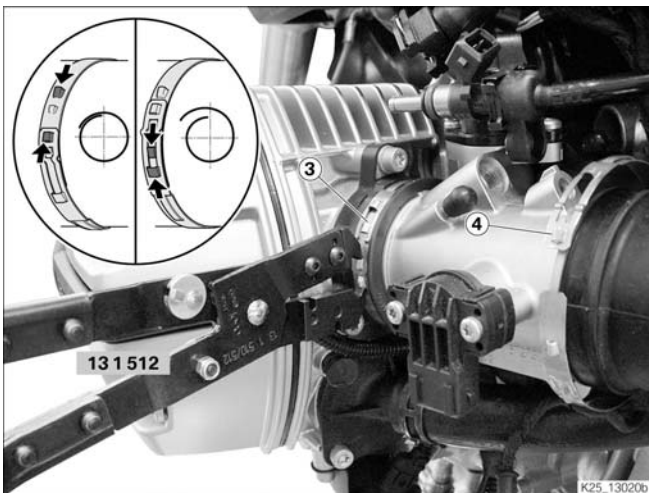
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.

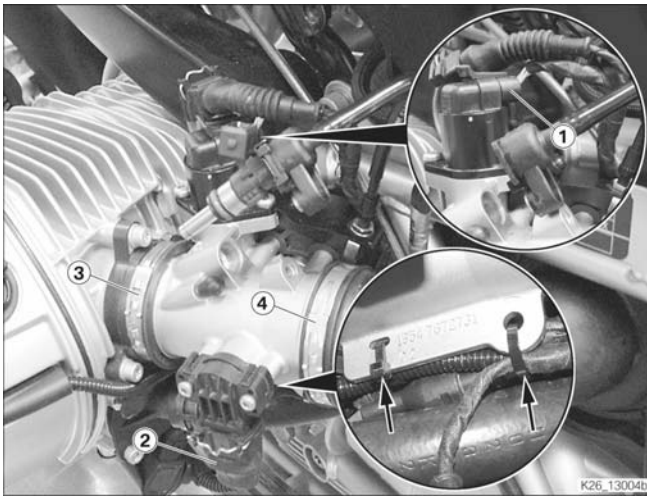


(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
-



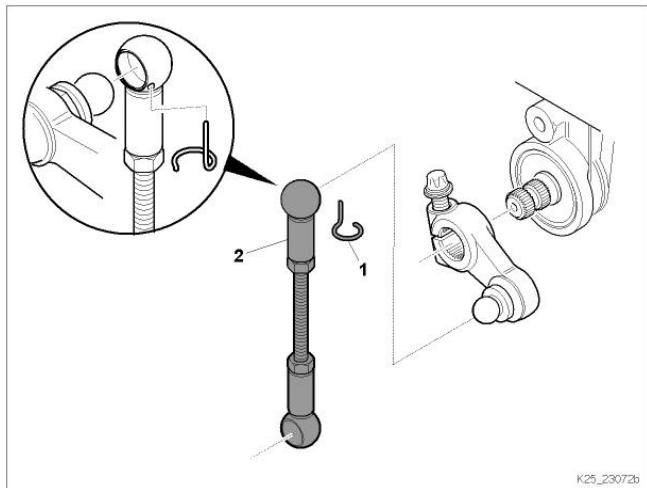
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

(-) Securing throttle valve stub with cable divider



- Tie up throttle valve stub and cable divider with cable tie (arrow).

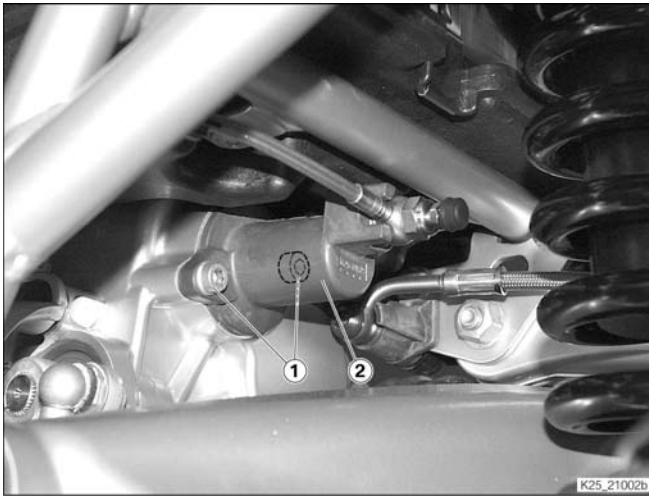
(-) Disengaging selector rod from shift lever



- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.

(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
-

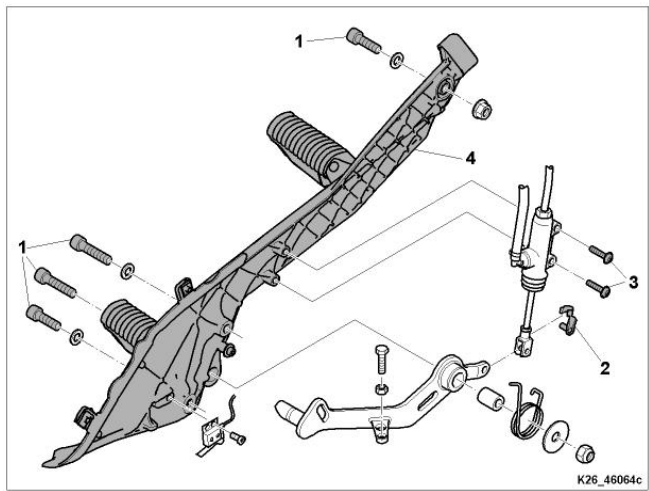


- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.


(-) Removing right footrest plate



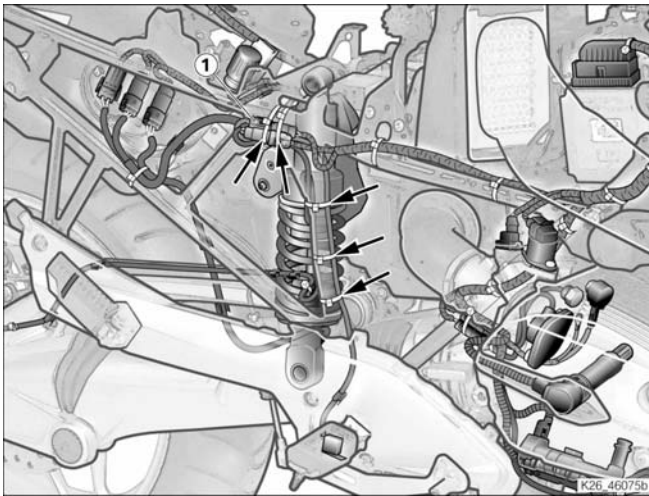
- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.

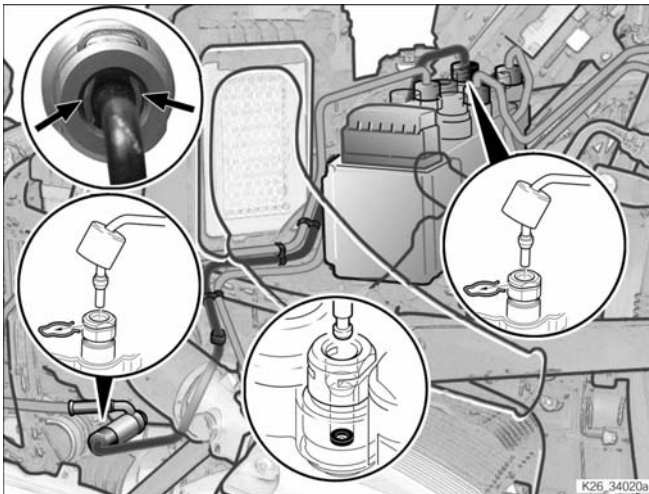
 Technical data			
Release temperature, screws for rear brake master cylinder		100 °C	

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.



(-) Disconnecting brake pipe for rear wheel circuit from pressure modulator

- Push the protective cap up.
- Remove the spring clip.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap the area around the connector in a cloth.
- Open the retaining clips, lift the brake pipe out of the pressure modulator and catch escaping brake fluid with a cloth.
- Seal the open end of the brake pipe to prevent brake fluid from dripping.

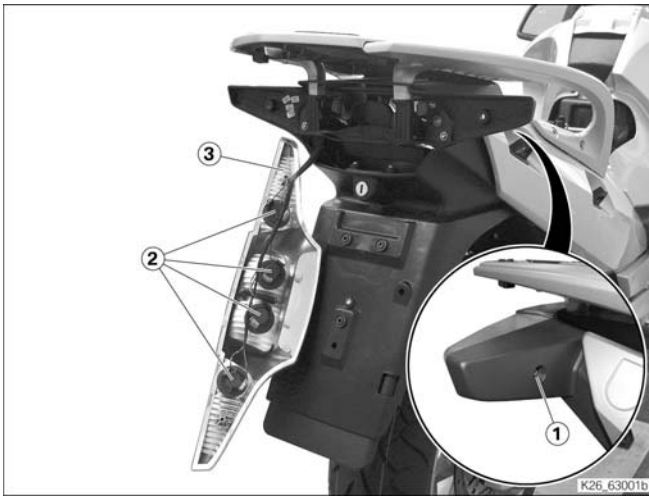


Note

Use the protective cap from a bleed screw to seal the brake pipes.

(-) Removing rear-light unit

- Remove screws (1).



- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).

(-) Disengaging wiring harness at rear

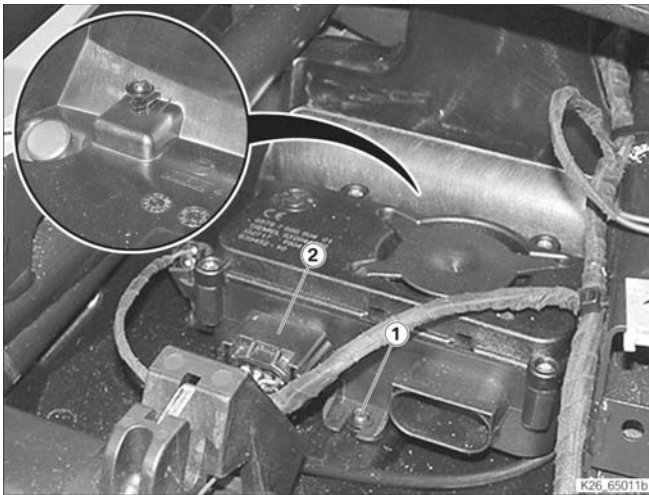
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



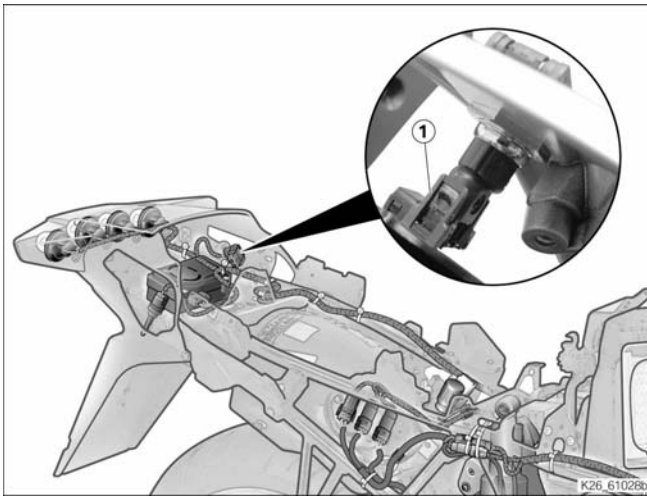
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

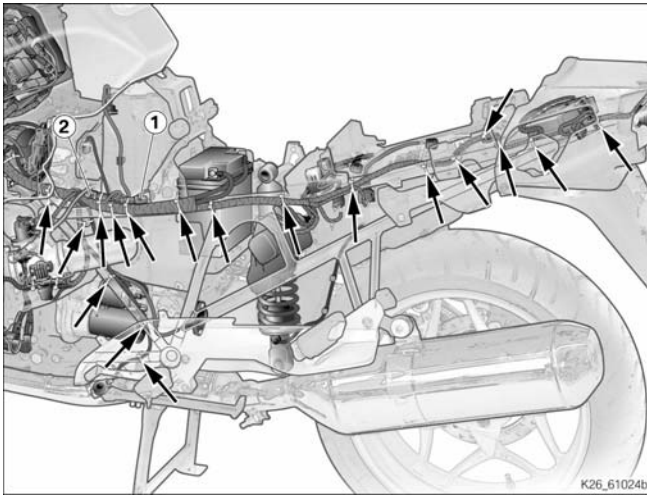


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.

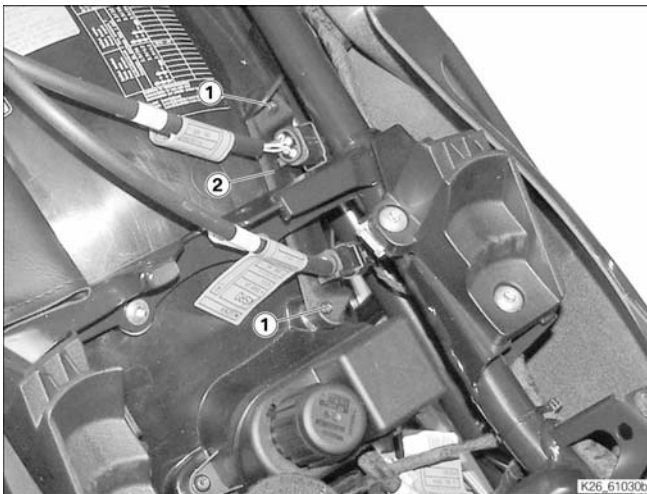


- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.

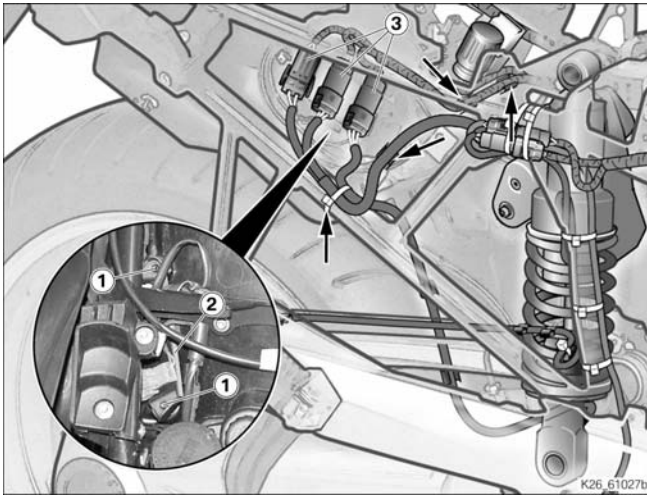
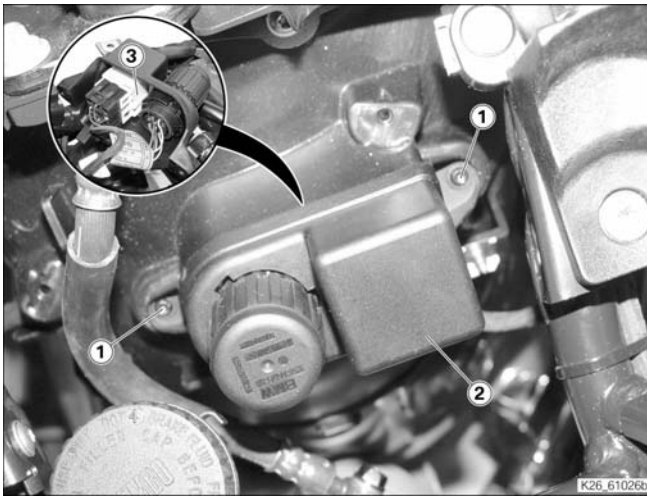


Variant, Seat heating

- Remove screws (1).
- Pass holder (2) forward with the cables.

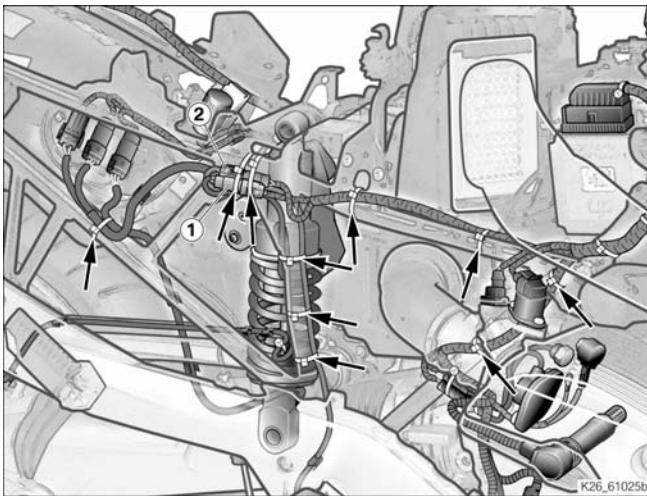


- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.



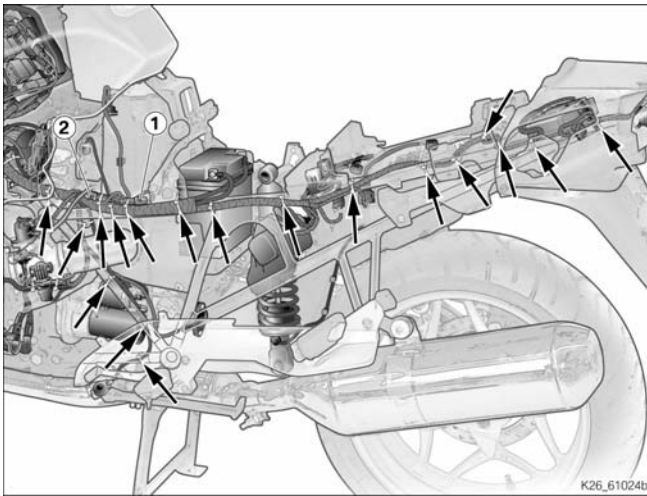
Variant, ESA

- Remove screws (1).
- Pass holder (2) forward with the cables.
- Disconnect plug (3) of the spring strut.



- Disconnect plug (1) of the speed sensor.

- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.



(-) Removing rear section of motorcycle

- Open hose clip (1).
- Disconnect the hose from the intake air silencer.

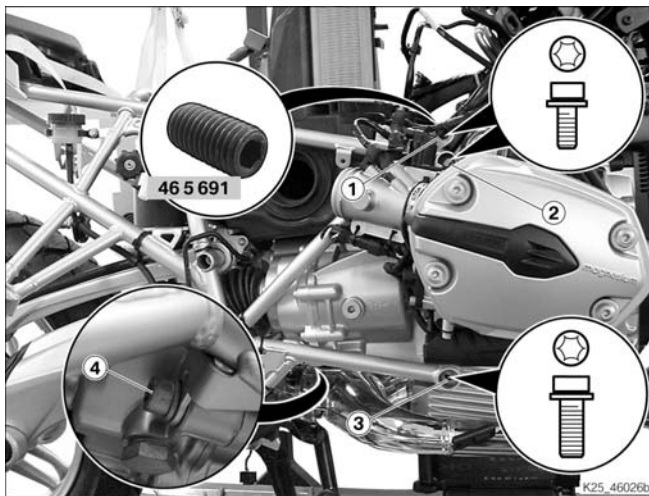


- Secure the front wheel on the lifting platform.
- Using straps, secure the rear section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.



► Releasing threaded fastener on rear frame

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.



Attention

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

Apply masking tape to the part of the swinging arm that could be damaged.

- Slacken screw (4), but do not remove it at this point.

▷ **Pressing universal shaft off gearbox output shaft**

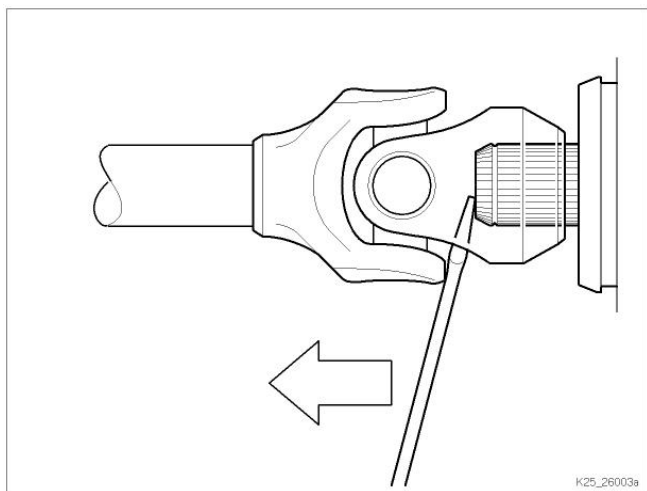
- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.



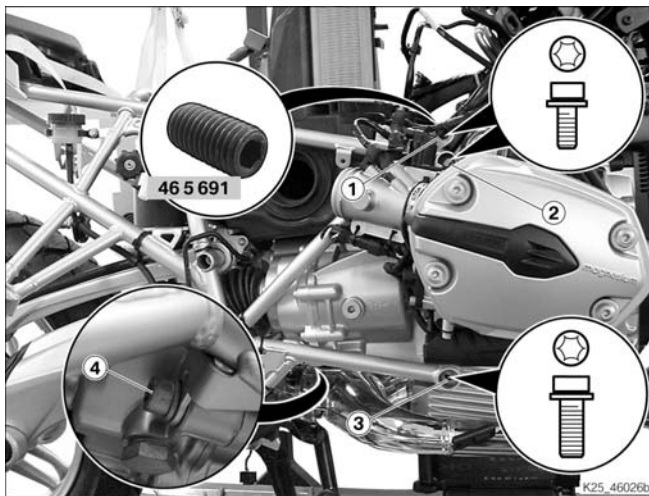
- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the shaft in this position.
- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.

Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- ◁
- Remove screw (4).



- Thread the fuel-tank breather hose out of the rear frame.
- Disconnect the fuel pressure regulator from the intake air silencer.
- Using crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) , carefully lift the rear section clear of the motorcycle, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.

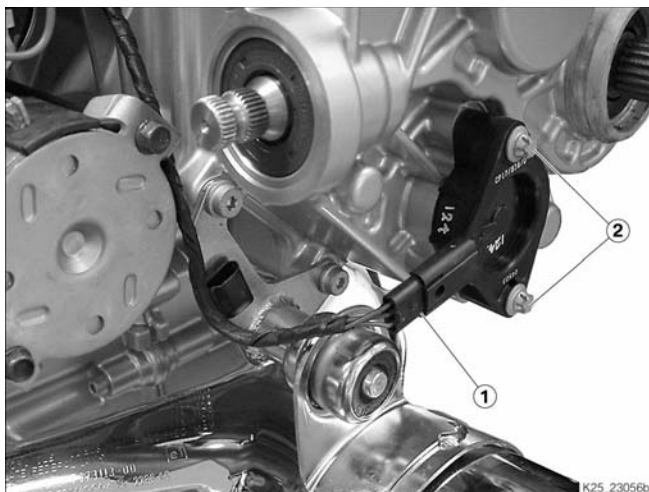


Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Pass the control-circuit line with the brake master cylinder forward out of the way.
- Carefully set down the rear section where it will not be damaged.

(-) Removing gearbox potentiometer



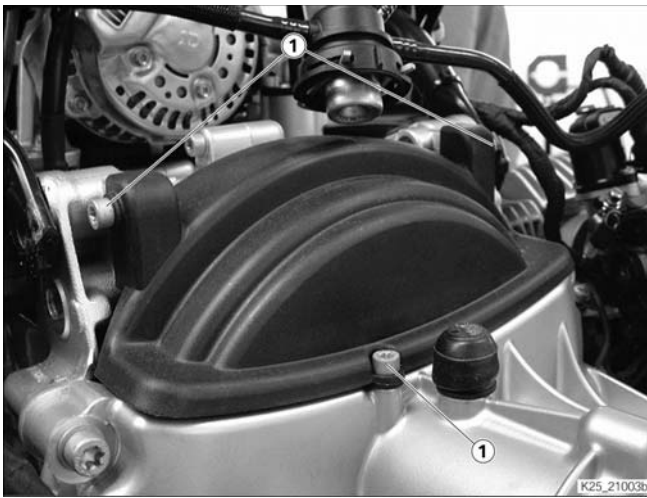
- Disconnect plug (1) of the gearbox potentiometer.
- Release the cable from the cable clips.
- Remove screws (2) from the gearbox potentiometer.
- Remove the gearbox potentiometer, noting the O-ring.

(-) Removing starter



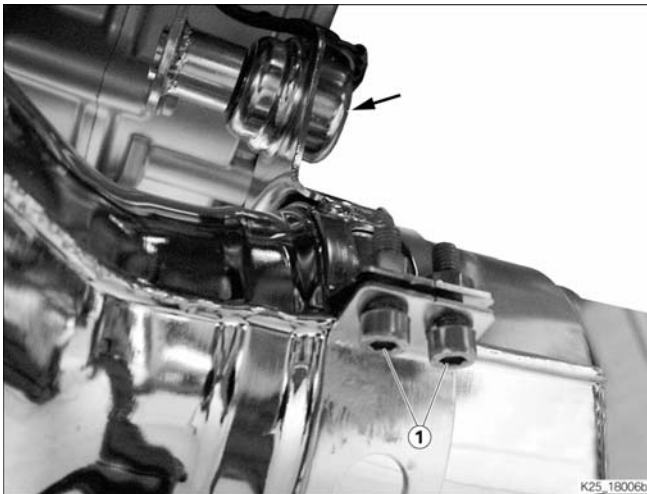
- Disconnect "starter positive" cable (1) (terminal 30).
- Disconnect "starter start signal" plug (2) (terminal 50).
- Remove screws (3).
- Remove the starter.

(-) Removing cover for clutch



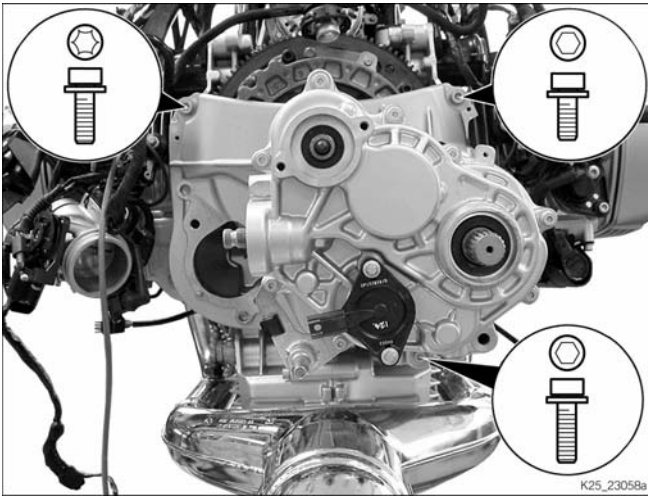
- Remove screws (1).
- Carefully slip the clutch cover to the rear underneath the pressure modulator and remove.
- Install screws to hold the pressure modulator in position.

(-) Removing gearbox




- Remove screws (1) of the clamps on the exhaust manifold.
- Pull clamp (arrow) off the bracket.

- Remove 3 screws.
- Pull the gearbox straight to the rear to remove.
- Keeping it straight to ensure that oil does not escape through the breather, place the gearbox on a smooth, level surface.



(-) Installing gearbox

- Remove dirt and old lubricant from the splines of the clutch hub and the gearbox input shaft.
- Lubricate the splines of the clutch hub and the gearbox input shaft.

 <p>Consumables/lubricants</p>		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

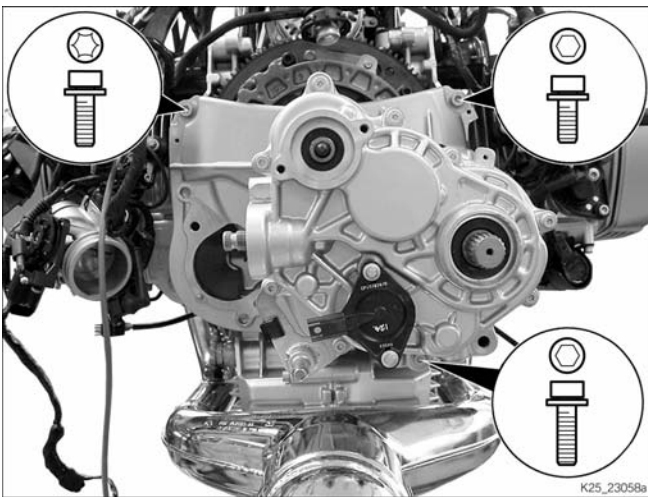
- Position the gearbox with the gearbox input shaft just introduced into the hub of the clutch plate.




Note

You will find it easier to introduce the splined end of the gearbox input shaft into the clutch hub if you engage a gear and turn the gearbox output shaft.


- Slide the gearbox over the reamed sleeve until it mates with the crankcase.
- Install 3 screws.



 <p>Tightening torques</p>		
Gearbox to engine block, M8 x 35	19 Nm	
Gearbox to engine block, M8 x 70	19 Nm	
Gearbox to engine block, M8 x 50	19 Nm	

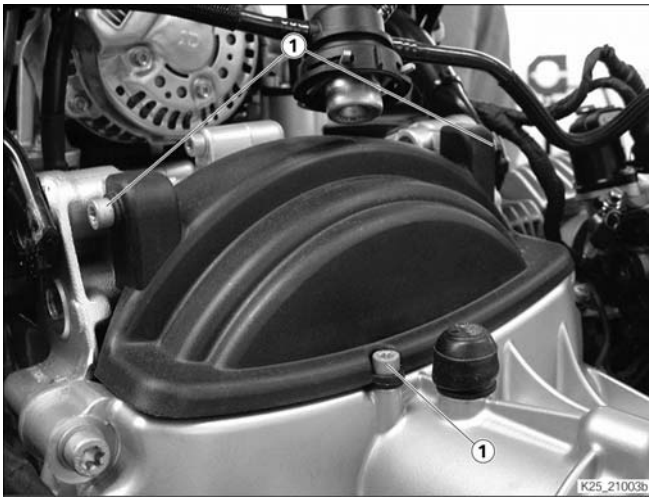
- Slip the exhaust clamp onto the holder on the gearbox and align it with the exhaust.
- Tighten screws (1).




 Tightening torques		
Clamp, elbow, rear, M6 x 20 Optimoly TA	8 Nm	

(-) Installing cover for clutch

- Remove screws (1).
- Carefully fit clutch cover under the pressure modulator and align.
- Install screws (1).




 Tightening torques		
Clutch cover to engine, M6 x 16	8 Nm	


(-) Installing starter

- Install the starter.
- Install screws (3).



 Tightening torques		
Starter with gearing to engine, M8 x 60	19 Nm	

- Connect "starter positive" cable (1) (terminal 30).

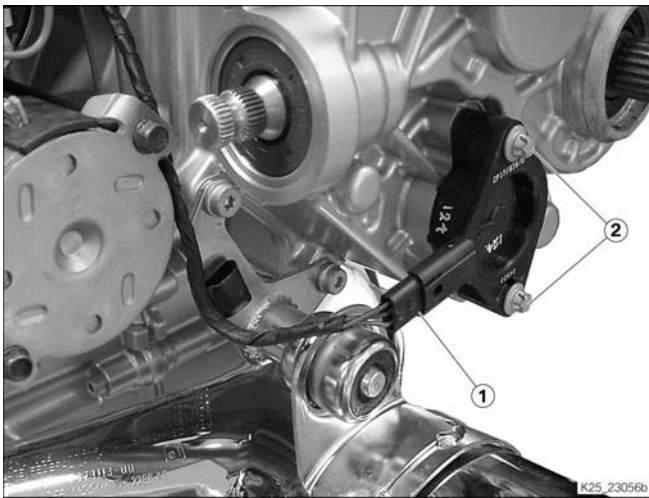
 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).

(-) Installing gearbox potentiometer

- Install the gearbox potentiometer, noting the O-ring.
- Install screws (2).

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Tightening torques

Gear potentiometer to gearbox	9 Nm	
-------------------------------	------	--

- Connect plug (1) to the gearbox potentiometer.
- Clip the cable into the cable clips.

(-) Installing rear section of motorcycle

- Remove dirt and old lubricant from the splines of the gearbox output shaft.
- Lubricate the splines of the gearbox output shaft.



Consumables/lubricants

Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476
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- Carefully manoeuvre the rear section of the motorcycle into position at the front section, making sure that the wiring harness is correctly positioned.
- Mate the universal shaft with the gearbox output shaft and align the rear frame with the anchorages.



Note

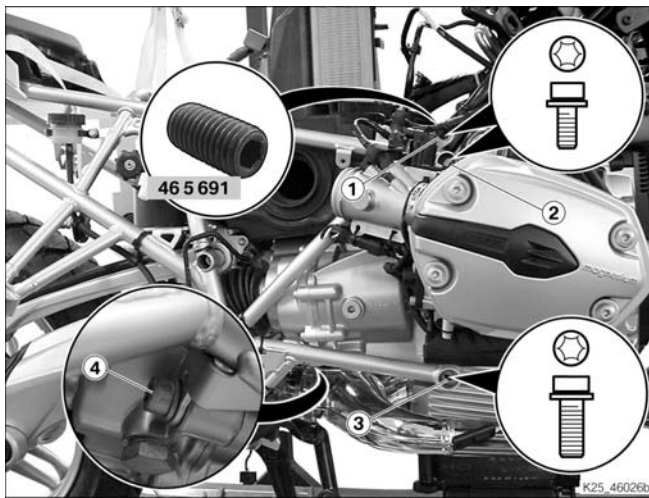
If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Carefully turn the rear wheel to check that the universal shaft is still correctly positioned.
- Position the fuel pressure regulator on the intake air silencer.


► Securing rear frame to motorcycle

- Install screw (4), **but do not tighten it at this point.**
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert screws (1) on left and right.
- Tighten screw (4).





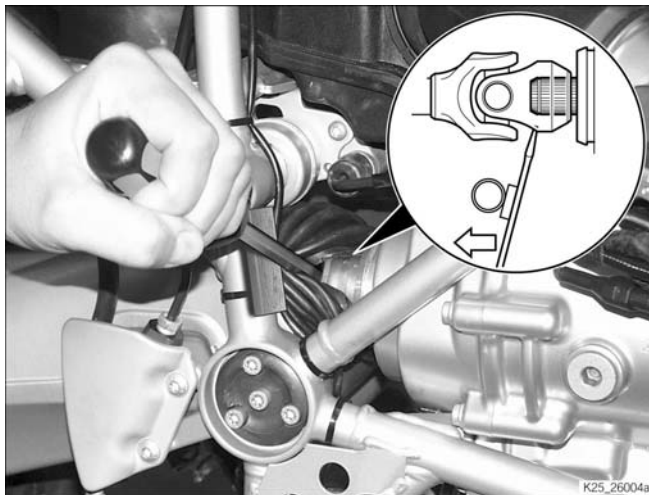
- Tighten screws (1), (2) and (3).

 Tightening torques		
Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	

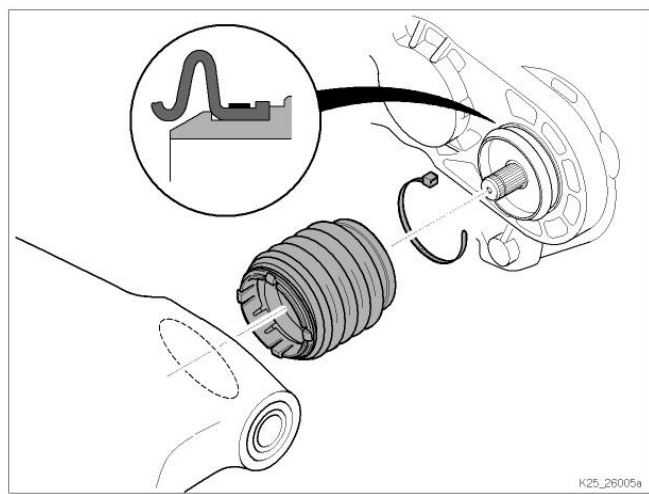



► **Pressing universal shaft onto gearbox output shaft**

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.



 Consumables/lubricants		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.

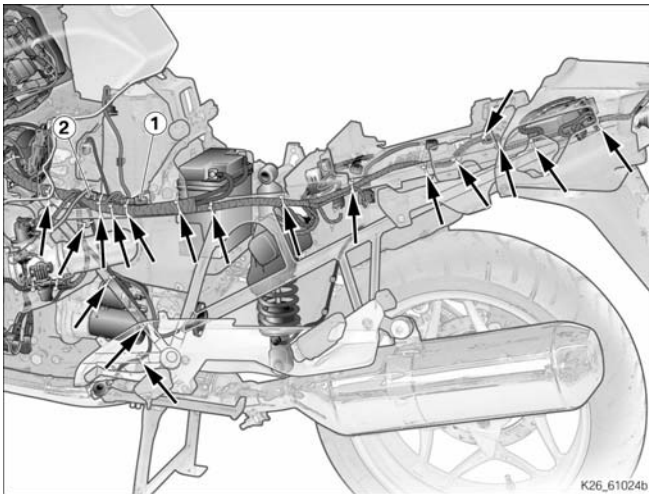


- Release the straps securing the front wheel and disengage crane (No. 46 5 671), (No. 46 5 672), (No. 46 5 673), (No. 46 5 674) with the straps from the rear section of the motorcycle.

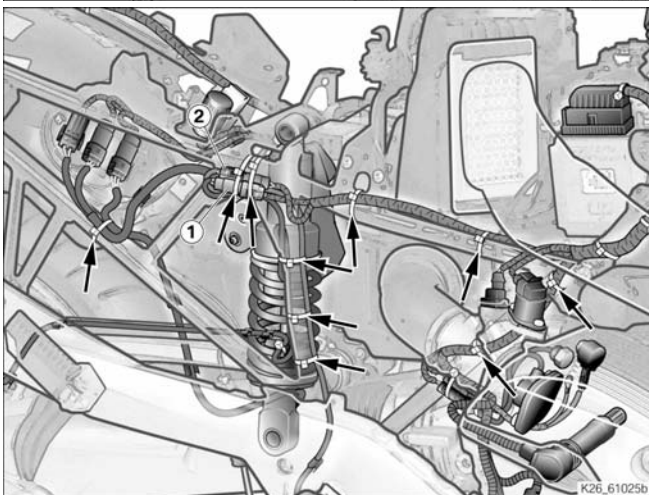


- Release the control-circuit line complete with the brake master cylinder and pass it through to the rear.
- Route the fuel-tank breather hose into position along the rear frame.
- Connect the hose of the crankcase breather to the intake air silencer.
- Slide hose clamp (1) into position.

(-) Securing wiring harness at rear



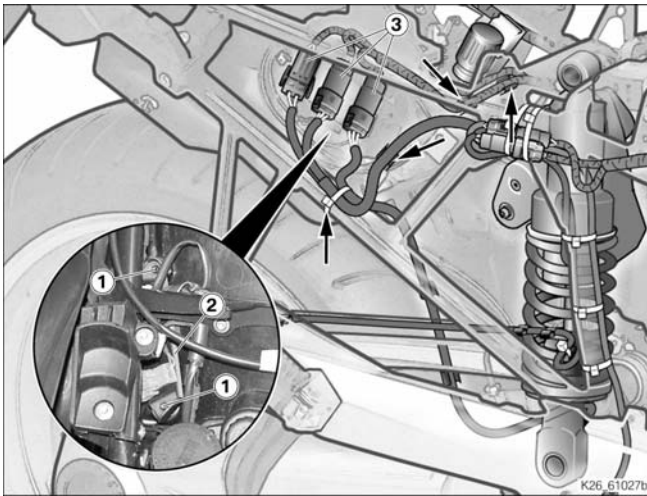
- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.



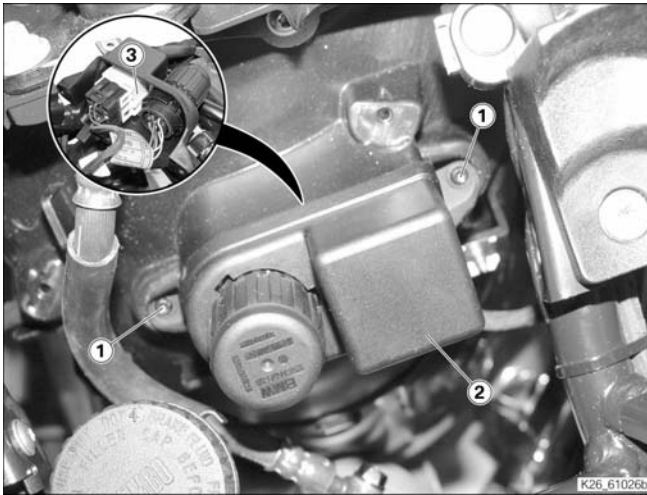
- Connect plug (1) of the speed sensor.

Variant, ESA

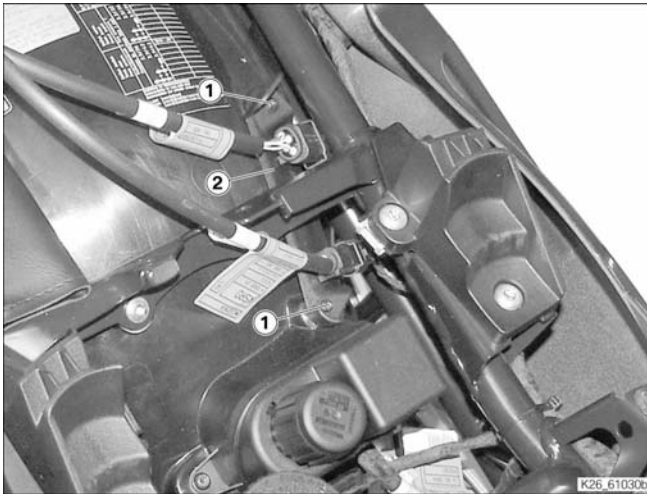
- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.



- Secure holder (2) with screws (1).



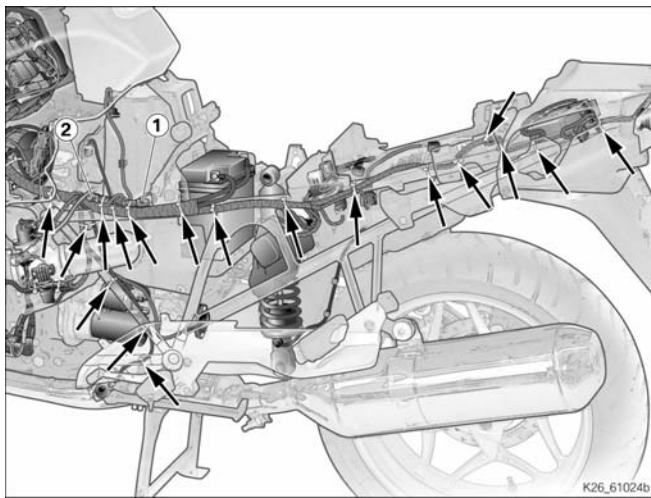
- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).



Variant, Seat heating

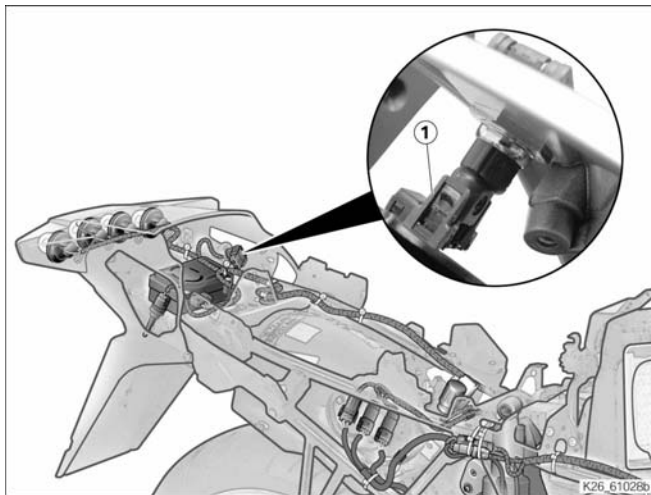
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

- Secure the wiring harness to the rear frame with cable ties (arrows).



Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



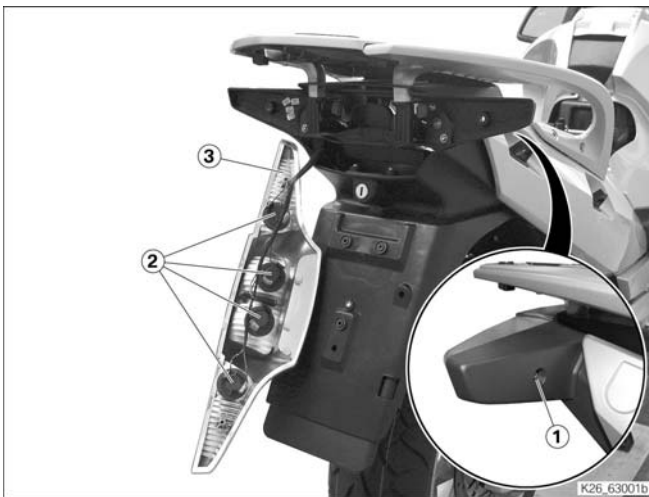
Variant, On-board computer

- Connect plug (1) of the temperature sensor.



(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



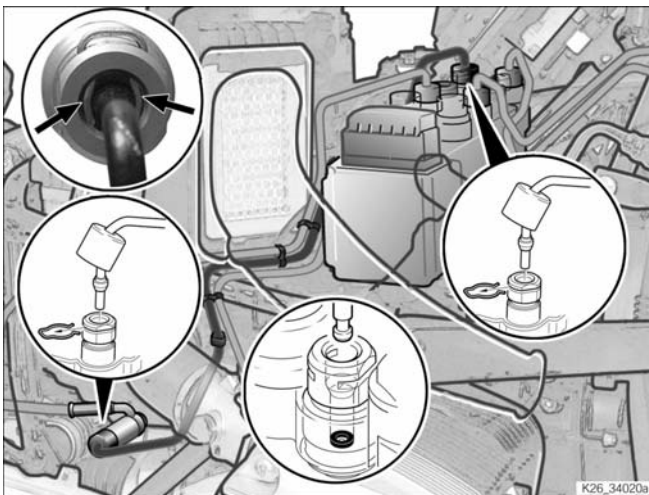
(-) Connecting brake pipe for rear wheel circuit to pressure modulator

⚠ Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.



- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.

⚠ Warning

Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure

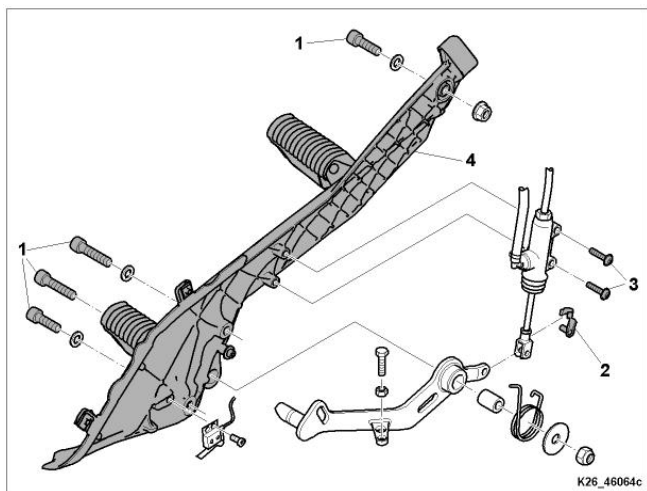
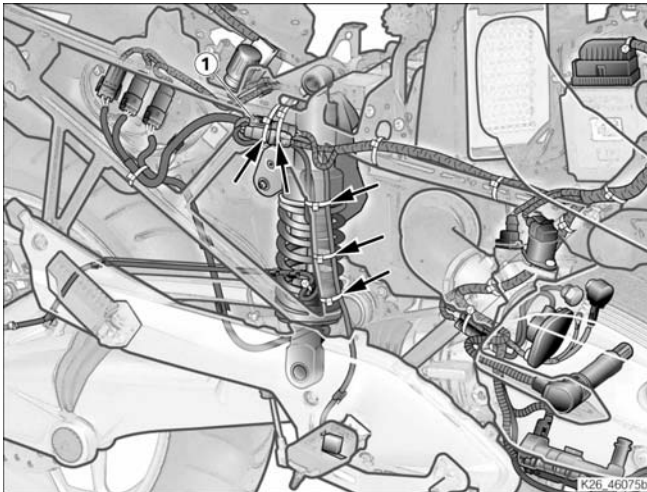
contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.

- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Installing right footrest plate

- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

- Install pin (2).
- Install screws (1).

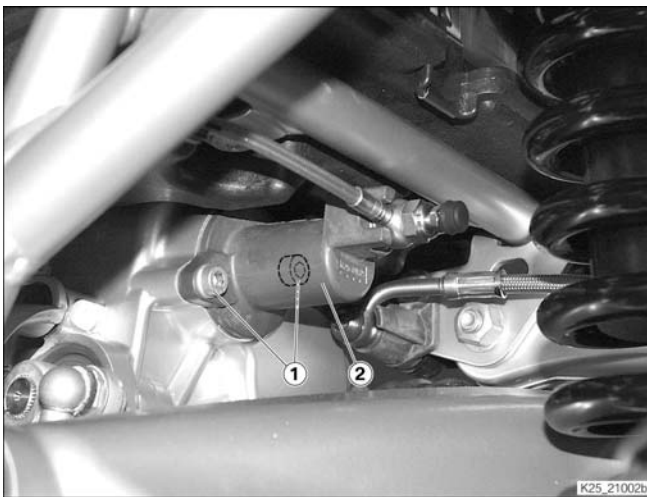
Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.



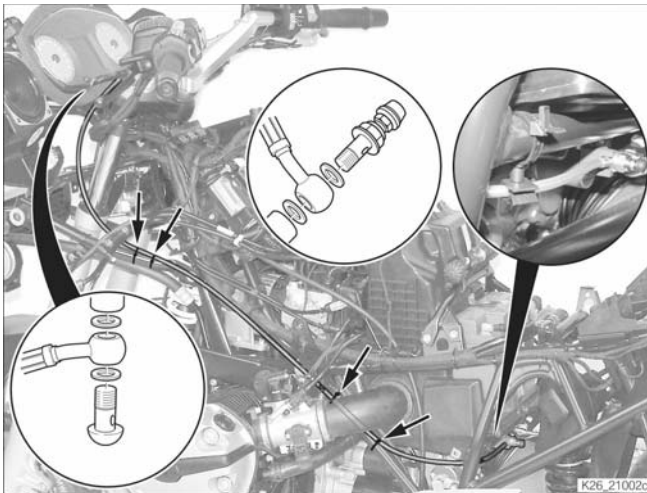
(-) Installing clutch slave cylinder

- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.




 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	

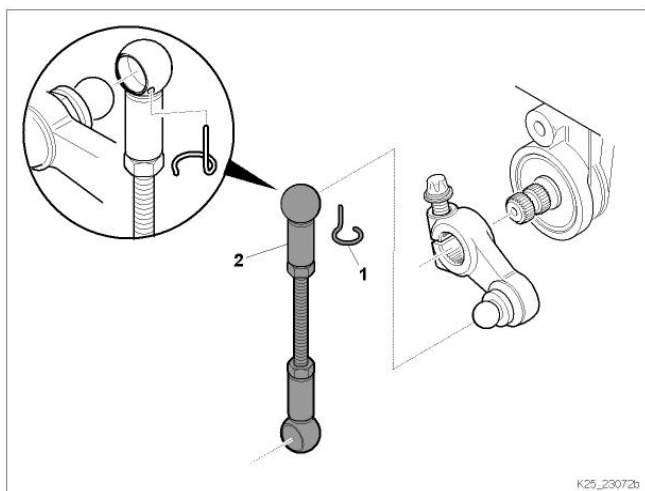
- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.



(-) Securing selector rod to shift lever

- Grease the ball head of the shift lever and the ball socket of selector rod (2).

 Consumables/lubricants		



Staburags NBU 30 PTM

High-performance lubricating grease

07 55 9 056 992

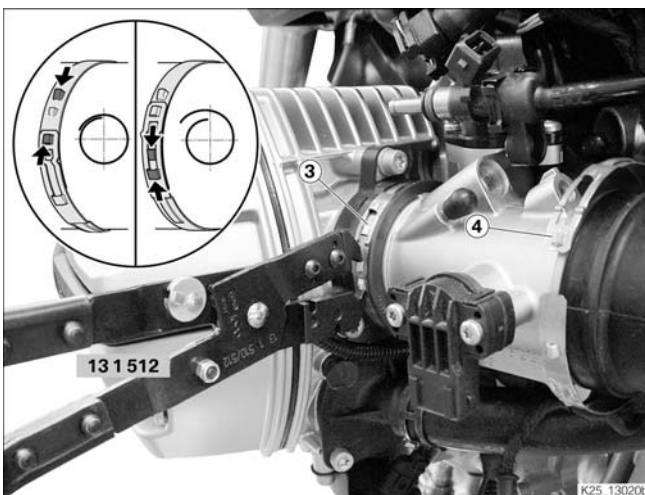
- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

(-) Releasing throttle valve stub with cable divider



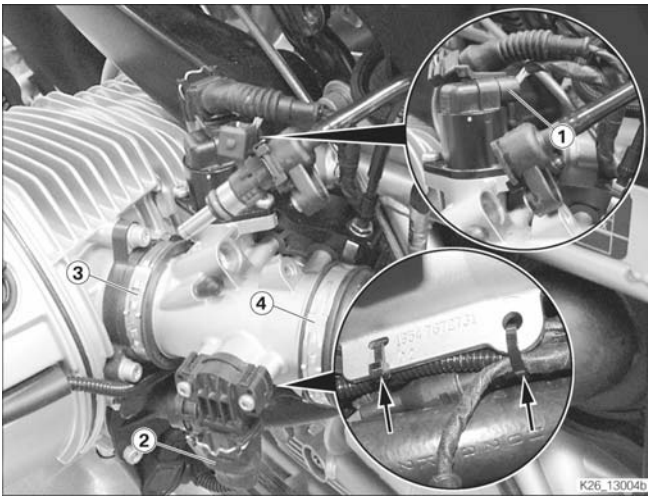
- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.

(-) Installing throttle-valve stub



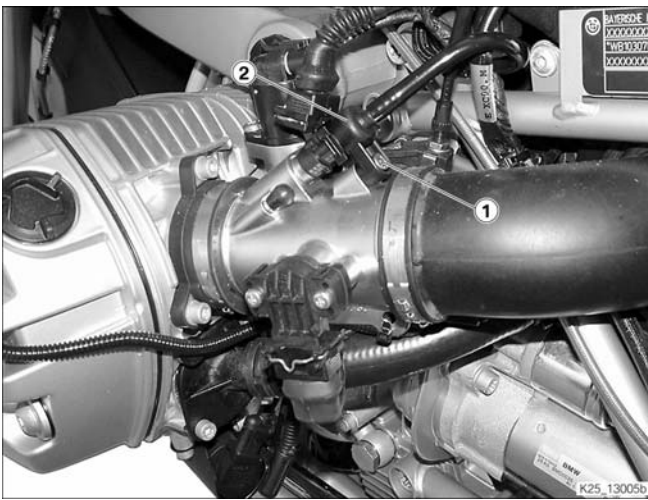
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .

- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to




- the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing right and left injection valves

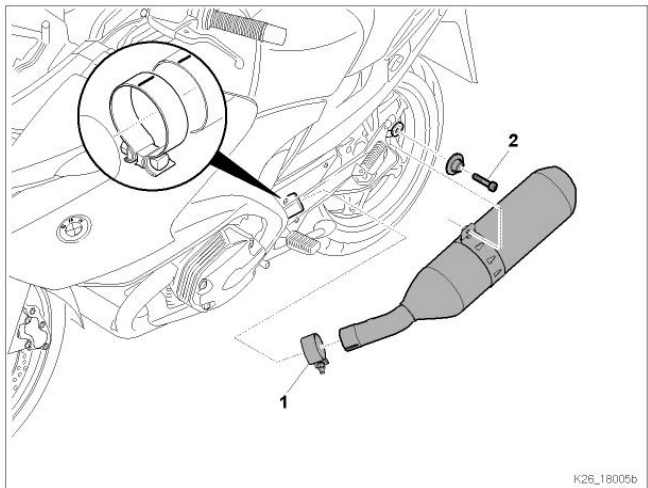


- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure with screws (2).


 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.


(-) Installing silencer



- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

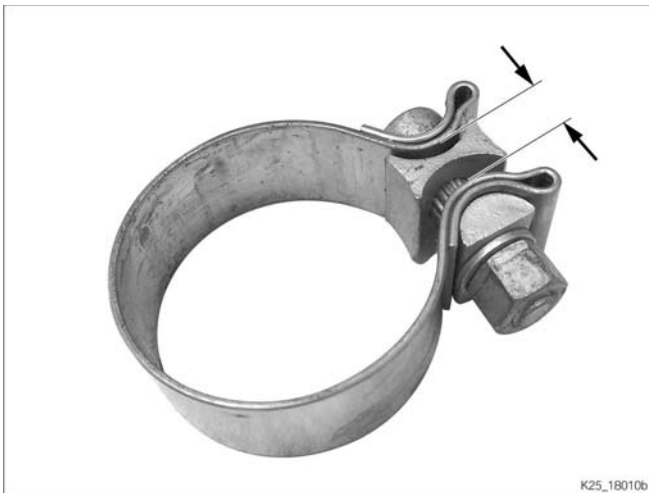
- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**

Test

- Check distance (*arrows*) between silencer and rear wheel.



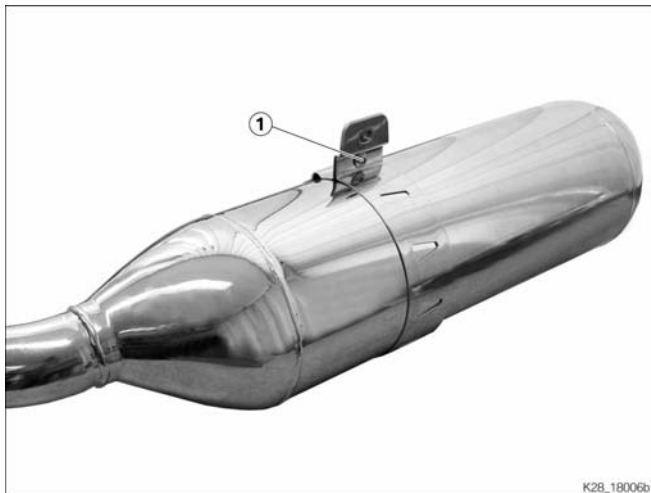
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).



! Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
--	--	------------	--

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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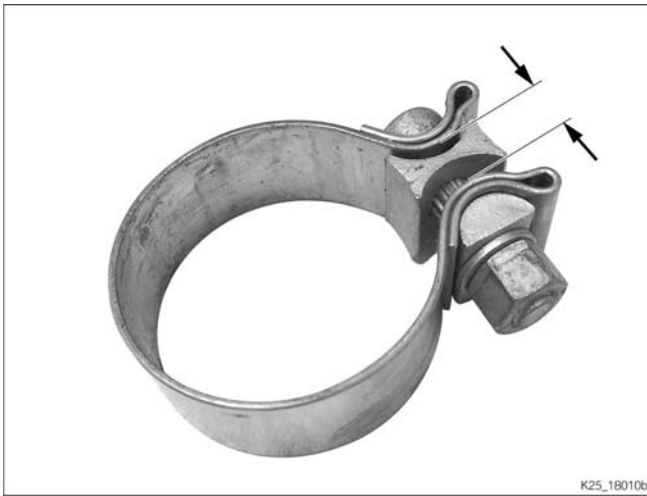



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.


Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.

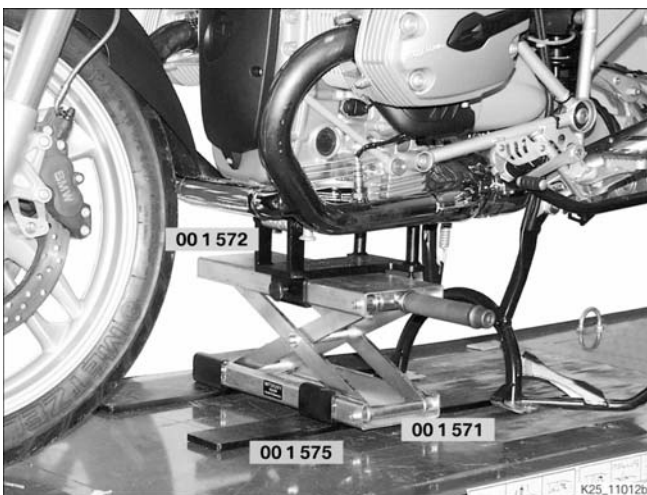


 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



(-) Filling gearbox with oil to correct level



Precondition

- Drain plug is installed.

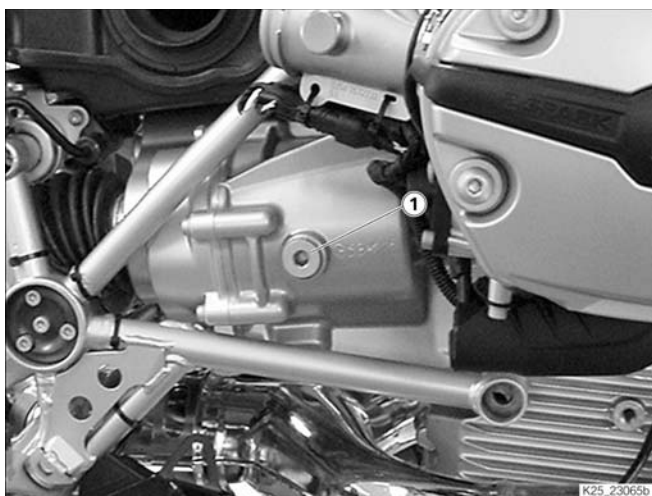


- Using a funnel of similar instrument, pour the correct quantity of gearbox oil into the gearbox.



Technical data

Oil capacity, gearbox	To bottom edge of thread of filler opening	0.9 l	
Consumables/lubricants			
Brand name hypoid-gear lubricant SAE 90 API GL 5			

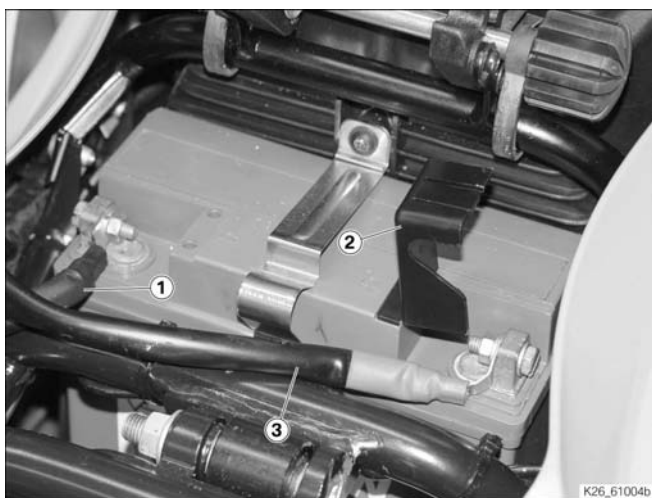


- Fit a new sealing ring to oil filler plug (1) and install and tighten the plug.



Tightening torques

Oil filler plug, gearbox	30 Nm	
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(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.

- Switch off the ignition.

(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

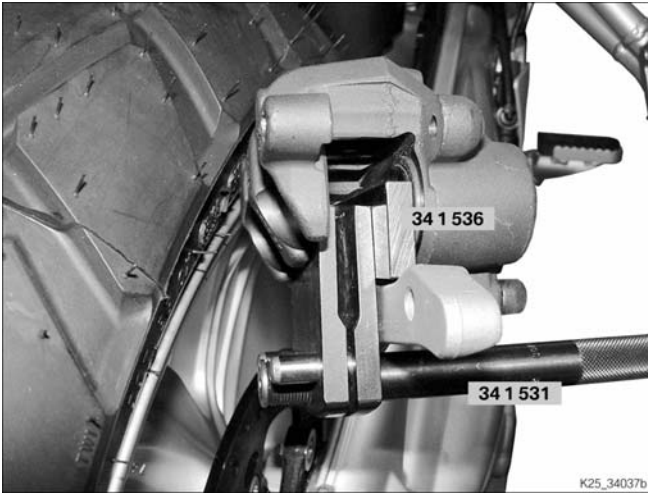


Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside

the housing and causing damage.


Avoidance: Do not disconnect the plugs from the pressure modulator.



- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

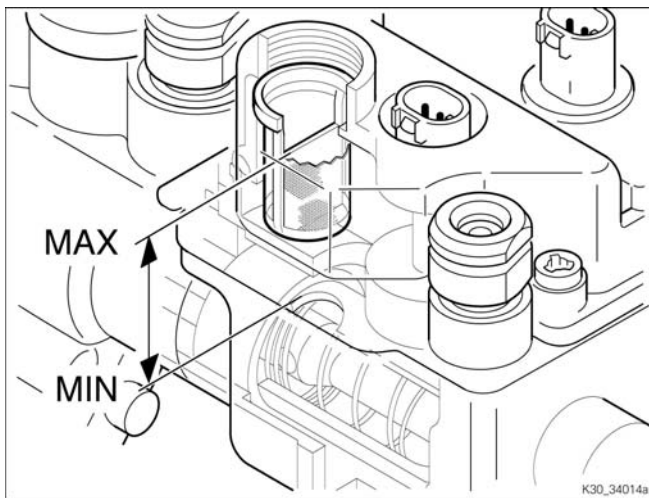
- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

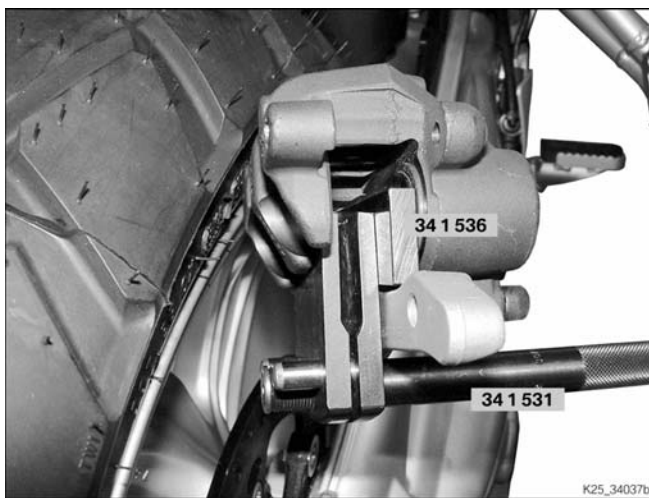
Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in



accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.



► **Instructions for filling rear wheel circuit reservoir**

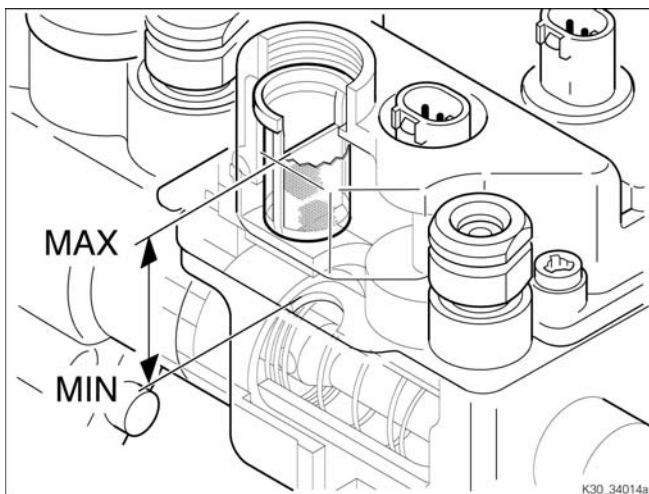
- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536) , in the rear brake caliper.



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.



- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.



Consumables/lubricants

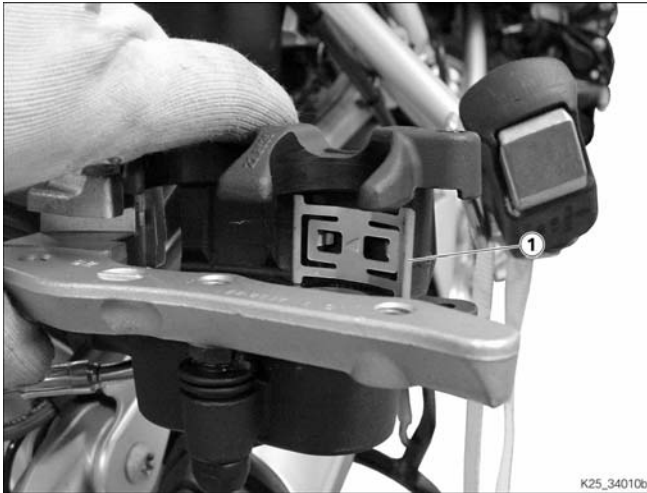
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
------------------	-------------------	--

- Hand-tighten the cap of the rear wheel-circuit reservoir.

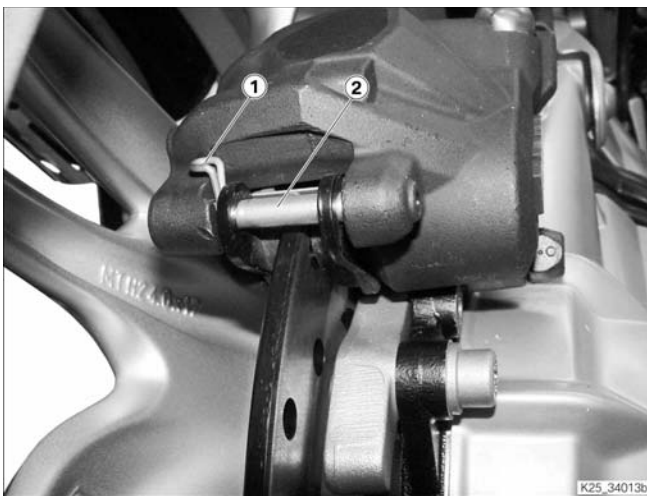
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary

▷ **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.
- » Arrow points in direction of travel.



K25_34010b



K25_34013b


- Install the brake pads.
- Manually install retaining pin (2).

▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).



K25_34034b

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

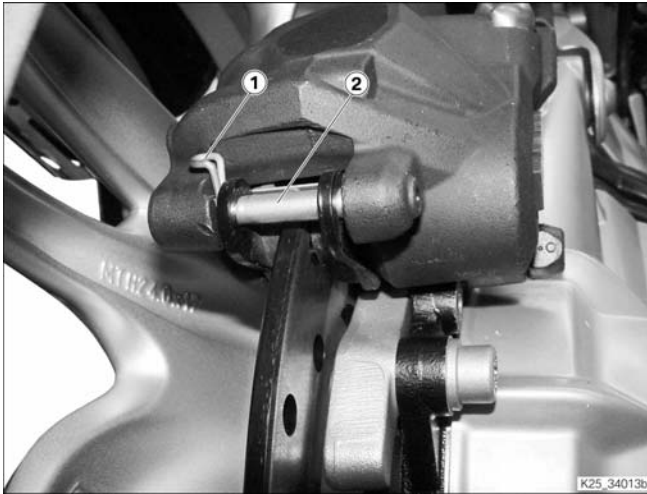
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



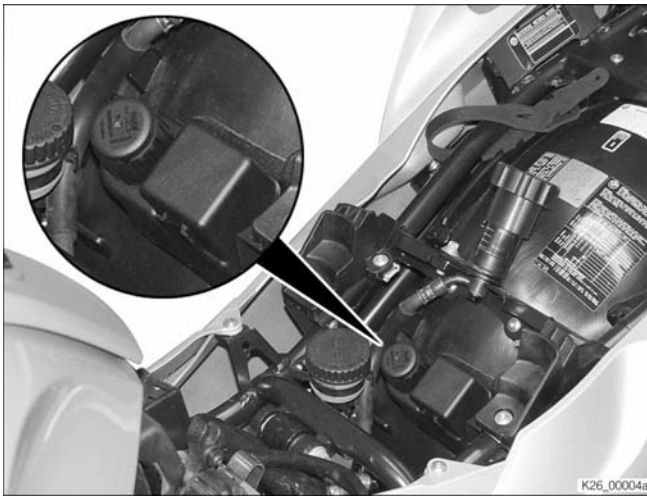
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.



- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



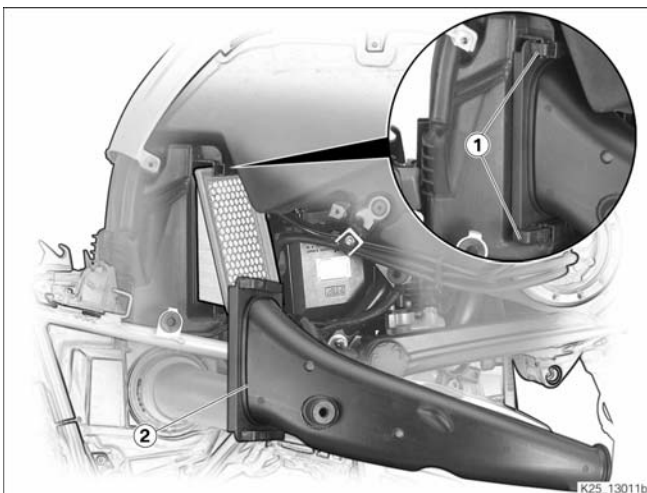
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

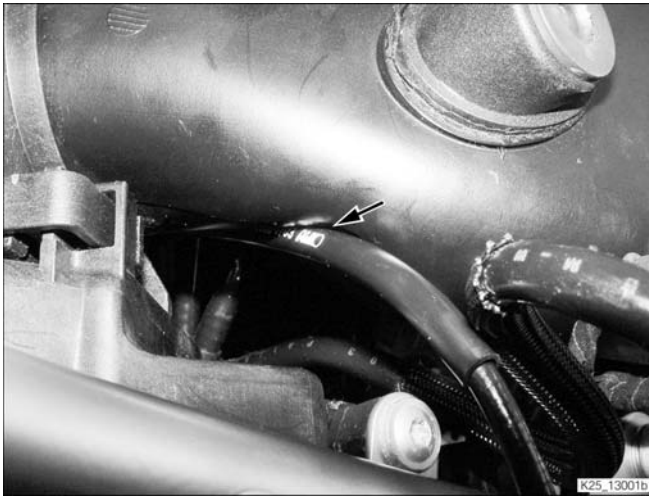
- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing intake air pipe



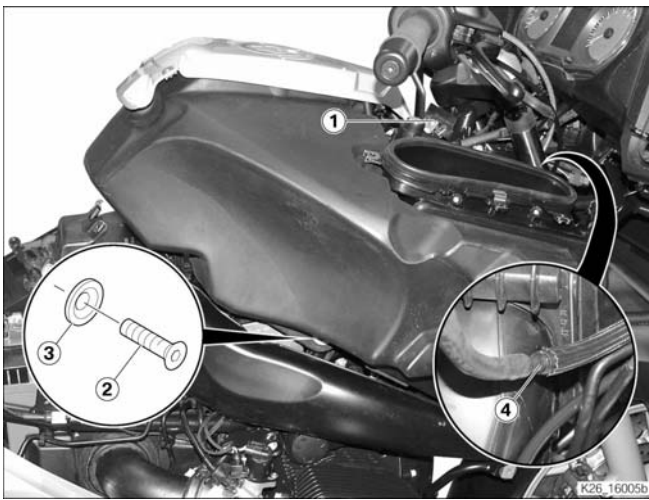
- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the



guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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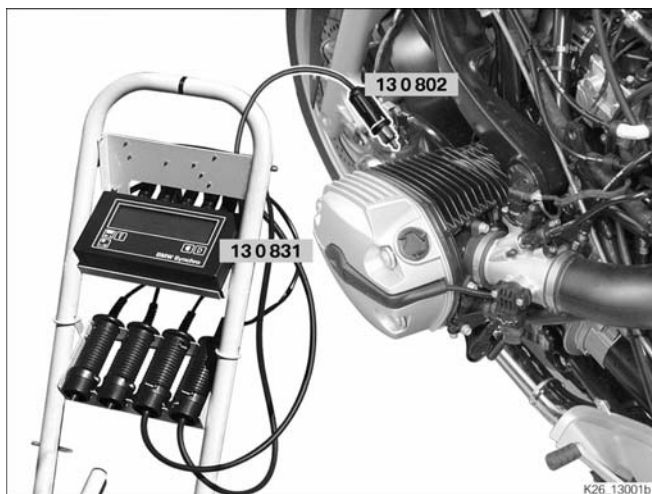
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

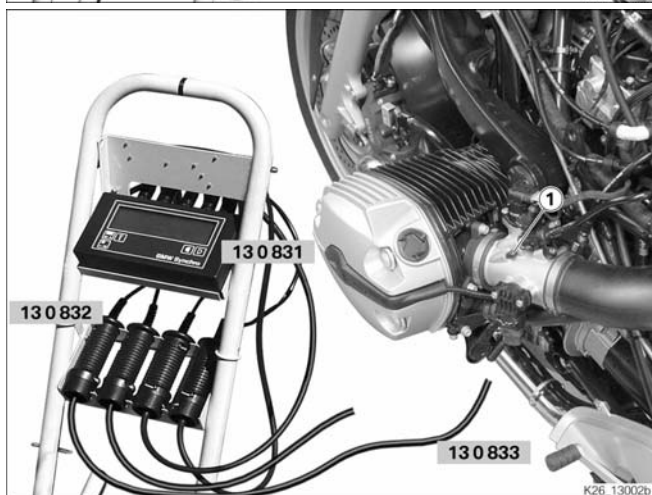
- Connect BMW Synchro (No. 13 0 831), (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



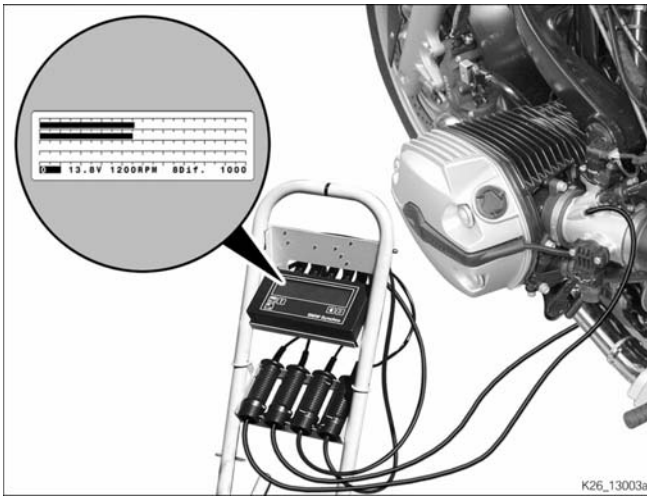
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions

issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

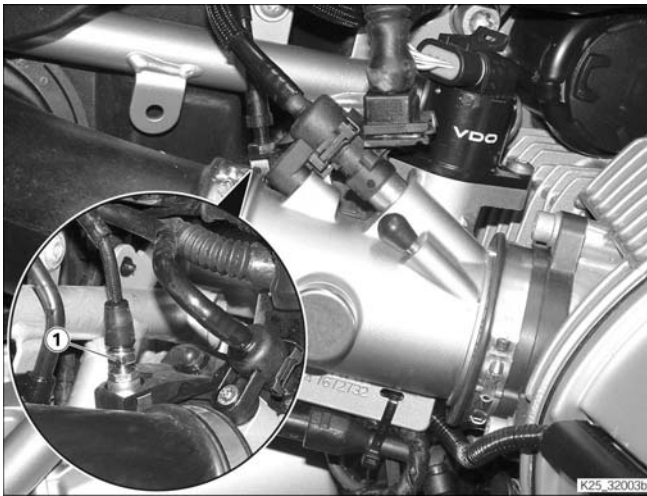
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.



» Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

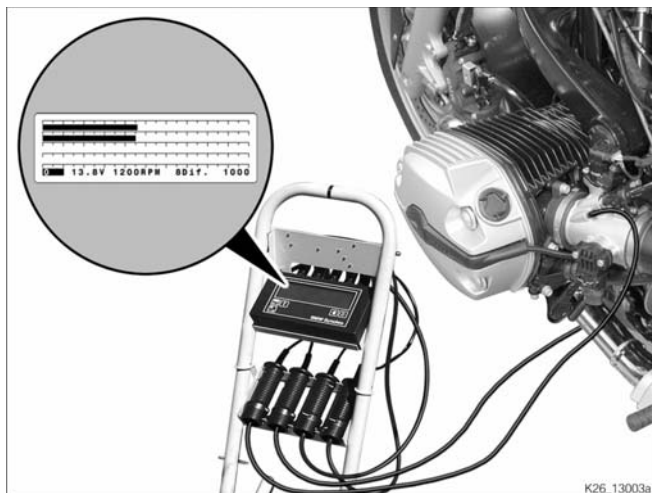
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.

- Disconnect the BMW Motorrad battery charger from the vehicle.

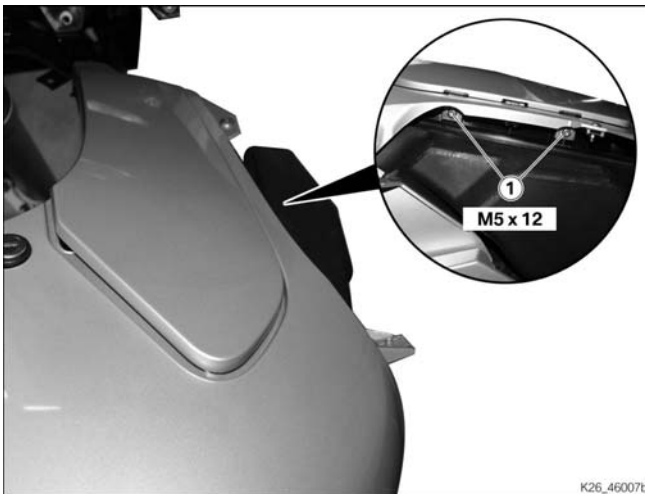
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



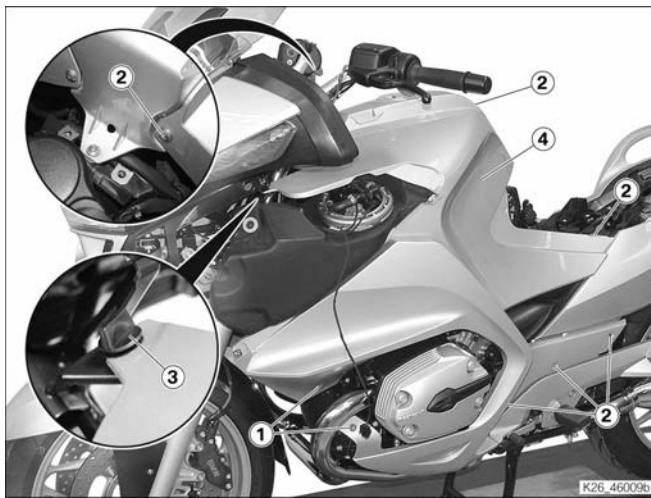
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).



- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **23 00 510 Changing gearbox oil (regular maintenance)**

(-) Changing gearbox oil



Note

Change oil, warmed to normal operating temperature.

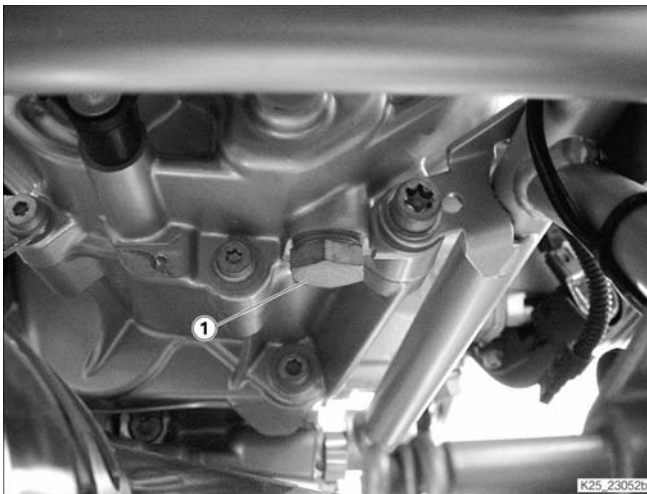
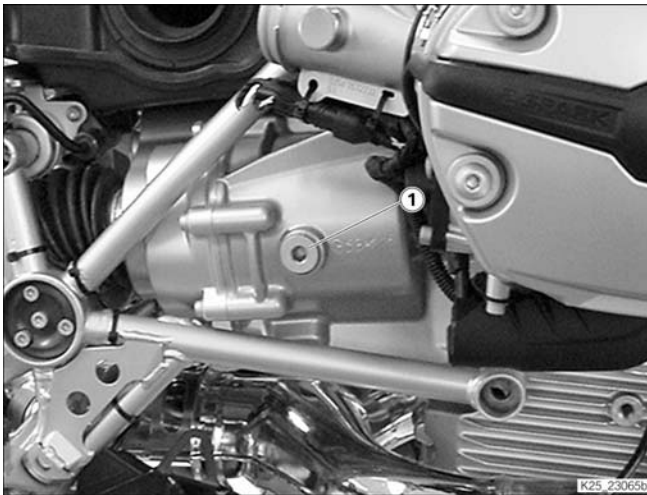
► Draining gearbox oil



Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.



- Place a suitable tray underneath the gearbox.
- Remove oil filler plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.

- Remove drain plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.
- Remove all chips of metal from the drain plug.
- Fit a new sealing ring to the oil drain plug and install and tighten the plug.



Tightening torques

Oil drain plug, gearbox	30 Nm	
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► Filling gearbox with oil to correct level

Precondition

- Drain plug is installed.



- Using a funnel of similar instrument, pour the correct quantity of gearbox oil into the gearbox.

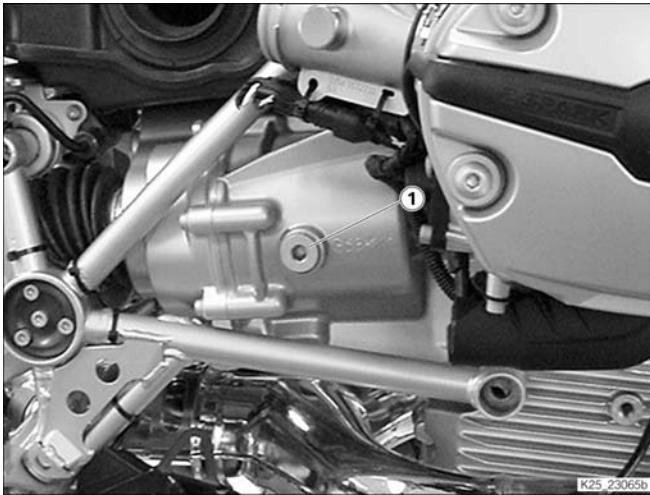


Technical data


Oil capacity, gearbox	To bottom	0.9 l	
-----------------------	-----------	-------	--



edge of thread of filler opening		
Consumables/lubricants		
Brand name hypoid-gear lubricant SAE 90 API GL 5		



- Fit a new sealing ring to oil filler plug (1) and install and tighten the plug.

 Tightening torques		
Oil filler plug, gearbox	30 Nm	



 **23 00 520 Replacing gearbox (gearbox removed)**

(-) Changing gearbox

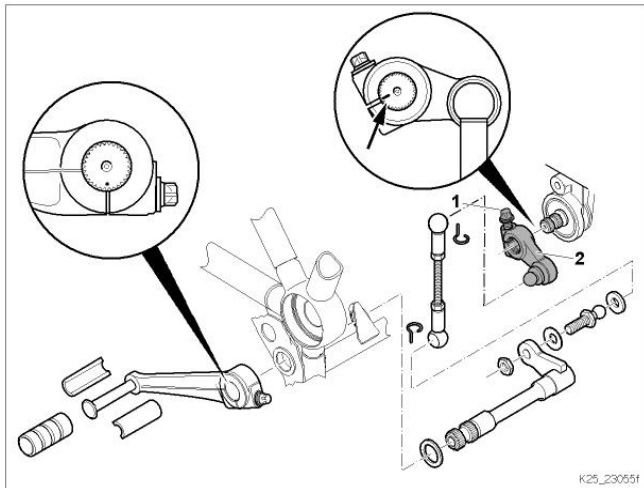
▶ **Removing breather**

- Remove breather (1).
- Install the cell plugs.



▶ **Removing shift lever from selector shaft**


- Remove screw (1) from the shift lever.
- Pull shift lever (2) off the selector shaft.

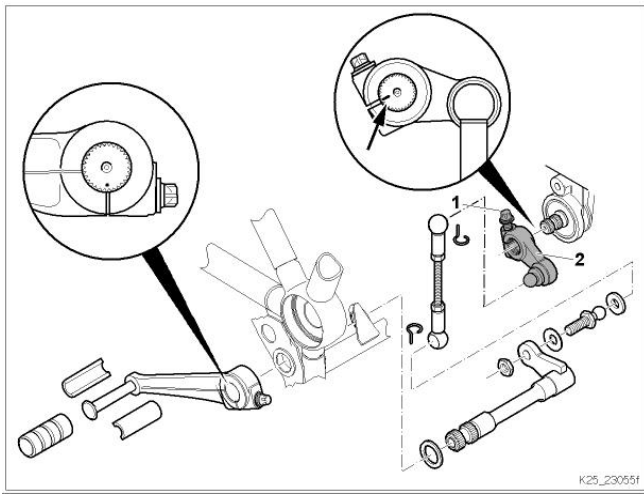


- Remove the transportation covers and seals.
- Remove reusable small items from the old gearbox and install them on the new gearbox.

▶ **Connecting shift lever to selector shaft**

- Position shift lever (2) on the selector shaft.
- Make sure that the mark (arrow) is aligned with the gap on the shift lever.
- Install screw (1) in the selector shaft.

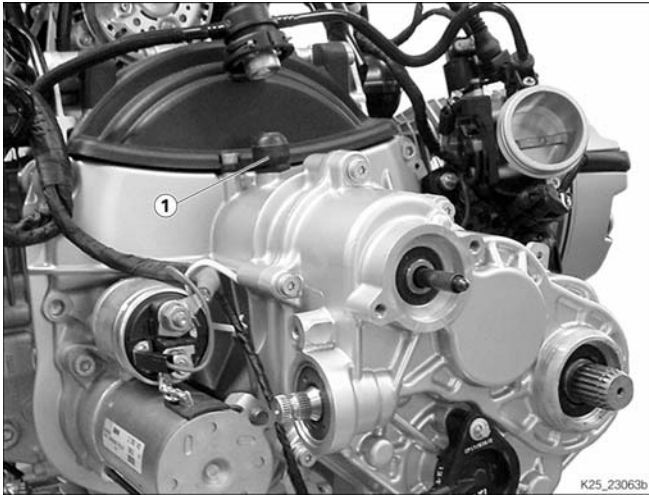
 Tightening torques		
Selector lever to selector shaft, M6 x 25	8 Nm	



- ▶ **Installing breather**
- Remove the cell plugs.
 - Install breather (1).



 **23 11 501 Replacing gearbox housing (gearbox removed)**



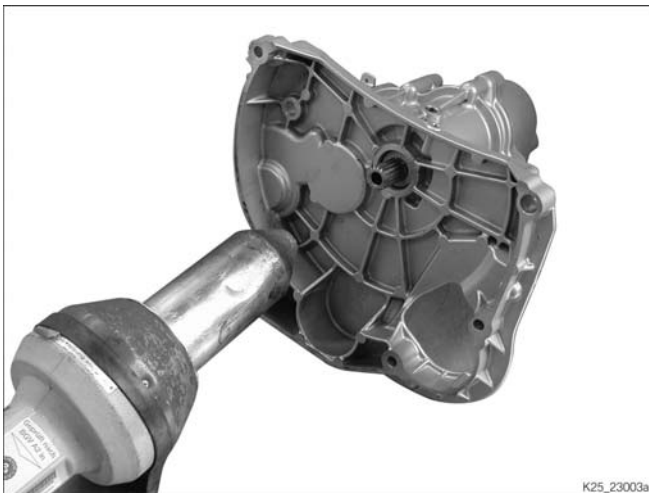
(-) Removing breather

- Remove breather (1).
- Install the cell plugs.




(-) Removing gearbox housing

- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



- Heat the bearing seats in the gearbox housing.

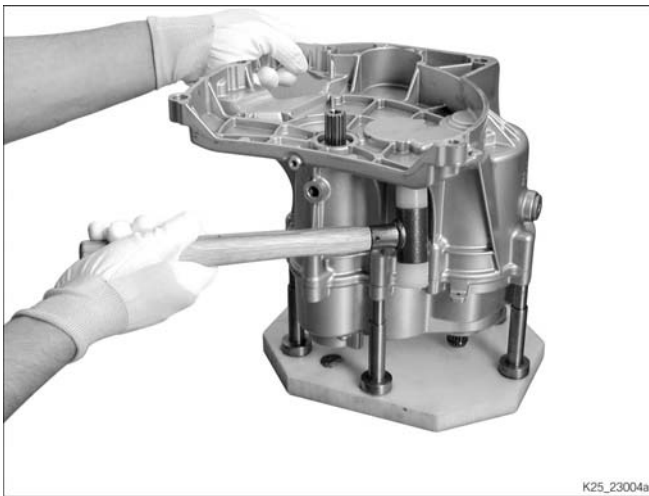
 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling



K25_23004a

heated parts.

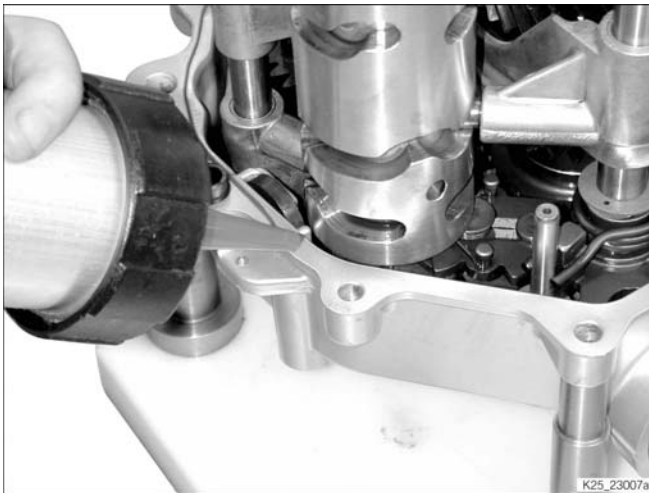
- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Installing gearbox housing



K25_23006b

- Insert reamed sleeves (1) into both bores.



K25_23007a

- Clean the sealing face of the gearbox housing.

⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203


Sealing compound




Warning

Nature: Heated/hot parts can cause burns.
Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.

 Technical data			
Mating temperature, gearbox housing		100 - 120 °C	

- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.

 Tightening torques		
Gearbox cover to gearbox housing	9 Nm	



(-) Installing shaft sealing ring of input shaft in gearbox housing

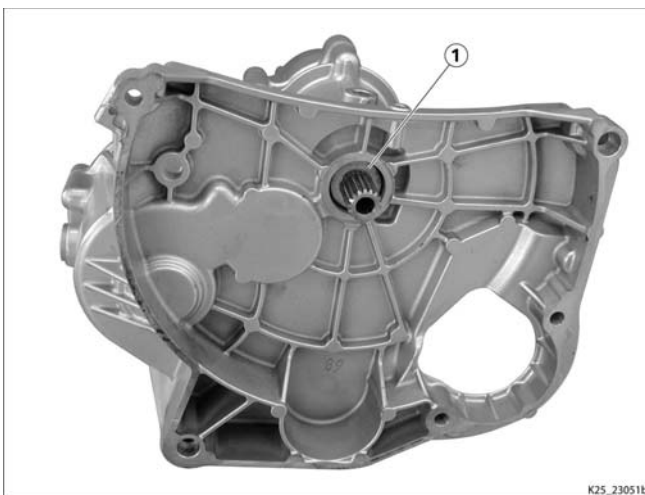
- Clean the bearing bore in the housing.



Note

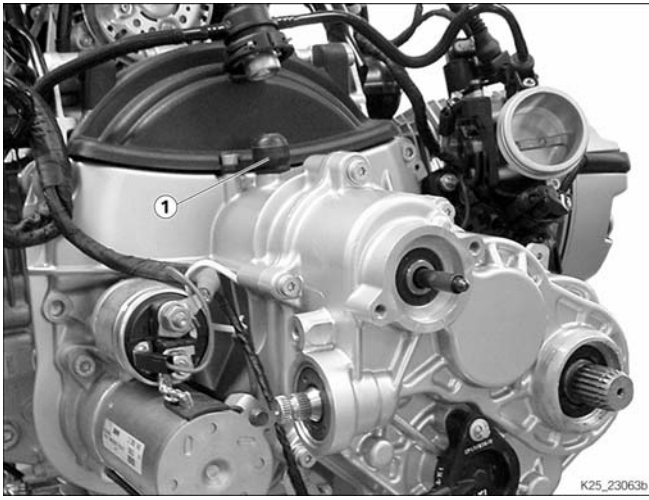
Lightly oil the sealing lips before installing the shaft sealing rings.

- Install a new shaft sealing ring, using sliding sleeve (No. 23 4 712) and drift (No. 23 4 711) .



(-) Installing breather

- Remove the cell plugs.
- Install breather (1).



K25_23063b

 **23 12 022 Replacing shaft sealing ring of input shaft in gearbox housing**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_46016a

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



K26_52002b

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



K26_52001b

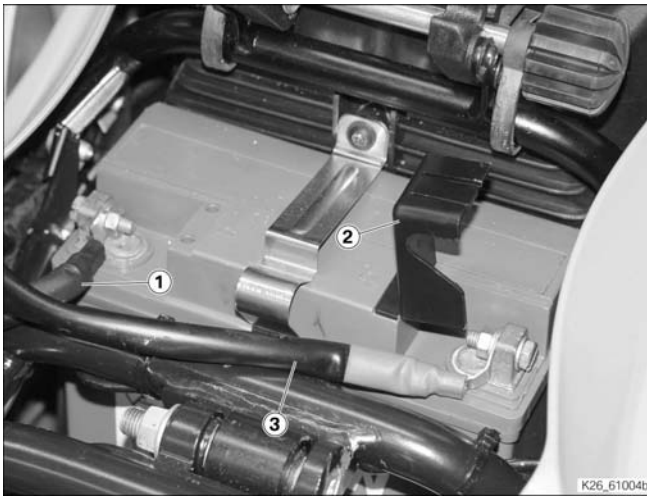
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

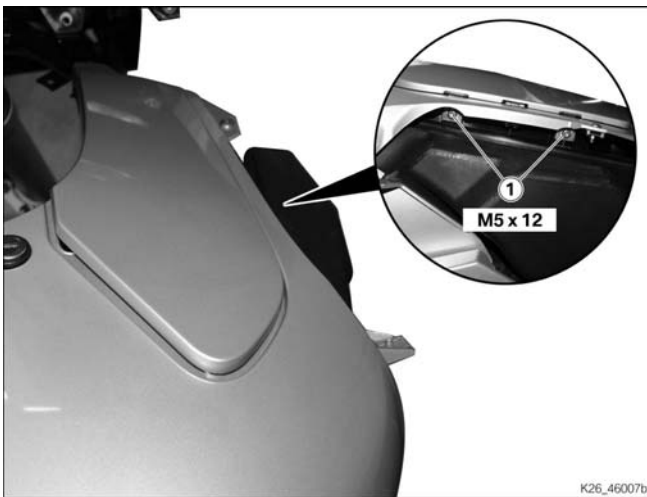
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



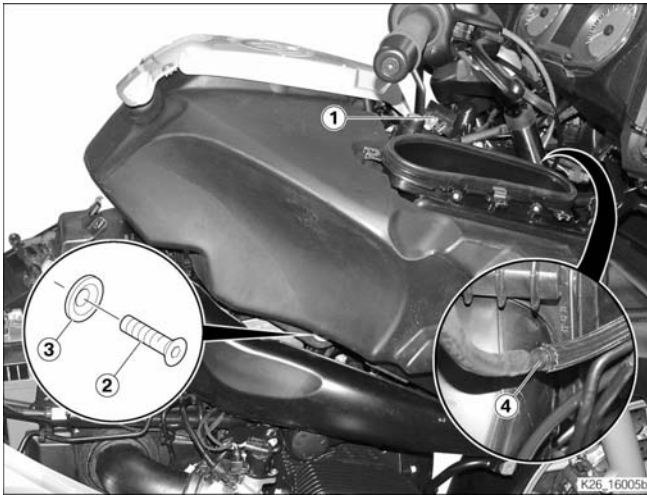
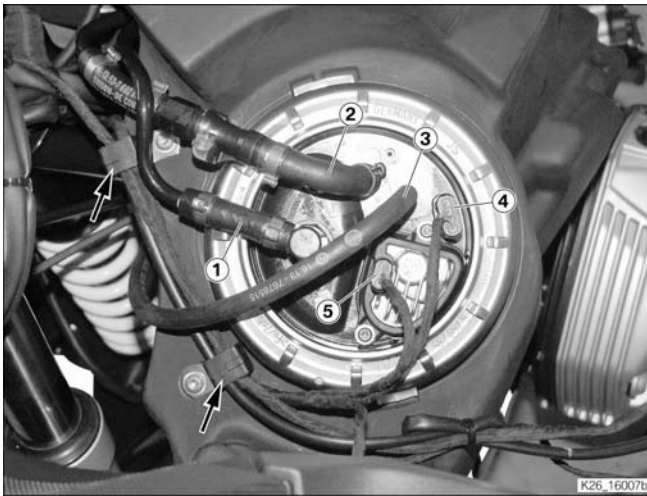
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

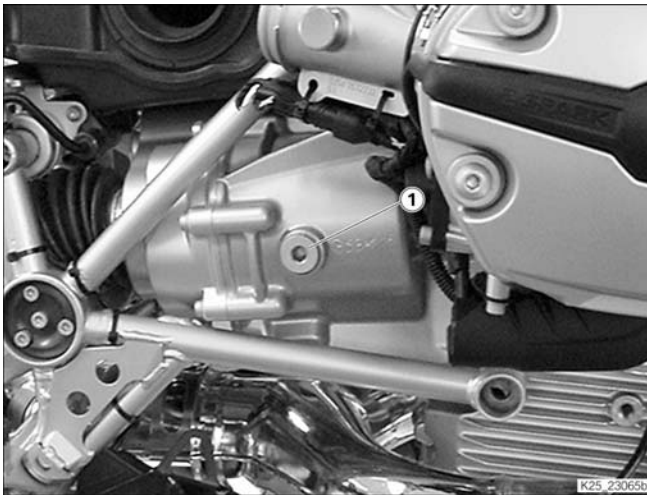


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Draining gearbox oil



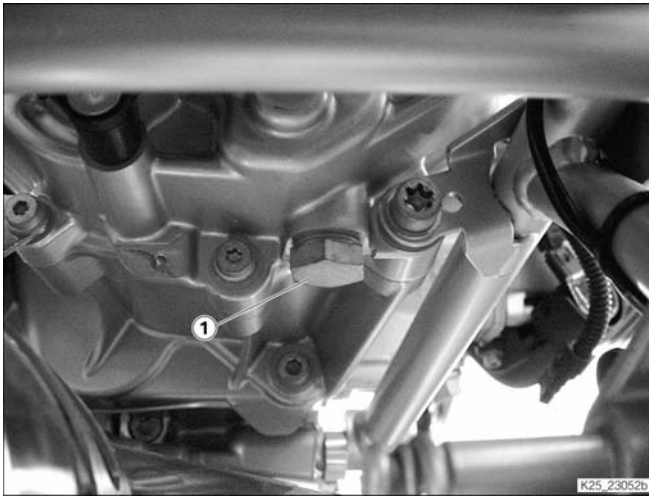
Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the gearbox.
- Remove oil filler plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.

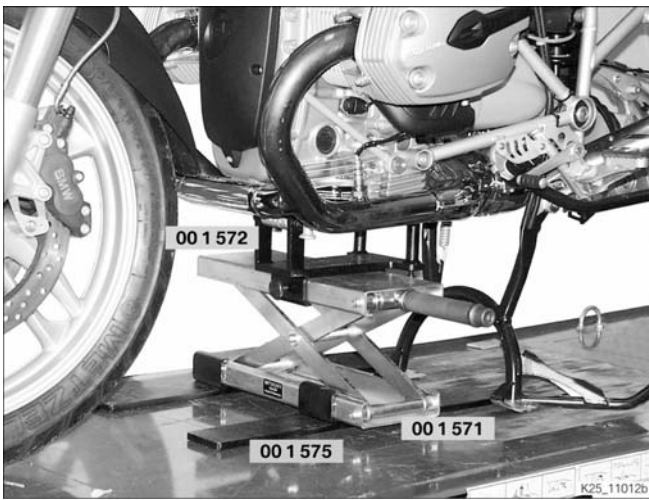
- Remove drain plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.
- Remove all chips of metal from the drain plug.
- Fit a new sealing ring to the oil drain plug and install and tighten the plug.



Tightening torques

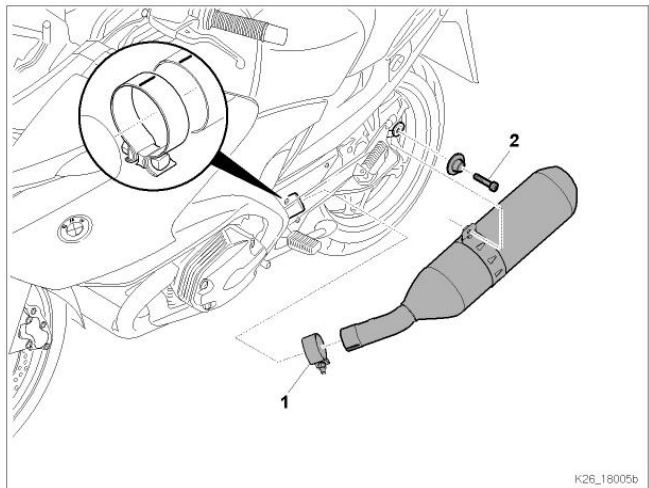
Oil drain plug, gearbox	30 Nm	
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(-) Installing engine stand



- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

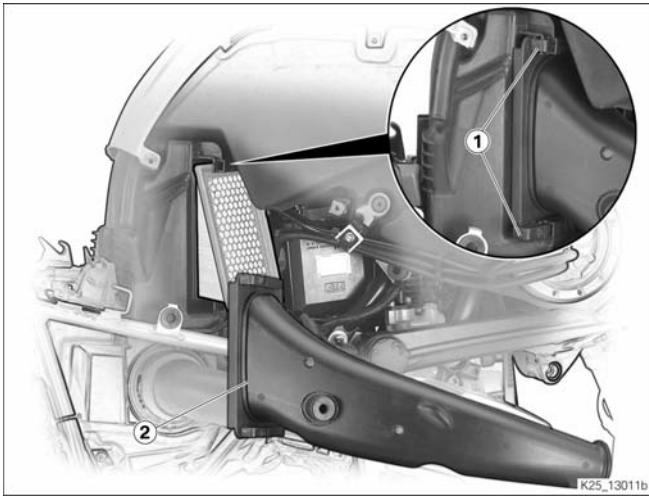
(-) Removing silencer



- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

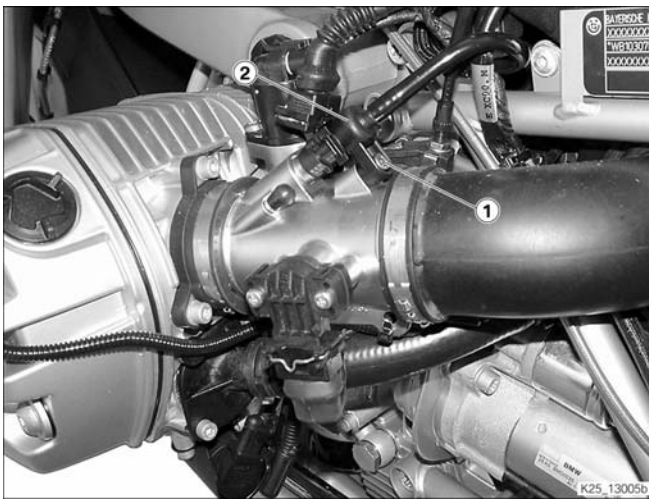
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



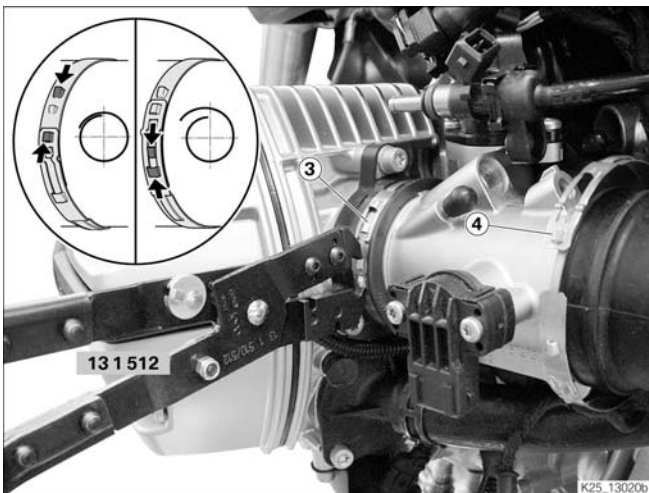
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.

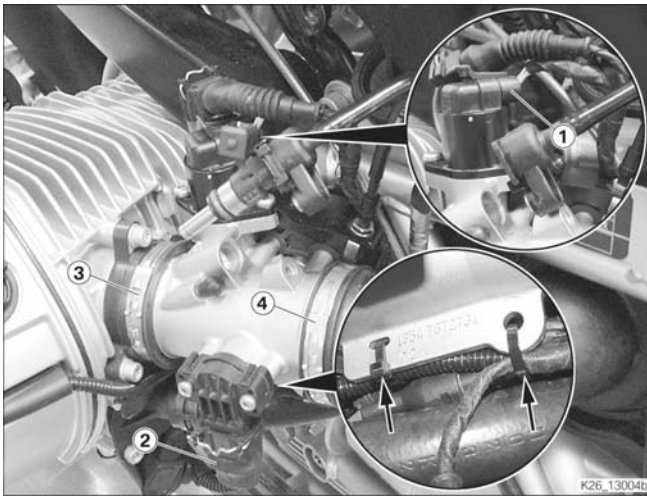


(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
-



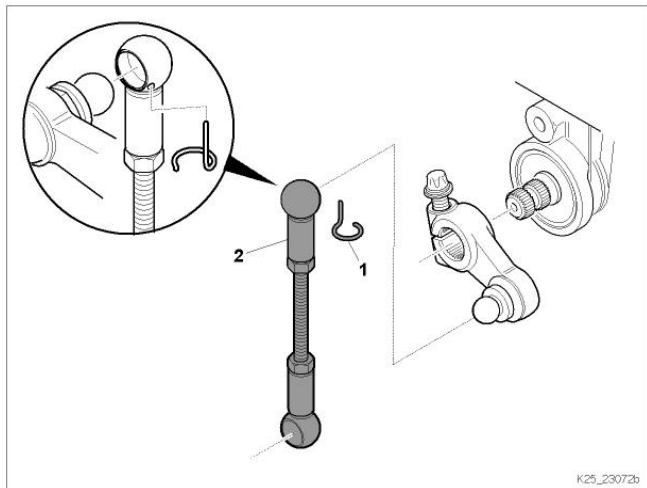
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

(-) Securing throttle valve stub with cable divider



- Tie up throttle valve stub and cable divider with cable tie (arrow).

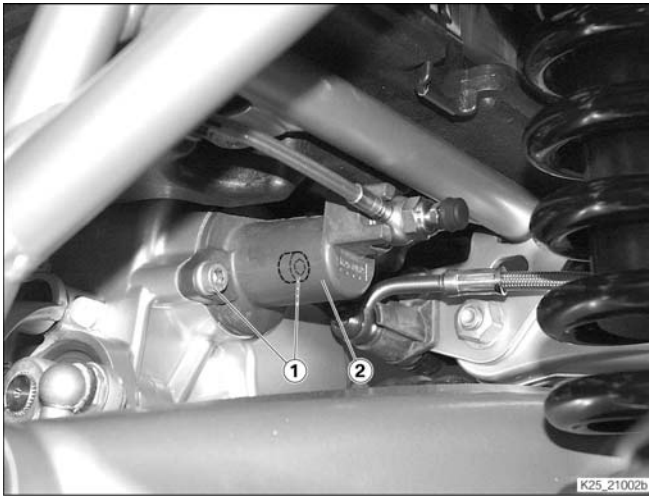
(-) Disengaging selector rod from shift lever



- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.

(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).

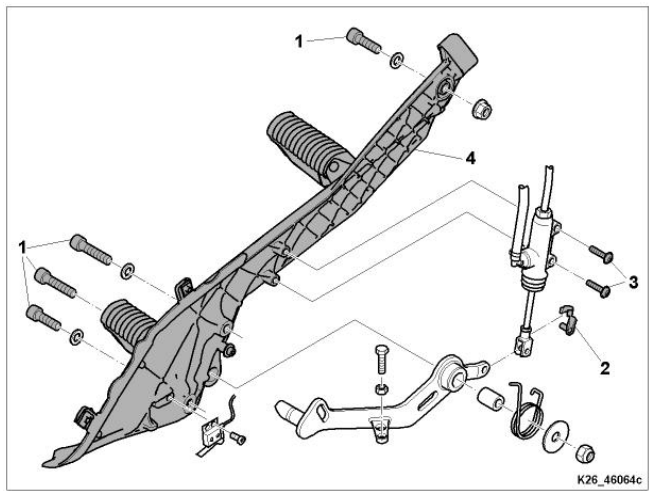


- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.


(-) Removing right footrest plate



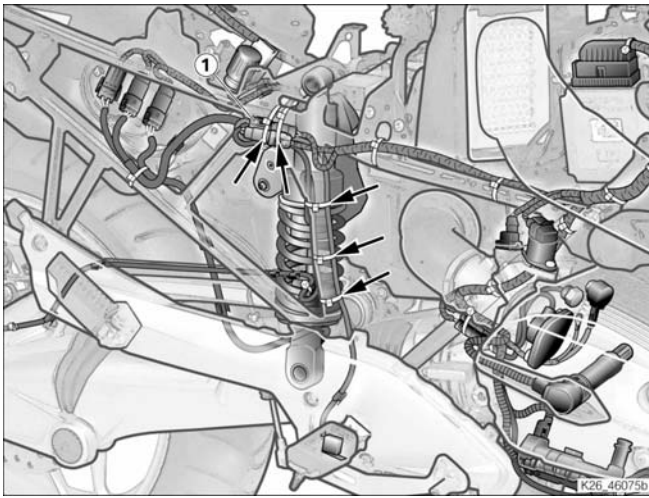
- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.

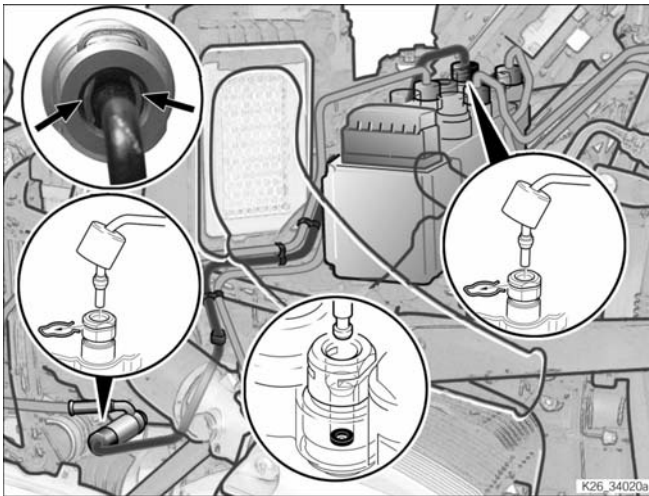
 Technical data			
Release temperature, screws for rear brake master cylinder		100 °C	

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.



(-) Disconnecting brake pipe for rear wheel circuit from pressure modulator

- Push the protective cap up.
- Remove the spring clip.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

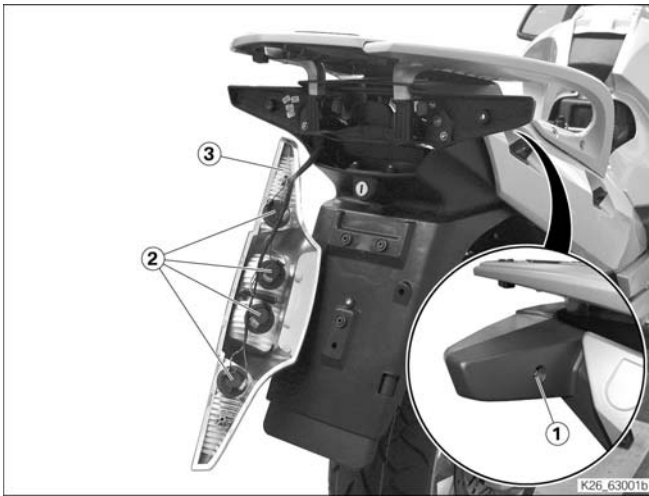
- Wrap the area around the connector in a cloth.
- Open the retaining clips, lift the brake pipe out of the pressure modulator and catch escaping brake fluid with a cloth.
- Seal the open end of the brake pipe to prevent brake fluid from dripping.

Note

Use the protective cap from a bleed screw to seal the brake pipes.

(-) Removing rear-light unit

- Remove screws (1).



- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).

(-) Disengaging wiring harness at rear

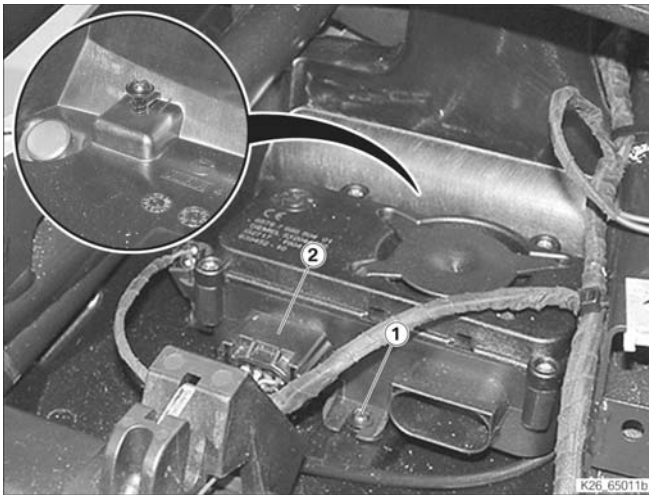
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



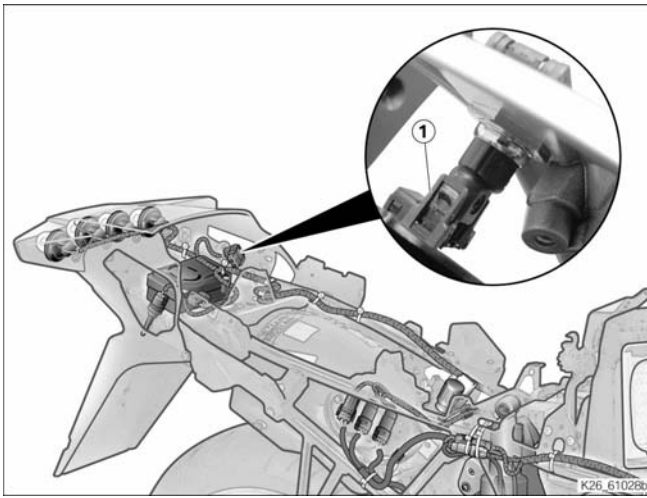
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

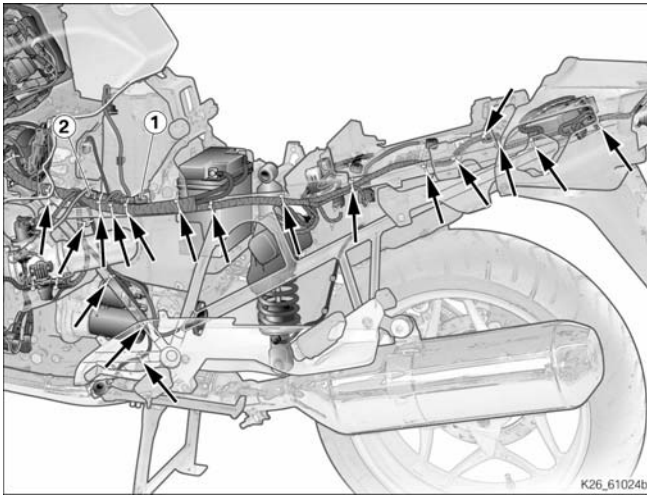


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.

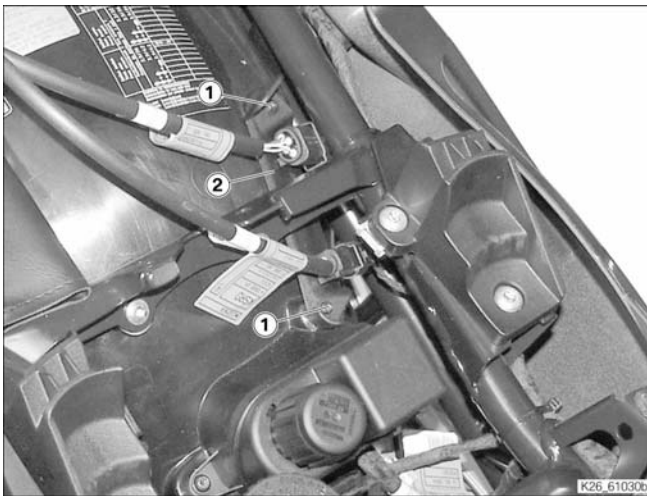


- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.

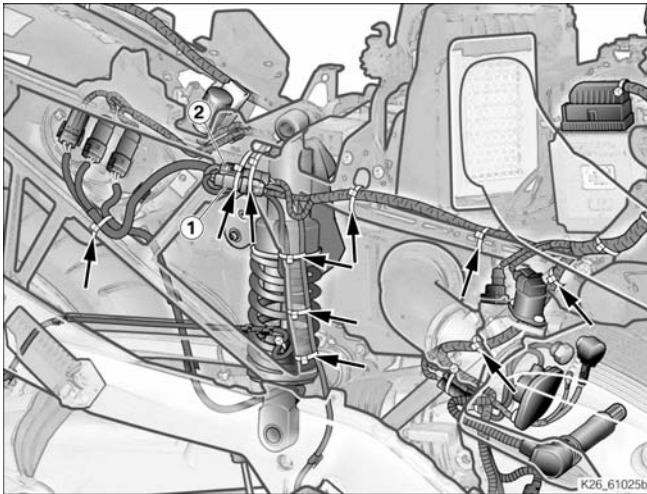
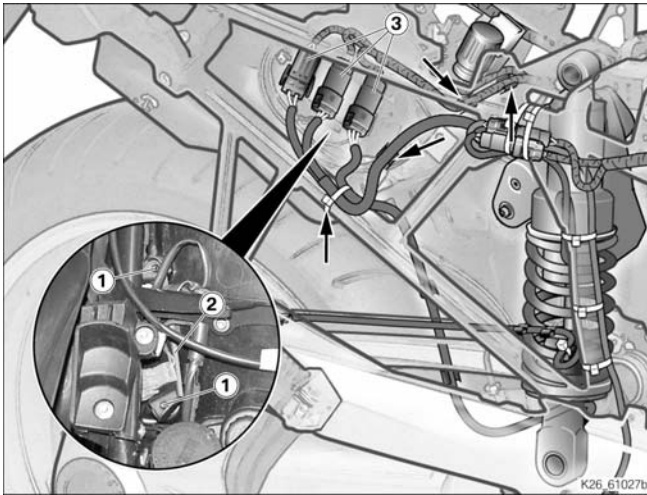
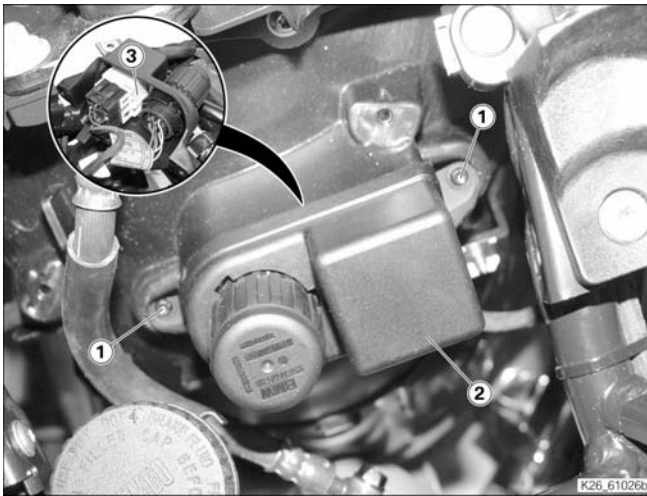


Variant, Seat heating

- Remove screws (1).
- Pass holder (2) forward with the cables.



- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.

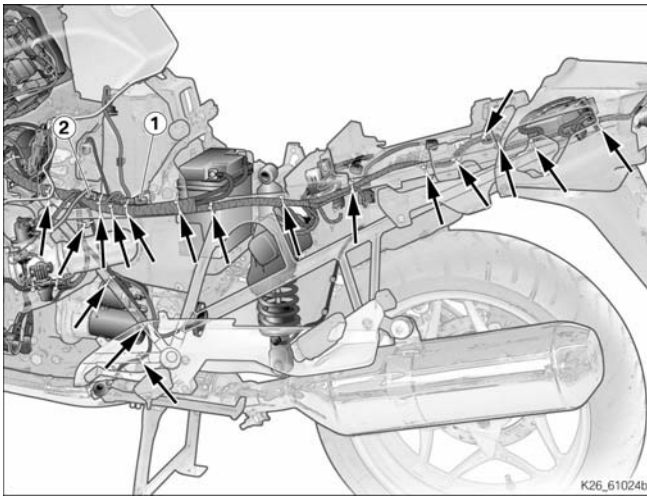


Variant, ESA

- Remove screws (1).
- Pass holder (2) forward with the cables.
- Disconnect plug (3) of the spring strut.

- Disconnect plug (1) of the speed sensor.

- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.



(-) Removing rear section of motorcycle

- Open hose clip (1).
- Disconnect the hose from the intake air silencer.

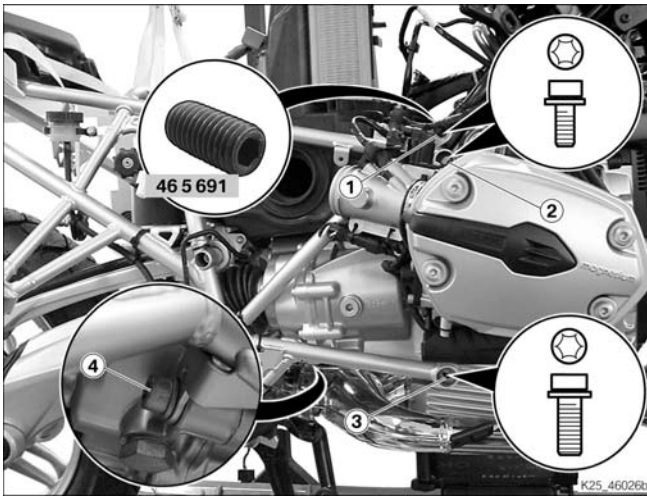


- Secure the front wheel on the lifting platform.
- Using straps, secure the rear section of the motorcycle to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.



► Releasing threaded fastener on rear frame

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.



Attention

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

Apply masking tape to the part of the swinging arm that could be damaged.

- Slacken screw (4), but do not remove it at this point.

▷ **Pressing universal shaft off gearbox output shaft**

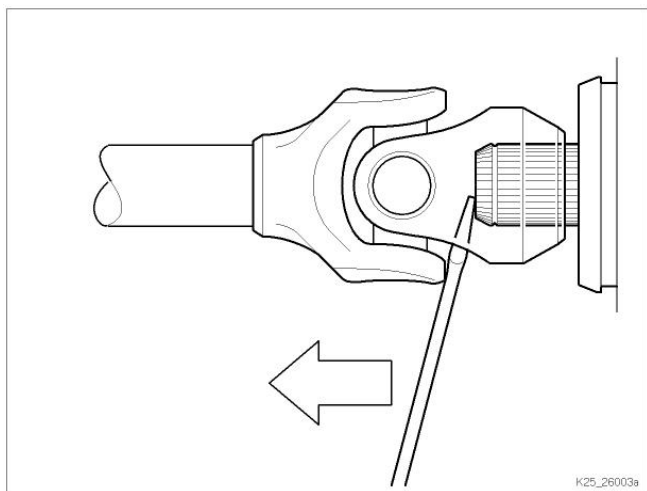
- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.



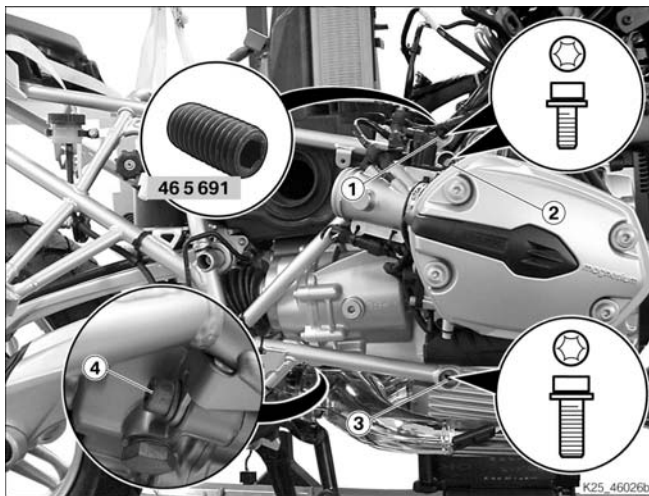
- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the shaft in this position.
- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.

Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- ◁
- Remove screw (4).



- Thread the fuel-tank breather hose out of the rear frame.
- Disconnect the fuel pressure regulator from the intake air silencer.
- Using crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) , carefully lift the rear section clear of the motorcycle, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.

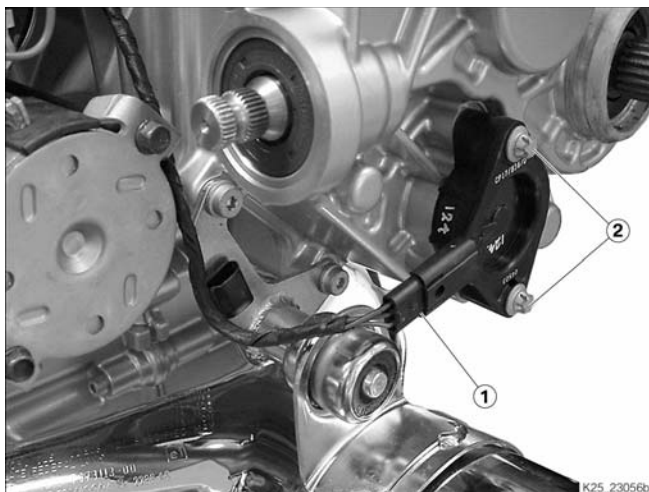


Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Pass the control-circuit line with the brake master cylinder forward out of the way.
- Carefully set down the rear section where it will not be damaged.

(-) Removing gearbox potentiometer



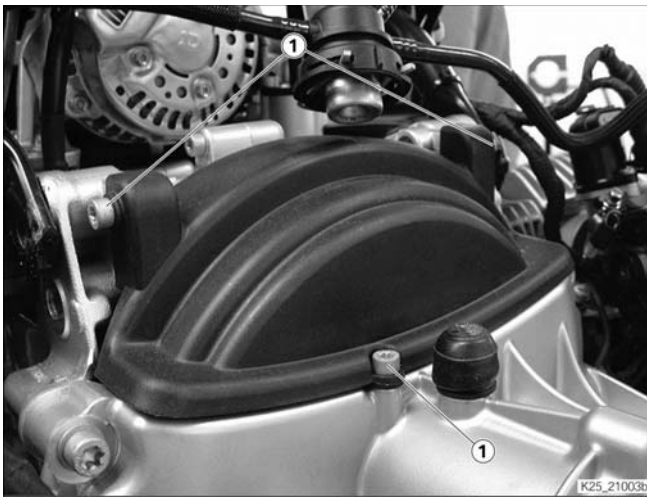
- Disconnect plug (1) of the gearbox potentiometer.
- Release the cable from the cable clips.
- Remove screws (2) from the gearbox potentiometer.
- Remove the gearbox potentiometer, noting the O-ring.

(-) Removing starter



- Disconnect "starter positive" cable (1) (terminal 30).
- Disconnect "starter start signal" plug (2) (terminal 50).
- Remove screws (3).
- Remove the starter.

(-) Removing cover for clutch



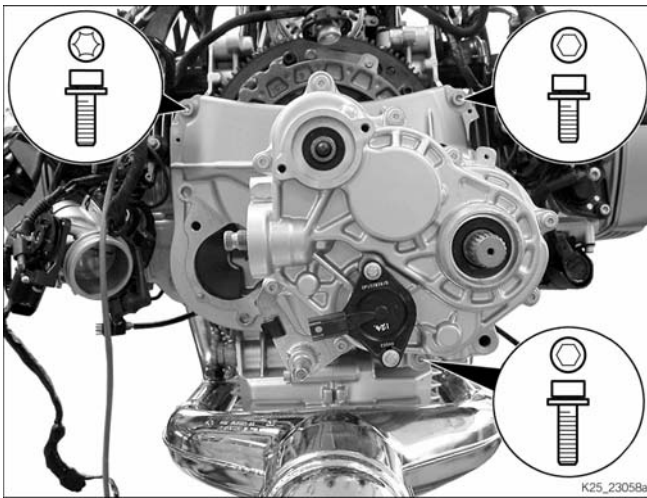
- Remove screws (1).
- Carefully slip the clutch cover to the rear underneath the pressure modulator and remove.
- Install screws to hold the pressure modulator in position.

(-) Removing gearbox



- Remove screws (1) of the clamps on the exhaust manifold.
- Pull clamp (arrow) off the bracket.

- Remove 3 screws.
- Pull the gearbox straight to the rear to remove.
- Keeping it straight to ensure that oil does not escape through the breather, place the gearbox on a smooth, level surface.



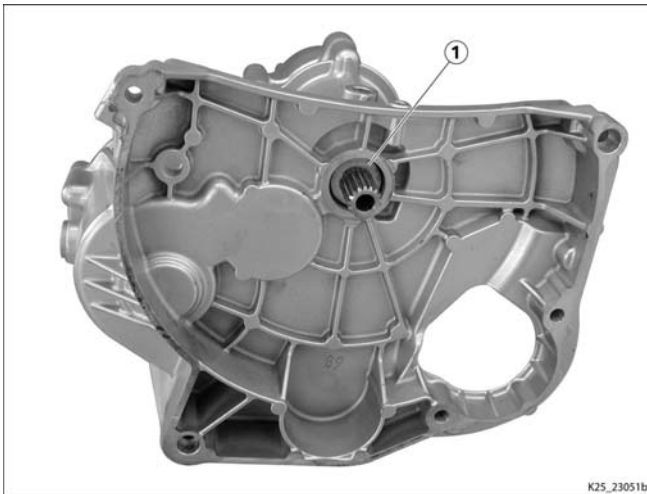
(-) Removing shaft sealing ring of input shaft from gearbox housing

- Using a suitable tool, carefully remove shaft sealing ring (1).



Note

It is not necessary to drain the gearbox oil before removing the input-side shaft sealing ring.



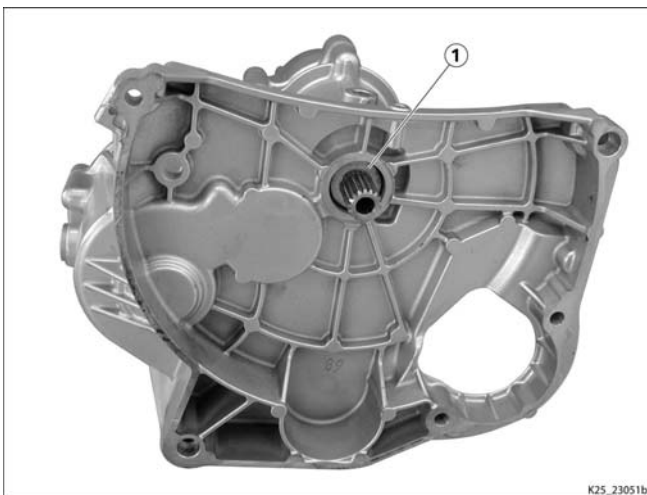
(-) Installing shaft sealing ring of input shaft in gearbox housing

- Clean the bearing bore in the housing.



Note

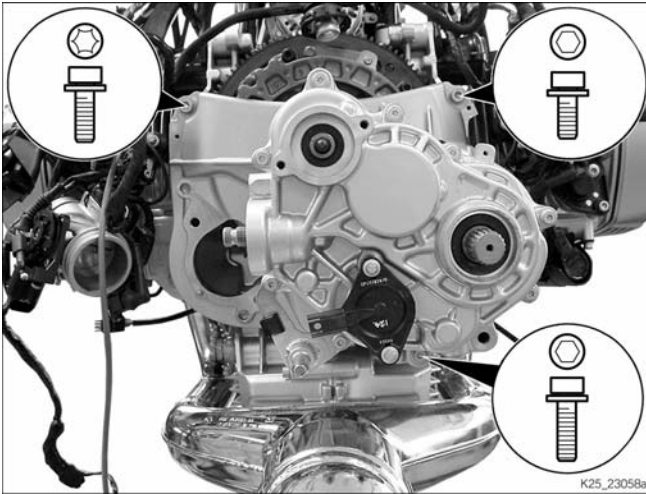
Lightly oil the sealing lips before installing the shaft sealing rings.




(-) Installing gearbox

- Remove dirt and old lubricant from the splines of the clutch hub and the gearbox input shaft.
- Lubricate the splines of the clutch hub and the gearbox

input shaft.



 <p style="text-align: center;">Consumables/lubricants</p>		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476


- Position the gearbox with the gearbox input shaft just introduced into the hub of the clutch plate.



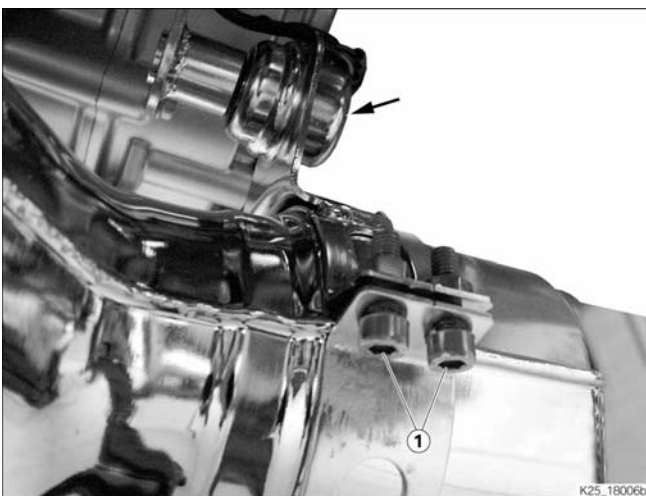
Note


You will find it easier to introduce the splined end of the gearbox input shaft into the clutch hub if you engage a gear and turn the gearbox output shaft.

- Slide the gearbox over the reamed sleeve until it mates with the crankcase.
- Install 3 screws.

 <p style="text-align: center;">Tightening torques</p>		
Gearbox to engine block, M8 x 35	19 Nm	
Gearbox to engine block, M8 x 70	19 Nm	
Gearbox to engine block, M8 x 50	19 Nm	

- Slip the exhaust clamp onto the holder on the gearbox and align it with the exhaust.
- Tighten screws (1).

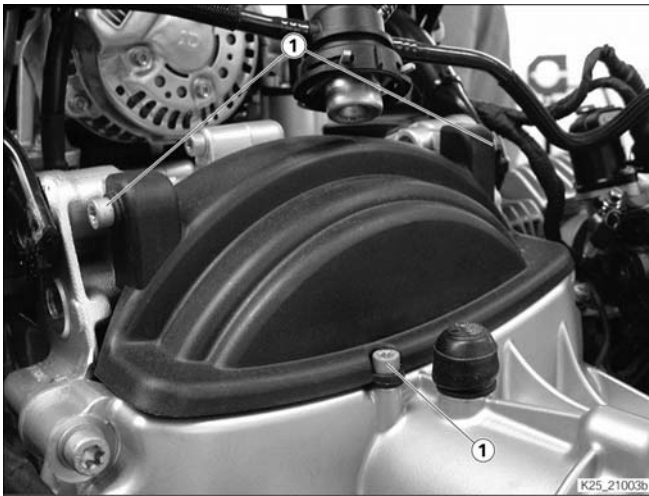



 <p style="text-align: center;">Tightening torques</p>		
Clamp, elbow, rear, M6 x 20	8 Nm	
Optimoly TA		

(-) Installing cover for clutch

- Remove screws (1).
- Carefully fit clutch cover under the pressure modulator and align.
- Install screws (1).






 Tightening torques		
Clutch cover to engine, M6 x 16	8 Nm	


(-) Installing starter

- Install the starter.
- Install screws (3).



 Tightening torques		
Starter with gearing to engine, M8 x 60	19 Nm	

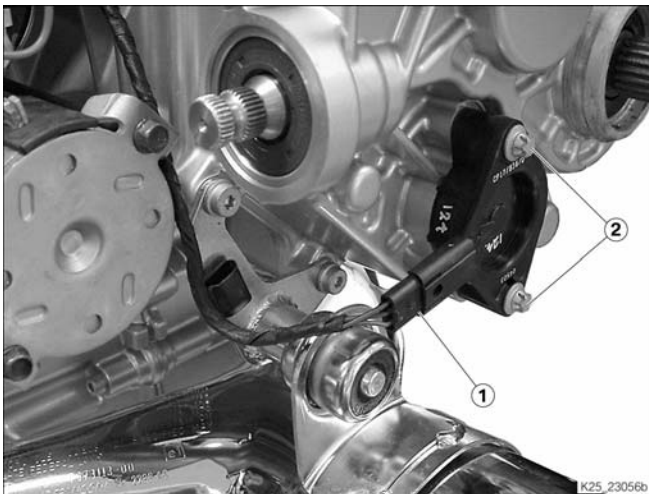
- Connect "starter positive" cable (1) (terminal 30).


 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).

(-) Installing gearbox potentiometer

- Install the gearbox potentiometer, noting the O-ring.
- Install screws (2).



 Tightening torques		
Gear potentiometer to gearbox	9 Nm	

- Connect plug (1) to the gearbox potentiometer.
- Clip the cable into the cable clips.

(-) Installing rear section of motorcycle

- Remove dirt and old lubricant from the splines of the gearbox output shaft.
- Lubricate the splines of the gearbox output shaft.



Consumables/lubricants

Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476
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- Carefully manoeuvre the rear section of the motorcycle into position at the front section, making sure that the wiring harness is correctly positioned.
- Mate the universal shaft with the gearbox output shaft and align the rear frame with the anchorages.



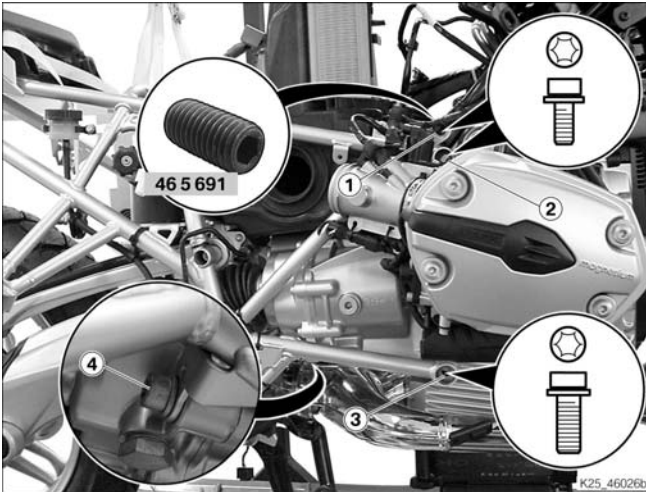
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Carefully turn the rear wheel to check that the universal shaft is still correctly positioned.
- Position the fuel pressure regulator on the intake air silencer.

► **Securing rear frame to motorcycle**

- Install screw (4), **but do not tighten it at this point.**
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert screws (1) on left and right.
- Tighten screw (4).
- Tighten screws (1), (2) and (3).

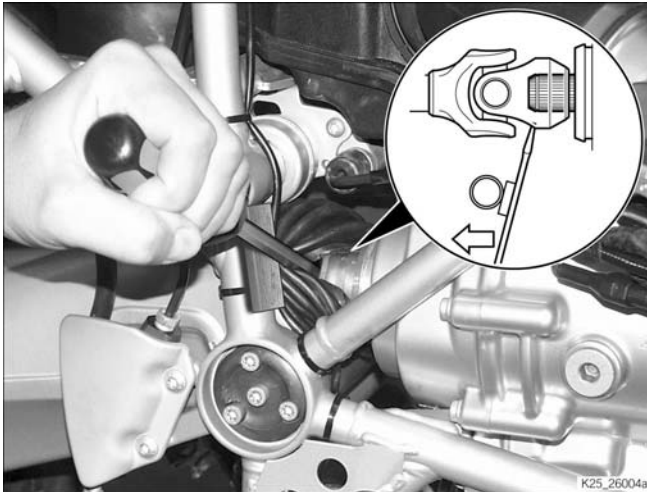


Tightening torques

Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	

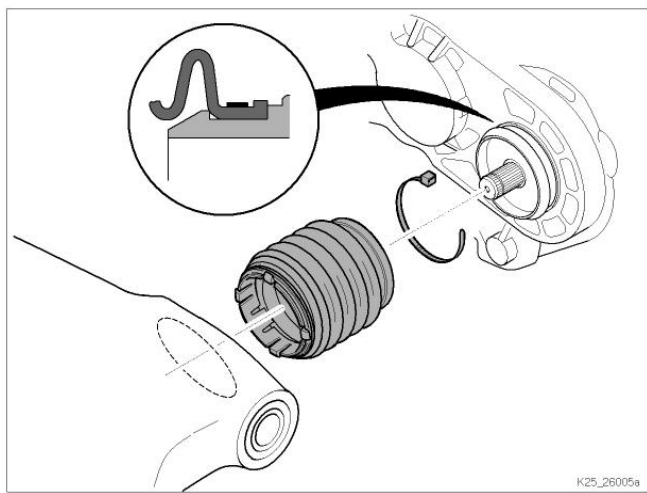


► **Pressing universal shaft onto gearbox output**




shaft

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.

 Consumables/lubricants		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

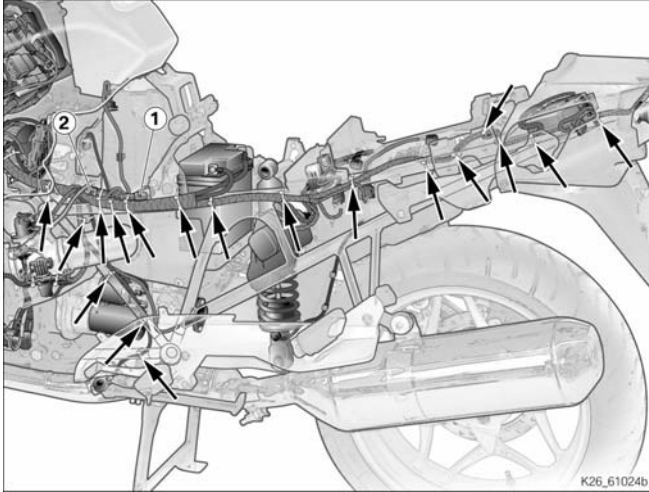
- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.



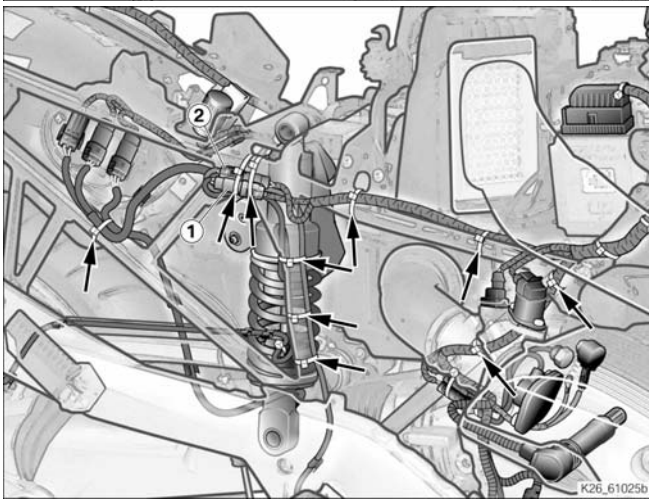
- Release the straps securing the front wheel and disengage crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) , (No. 46 5 674) with the straps from the rear section of the motorcycle.
- Release the control-circuit line complete with the brake master cylinder and pass it through to the rear.
- Route the fuel-tank breather hose into position along the rear frame.
- Connect the hose of the crankcase breather to the intake air silencer.
- Slide hose clamp (1) into position.



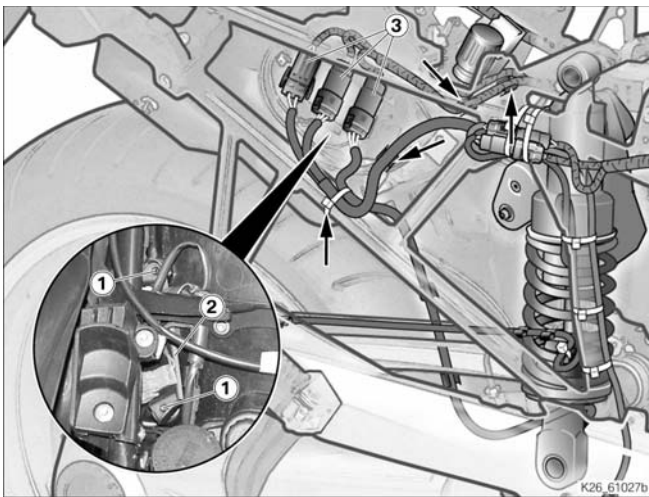
(-) Securing wiring harness at rear



- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.



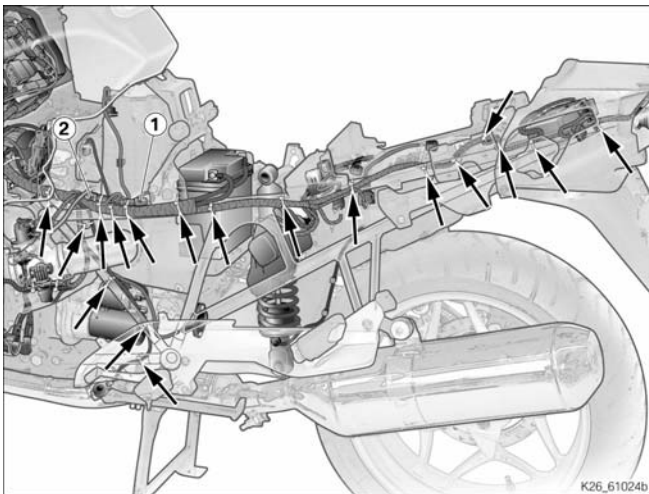
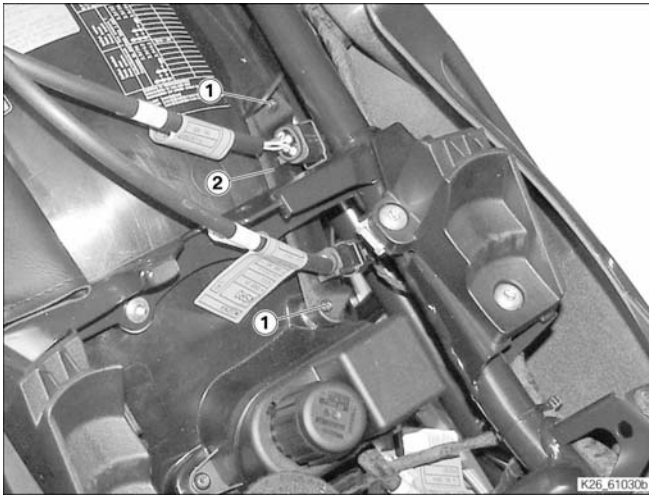
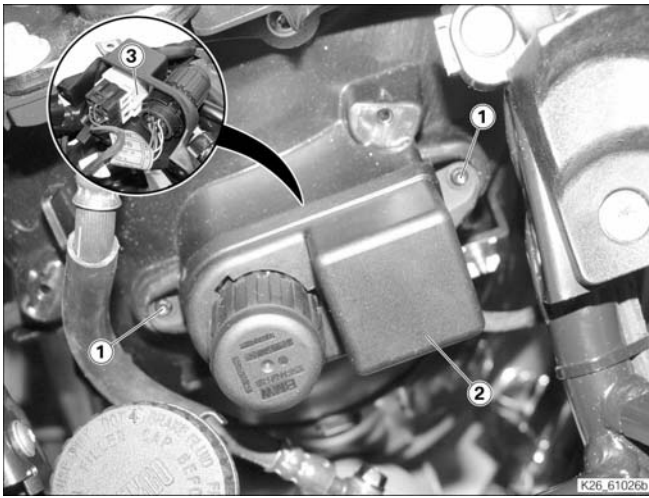
- Connect plug (1) of the speed sensor.



Variant, ESA

- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Secure holder (2) with screws (1).

- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).



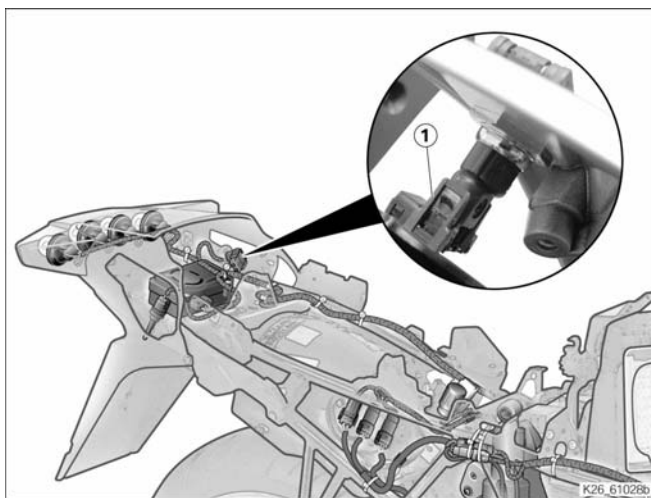
Variant, Seat heating

- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

- Secure the wiring harness to the rear frame with cable ties (arrows).

Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



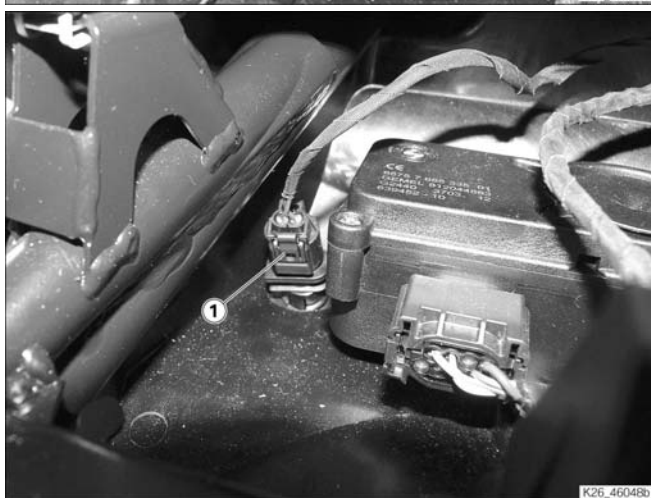
Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



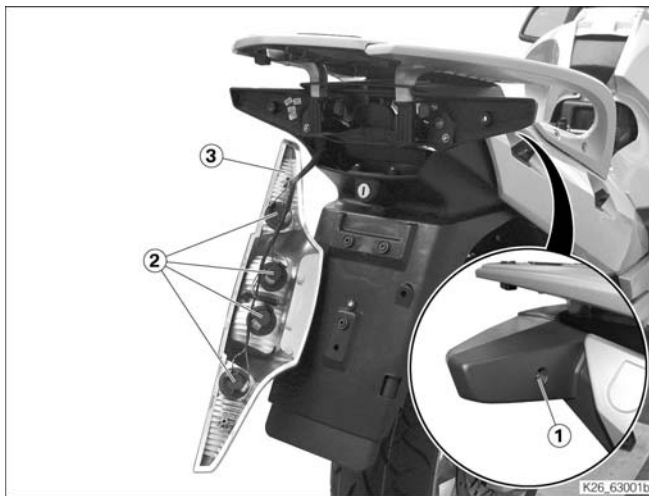
Variant, On-board computer

- Connect plug (1) of the temperature sensor.

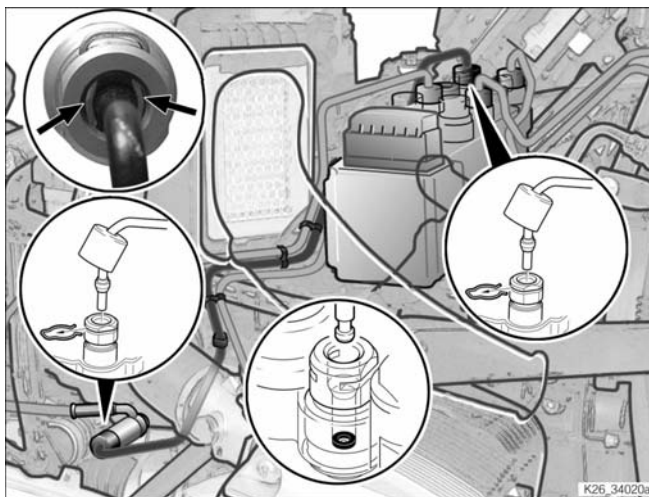


(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



(-) Connecting brake pipe for rear wheel circuit to pressure modulator



Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.



Warning

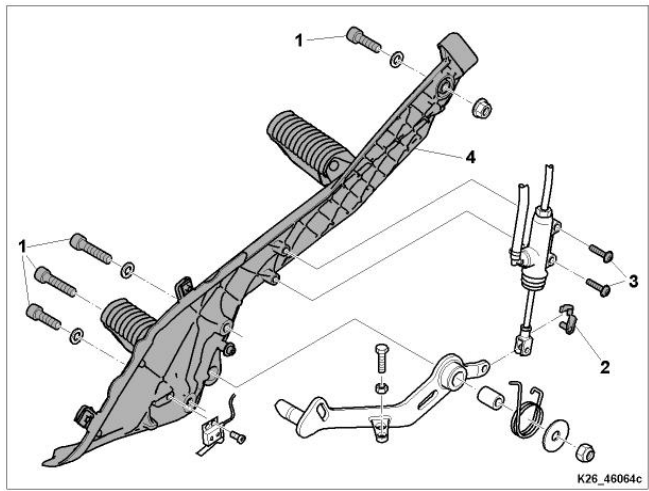
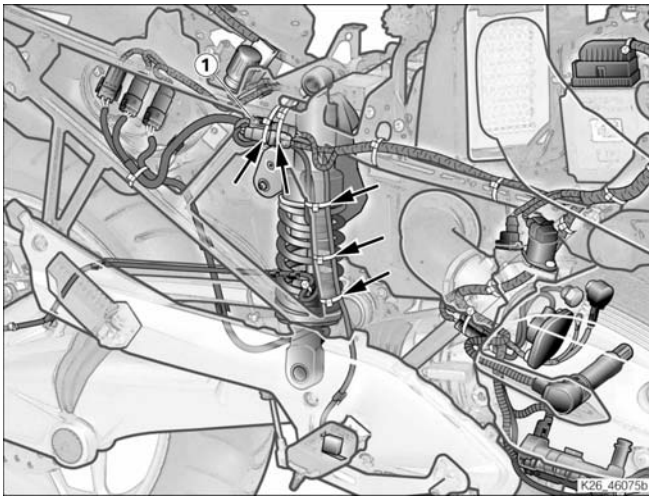
Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.


- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Installing right footrest plate


- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

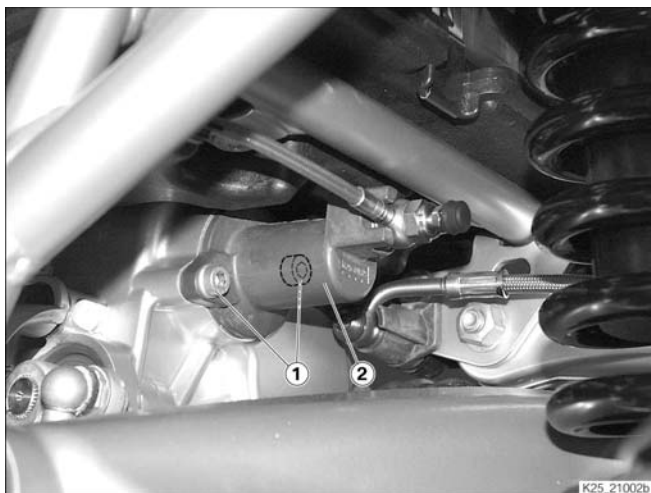
- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.

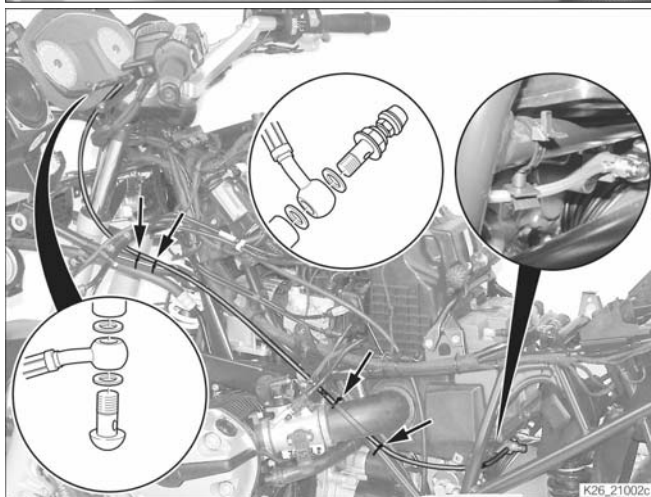


(-) Installing clutch slave cylinder



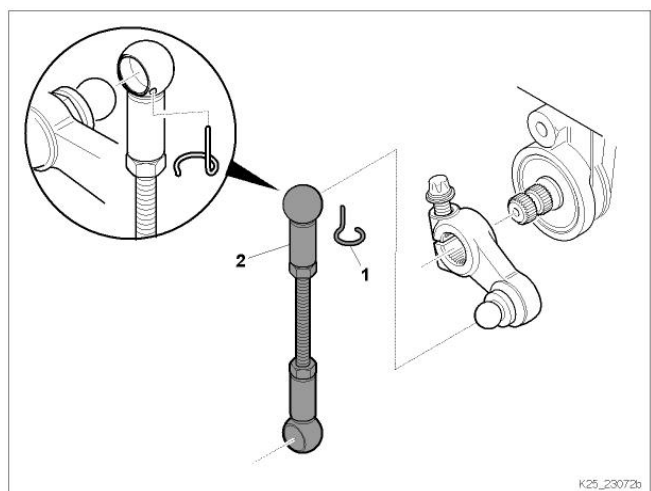
- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.

 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	




- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.

(-) Securing selector rod to shift lever



- Grease the ball head of the shift lever and the ball socket of selector rod (2).

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

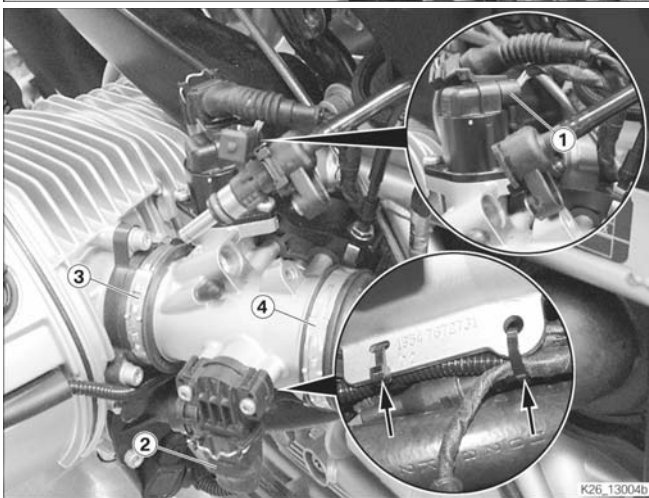
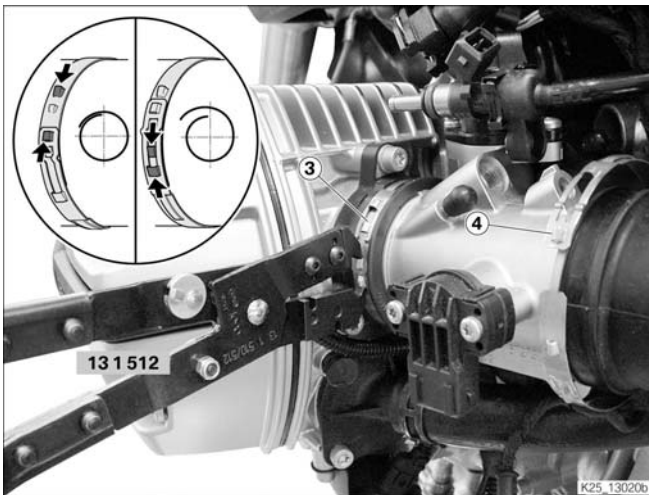
(-) Releasing throttle valve stub with cable divider

- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.



(-) Installing throttle-valve stub

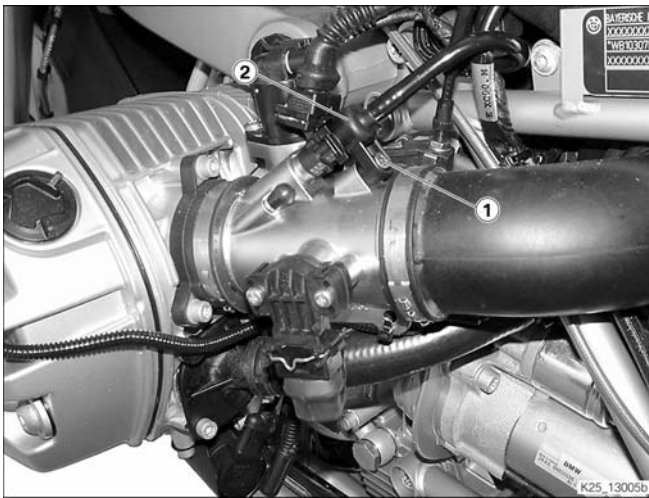
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .




- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing right and left injection valves

- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure

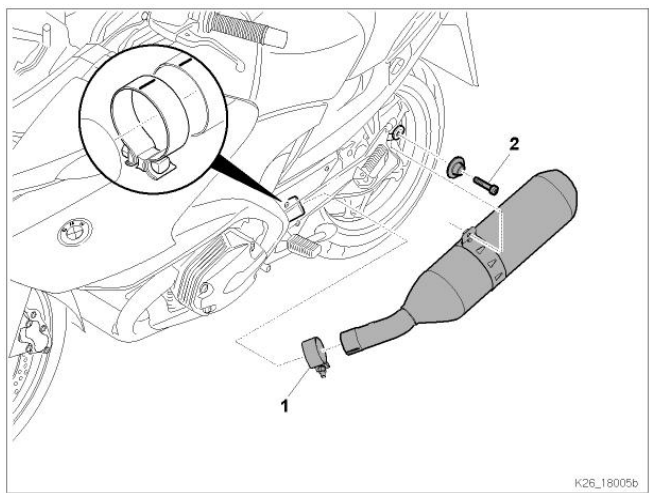


with screws (2).


 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.


(-) Installing silencer



- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

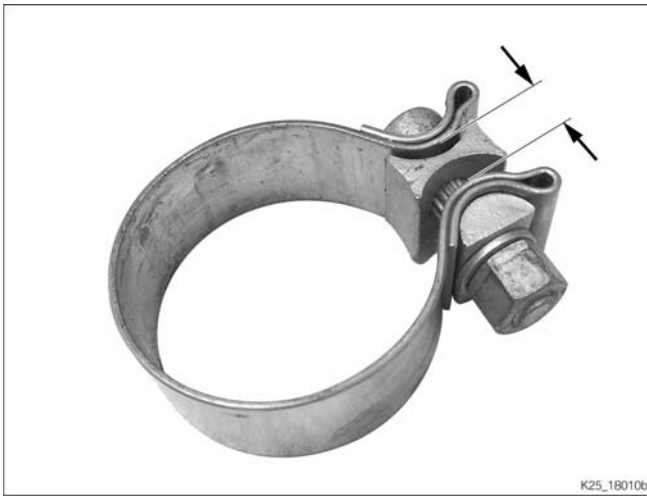
- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


► Checking Torca clamp on silencer

- Tighten the Torca clamp.



Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

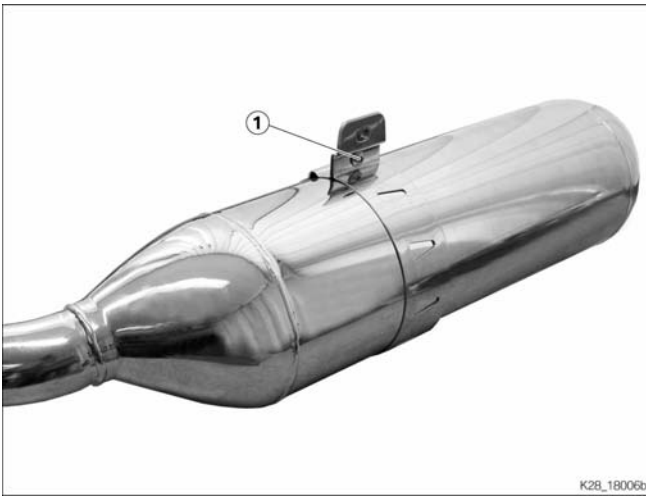


Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.



- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
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Checking Torca clamp on silencer

- Tighten the Torca clamp.

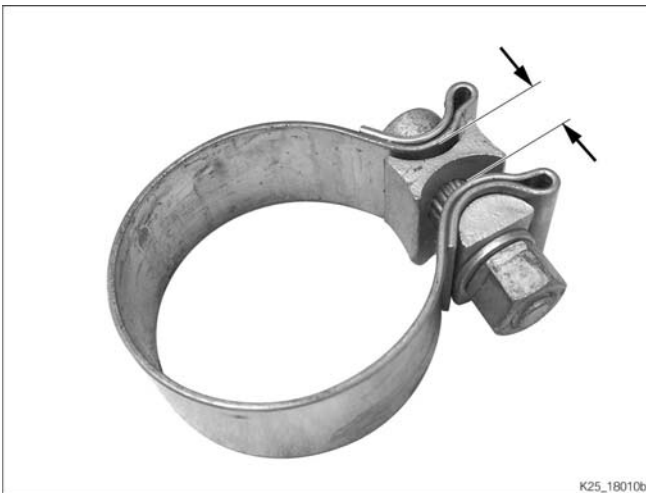
Test

- Check that a gap is visible at the clamp seat before final torque is applied.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
---	-------	--



Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.



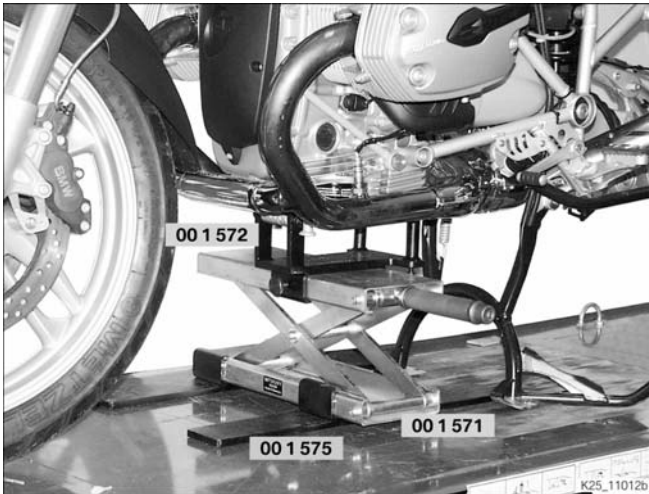
Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575).



(-) Filling gearbox with oil to correct level

Precondition

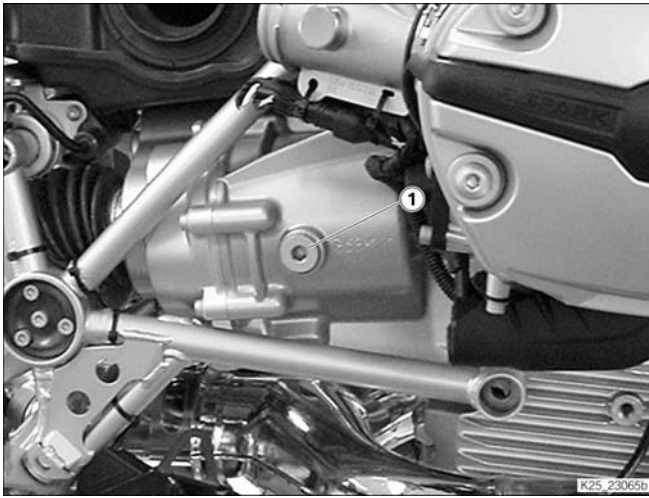
- Drain plug is installed.
- Using a funnel of similar instrument, pour the correct quantity of gearbox oil into the gearbox.




Technical data

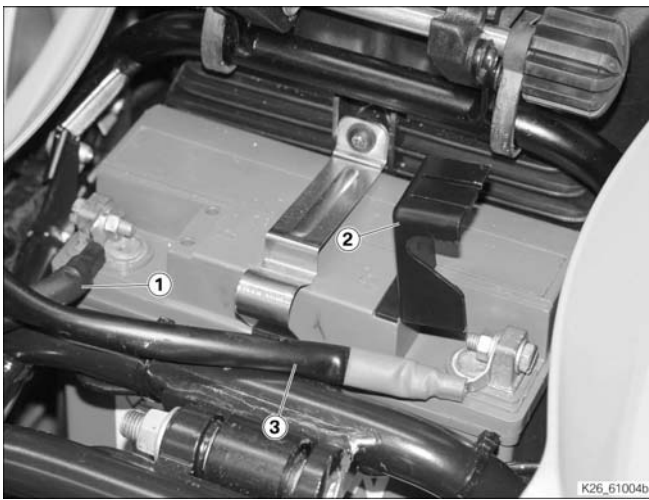
Oil capacity, gearbox	To bottom edge of thread of filler opening	0.9 l	
Consumables/lubricants			
Brand name hypoid-gear lubricant SAE 90 API GL 5			

- Fit a new sealing ring to oil filler plug (1) and install



and tighten the plug.

 Tightening torques		
Oil filler plug, gearbox	30 Nm	



(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means

that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

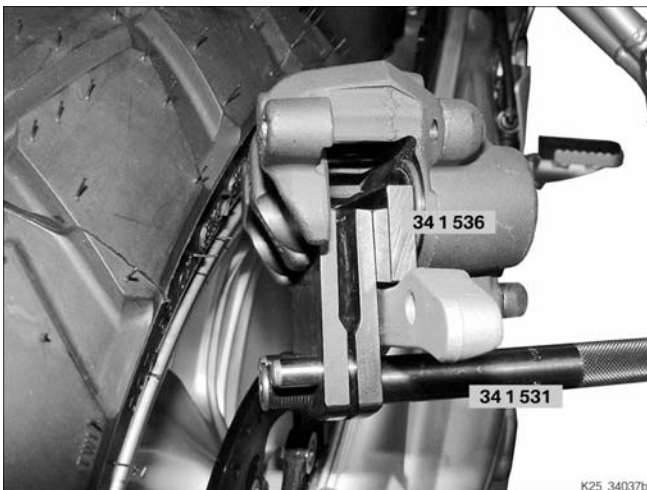
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



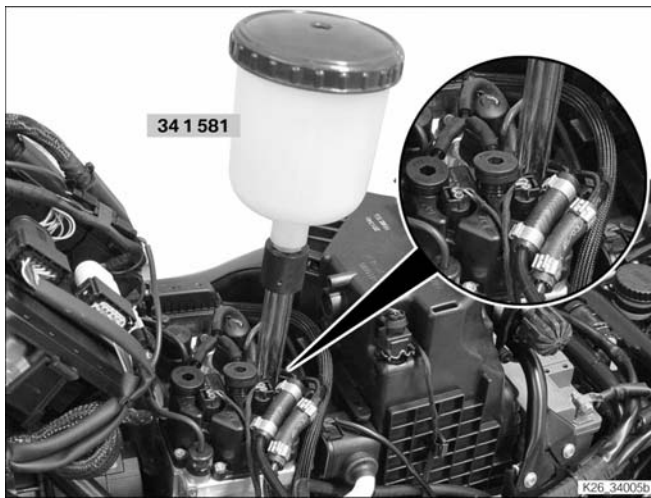
Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.




- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.

- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be

covered by the fluid.

- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.



Tightening torques

Rear brake caliper bleed screw	10 Nm	
--------------------------------	-------	--

- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.

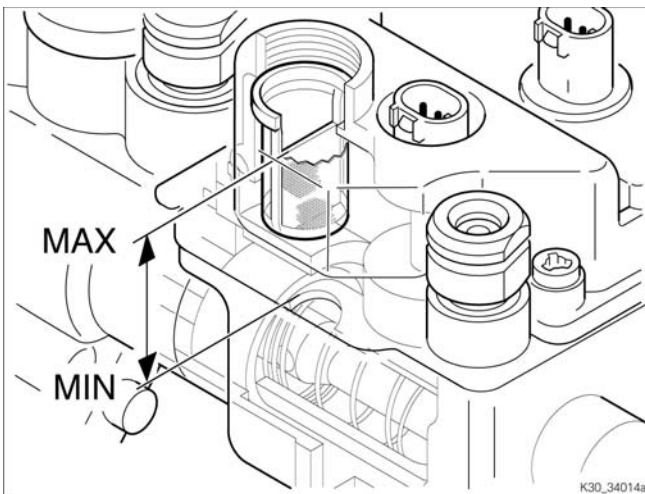


Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the **(MAX)** mark.



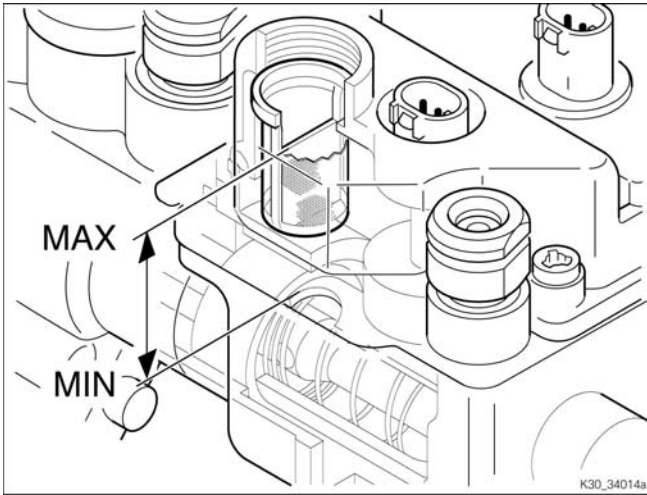
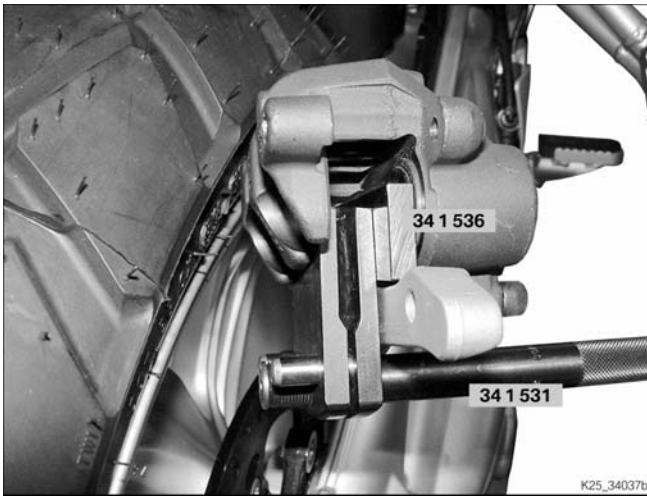
► Instructions for filling rear wheel circuit reservoir

- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536), in the rear brake caliper.




Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.



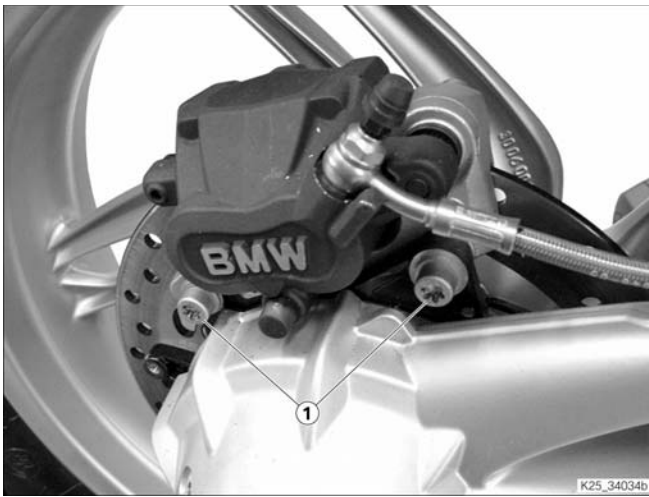
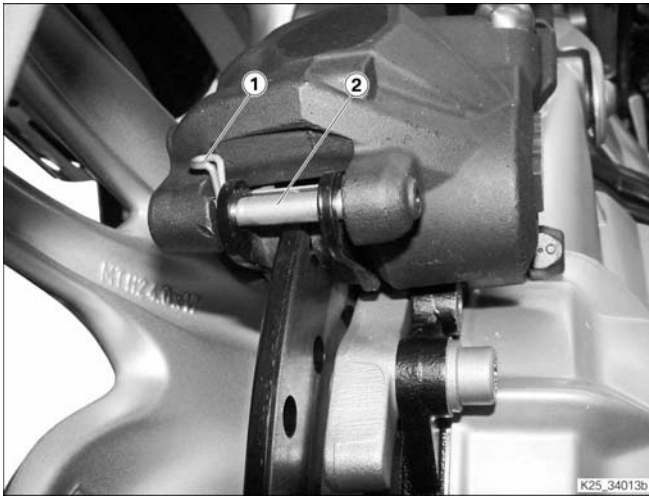
Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.

- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897


- Hand-tighten the cap of the rear wheel-circuit reservoir.
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary
- ▷ **Installing rear brake pads**
 - Check that spring (1) is correctly seated and installed right way round.
 - » Arrow points in direction of travel.

- Install the brake pads.
- Manually install retaining pin (2).



▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

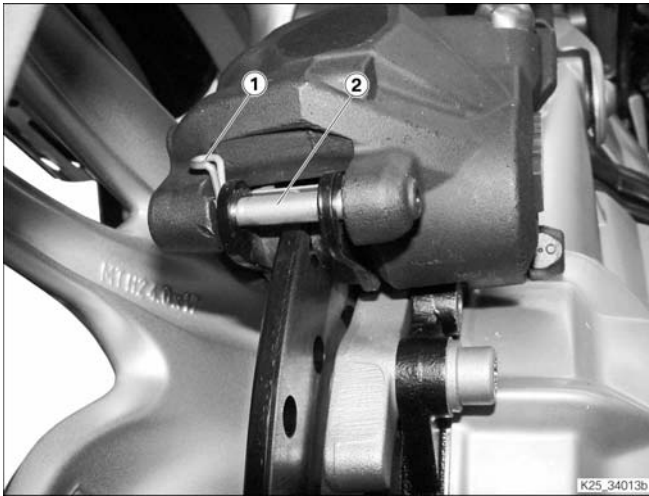
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



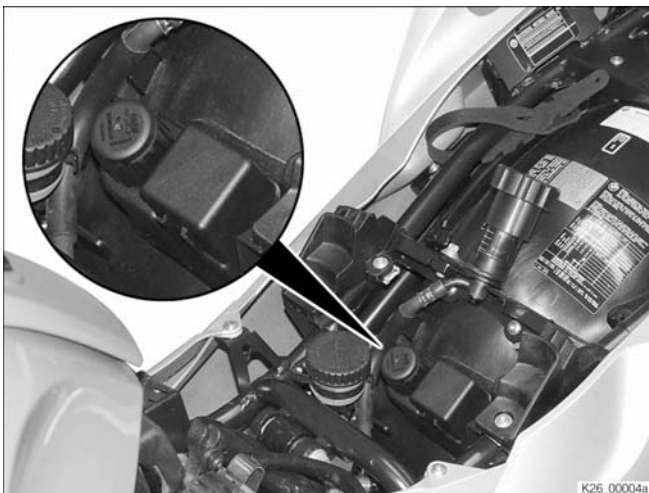
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Performing bleed test with the BMW Motorrad diagnostic system



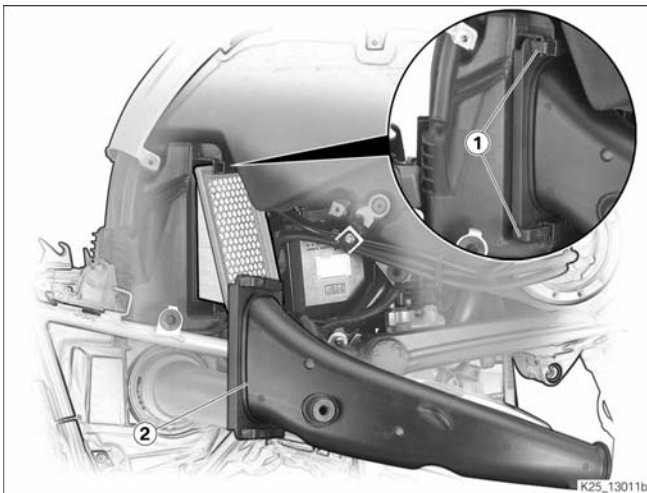
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

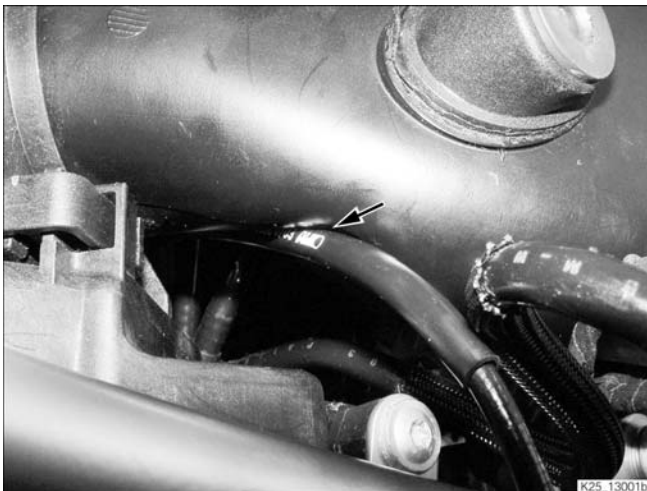
Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

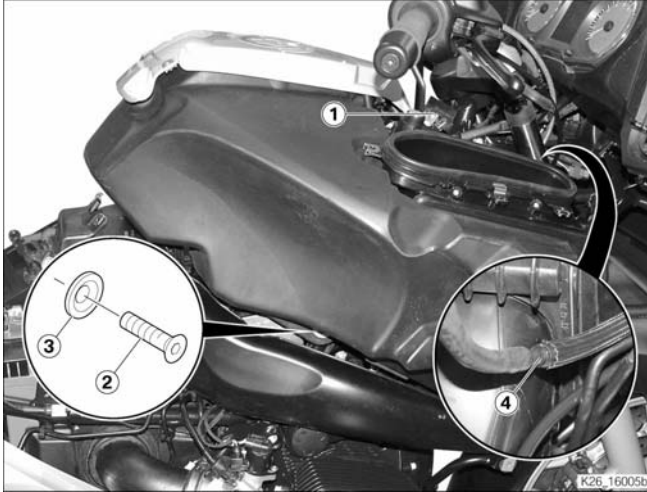
(-) Installing intake air pipe



- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.




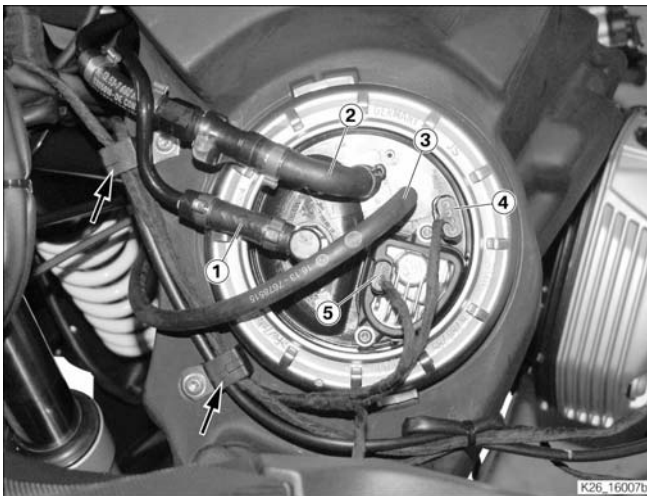
- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.



(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.

Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
---	--	------------	--

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

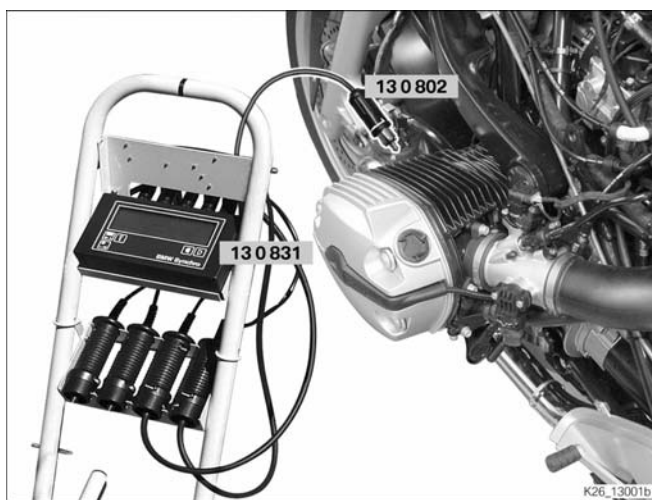
► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the



motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

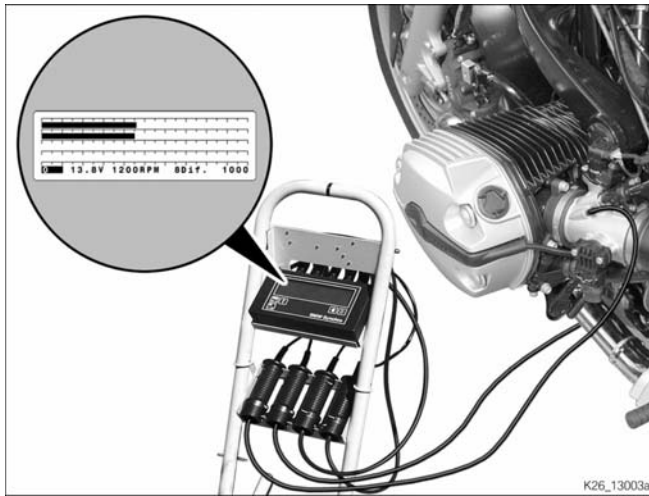
► 1. Checking idle

Test



Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the



system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not


change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

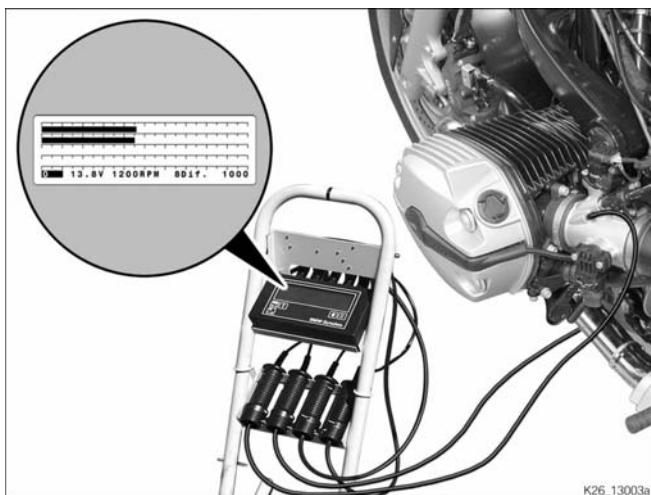
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 -	max. 15 mbar	

	1800 min ⁻¹		
--	---------------------------	--	--

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



▶ **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

-
- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

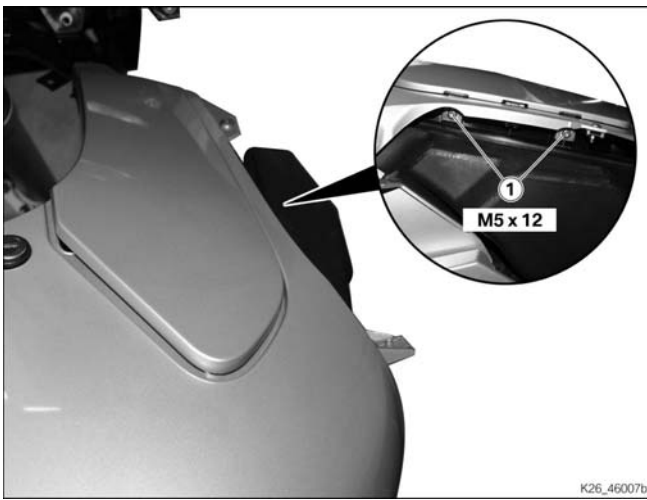
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



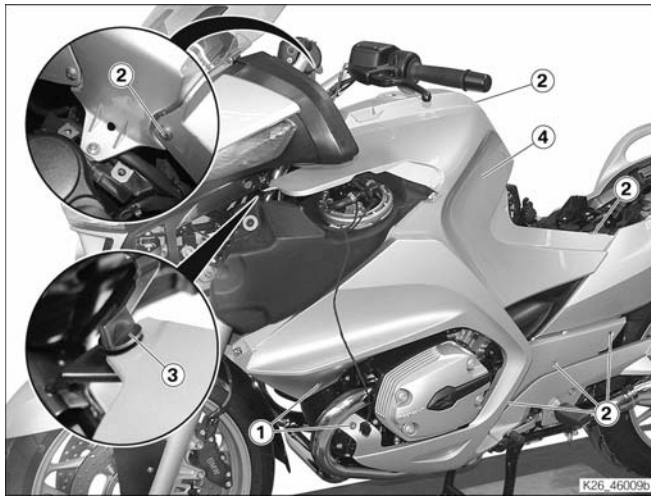
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **23 12 023 Replacing rotary shaft seal of input shaft in housing cover**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



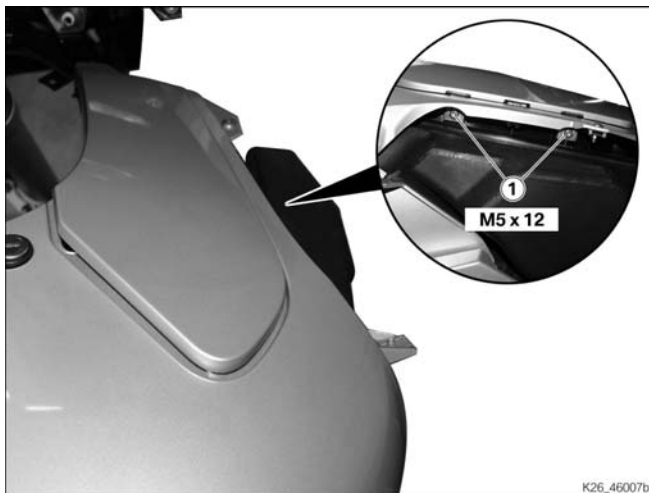
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



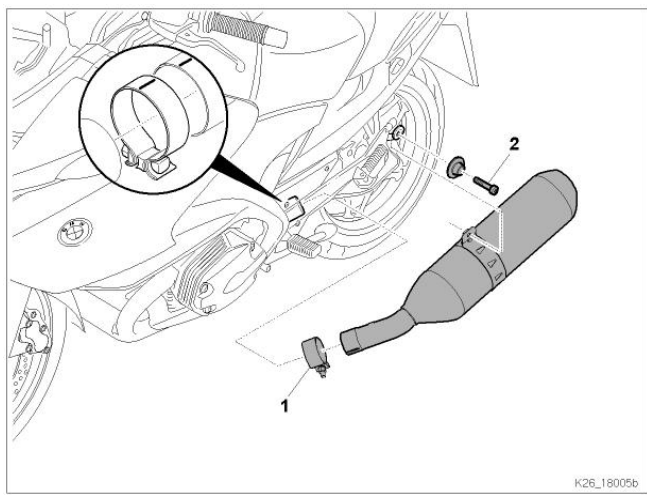
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Remove rear wheel.

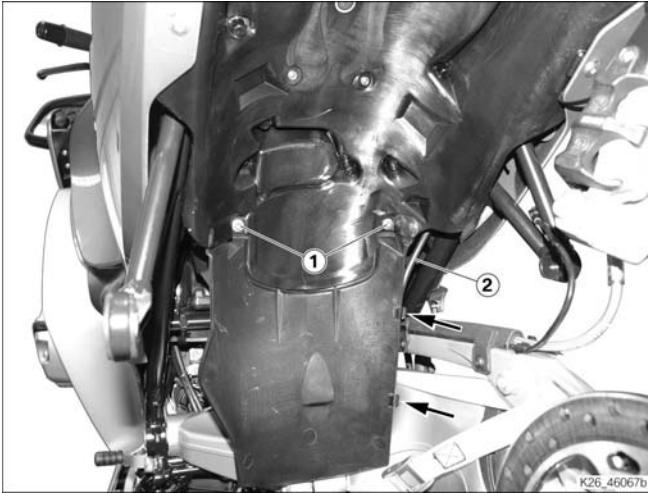


(-) Removing rear mudguard, front section

- Remove screws (1).



- Disengage and remove the front section of the rear mudguard.



Variant, ESA

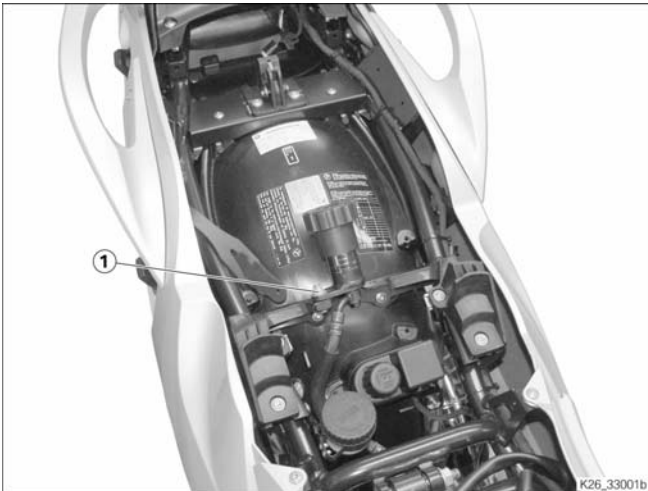
- Release cable (2) from cable holders (arrows).
- Remove screws (1).
- Disengage and remove the front section of the rear mudguard.

(-) Removing rear spring strut

- Apply masking tape to the lower part of the rear-wheel drive unit.
- Support the rear-wheel drive unit with scissor-type lifter (No. 00 1 571) .

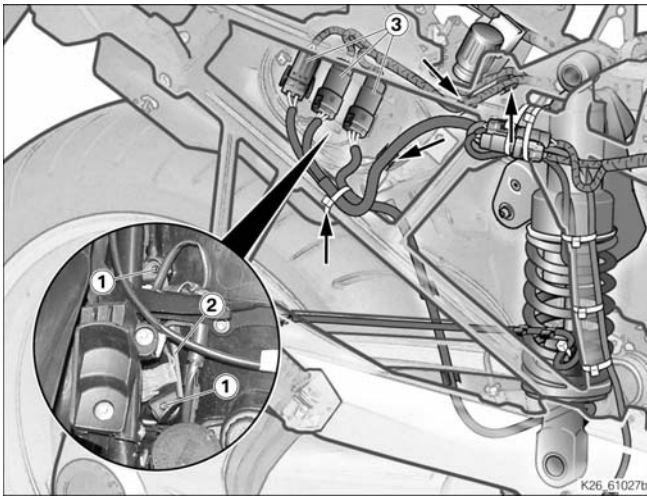
Variant, not for ESA

- Remove screw (1) and remove the spring-strut adjuster knob.



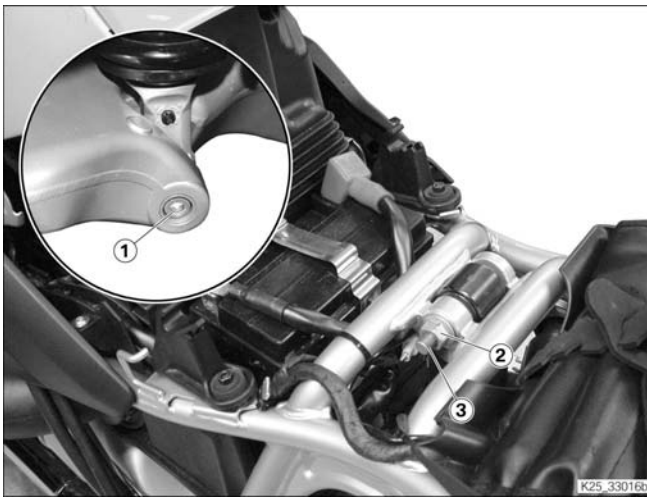
Variant, ESA

- Remove screws (1) and manoeuvre the holder clear.
- Disconnect plug (2).
- Cut through the cable ties (arrows) at the frame and



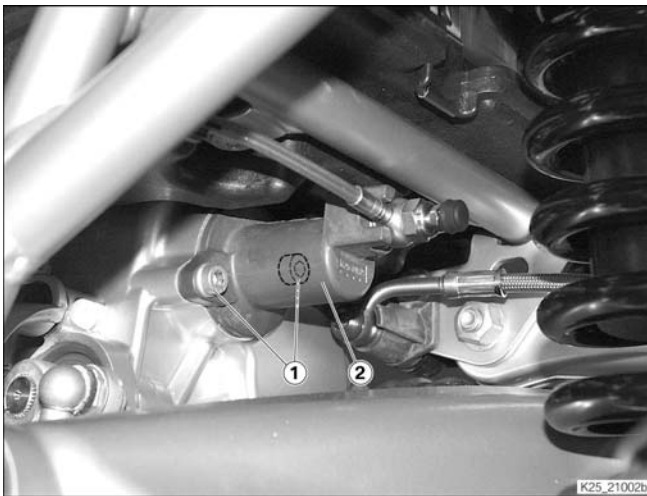
guide the cable down until clear.

- Remove screw (1).
- Remove nut (2).
- Lift the spring strut and remove screw (3).
- Remove the spring strut.



(-) Removing clutch slave cylinder from gearbox

- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.



(-) Removing shaft sealing ring of input shaft from housing cover

- Using a suitable tool, carefully remove shaft sealing ring (1).



(-) Installing rotary shaft seal of input shaft in gearbox cover

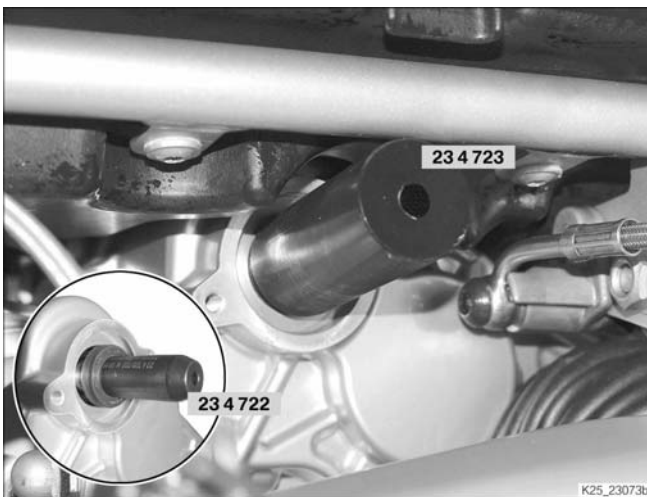
- Clean the bearing bore in the housing.



Note


Lightly oil the sealing lips before installing the shaft sealing rings.

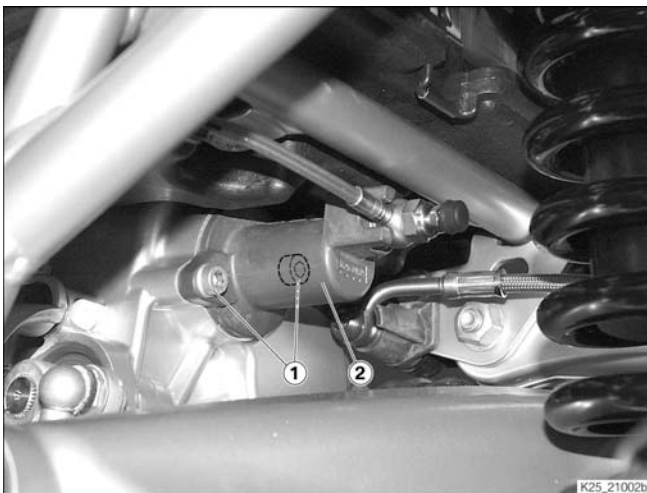
- Install a new shaft sealing ring, using sliding sleeve (No. 23 4 722) and drift (No. 23 4 723) .



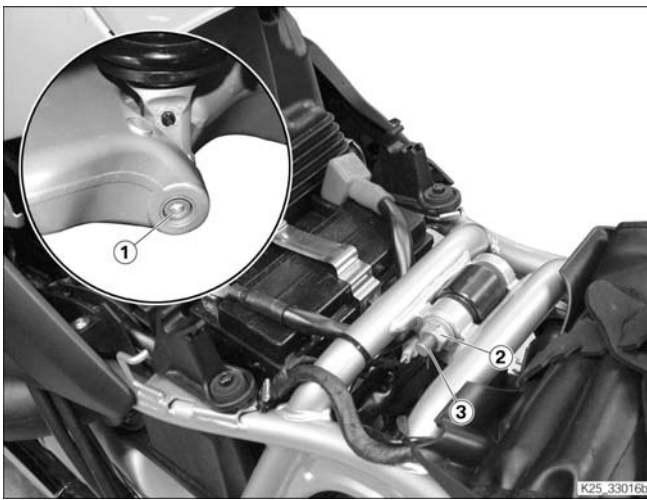
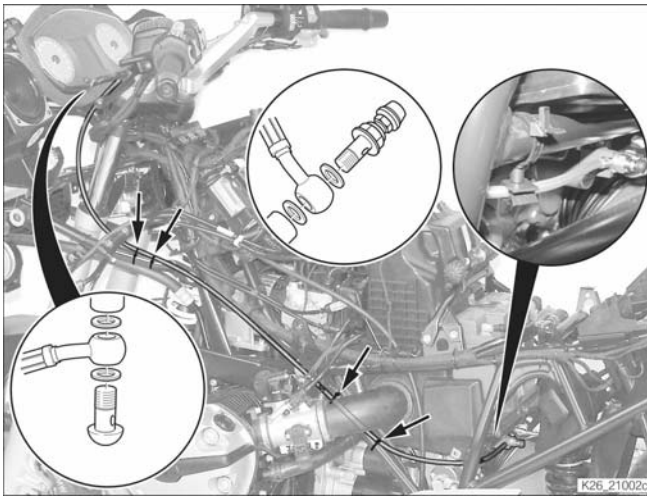
(-) Installing clutch slave cylinder

- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.

 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	




- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.




(-) Installing rear spring strut


- Clean the threads.
- Grease screw heads (1) and (3).

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Hold the spring strut in position and install screw (3).
- Align the swinging arm, install screw (1) and tighten.

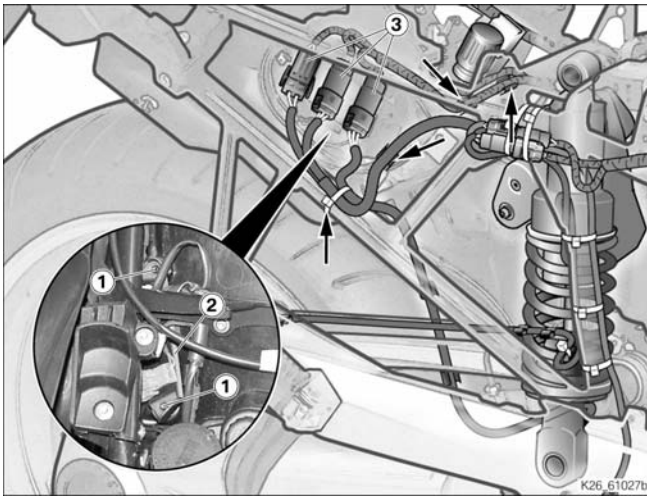
 <p>Tightening torques</p>		
Spring strut to rear swinging arm, M10 x 80 - 10.9 Loctite 243	Initial torque, 20 Nm	
	Final torque, 58 Nm	

- Install new nut (2) and tighten.

 <p>Tightening torques</p>		
Spring strut to main frame, M10 x 1.25, Replace nut Mechanical thread lock	50 Nm	

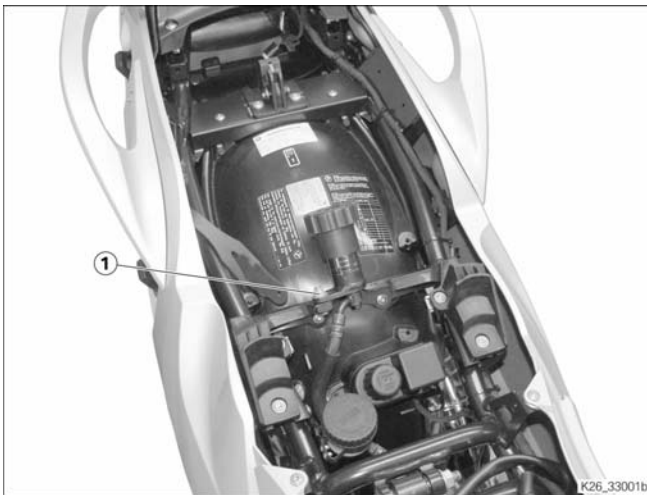
Variant, ESA

- Pass the cable through from below and secure it to the frame (arrows).
- Connect plug (2).
- Insert the holder and secure it with screws (1).



Variant, not for ESA

- Secure the adjuster knob to the holder with screw (1).



- Remove scissor-type lifter (No. 00 1 571) .
- Remove the masking tape from the bottom part of the rear-wheel drive unit.

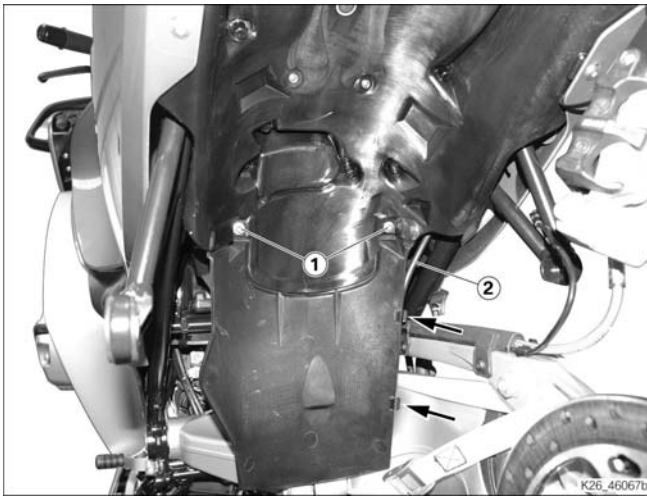
(-) Installing rear mudguard, front section

- Engage the front section of the rear mudguard.
- Install screws (1).



Variant, ESA

- Engage the front section of the rear mudguard.
- Install screws (1).
- Secure cable (2) in cable holders (arrows).



(-) Installing rear wheel


- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.

Attention

Nature: Components can be damaged by hard or sharp-edged objects.


Avoidance: Avoid scratching the components; use masking tape if necessary.

- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.

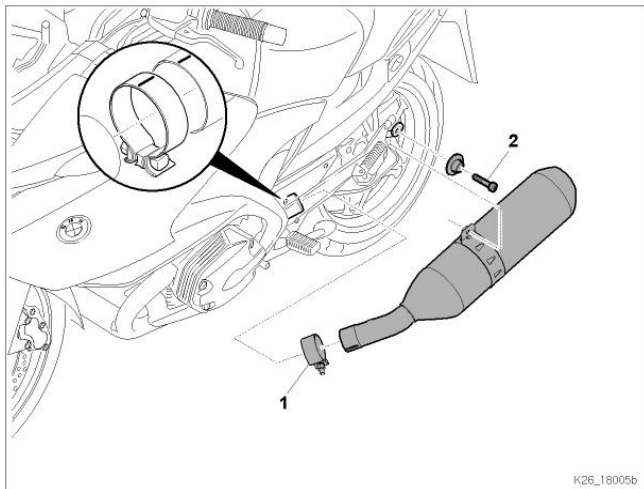
 Tightening torques		
Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite sequence	60 Nm	
Wheel flange with cut thread, M10 x 40 x 1.25, in diagonally opposite sequence	60 Nm	

(-) Installing silencer

- Grease the inner face of Torca clamp (1).

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the



K26_18005b

manifold and fit screw (2) in position.


- Tighten screw (2).

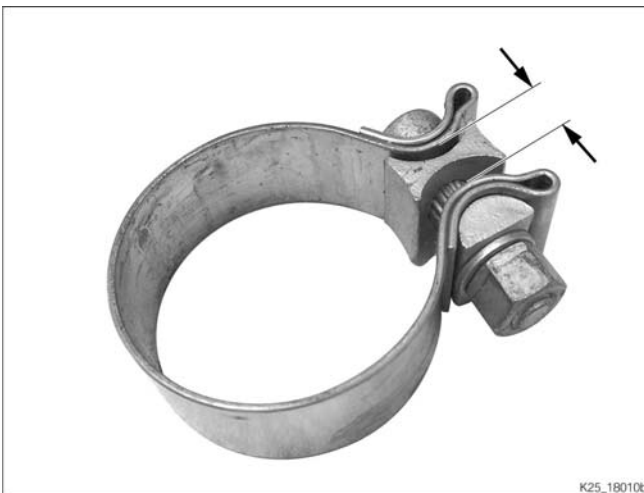
 Tightening torques		
End silencer to footrest support, M8	19 Nm	



K28_18007b

- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




K25_18010b

► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

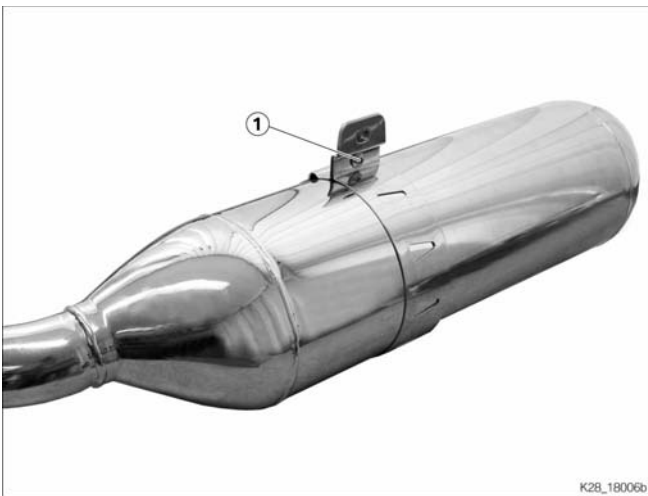
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




 **Attention**


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.


- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




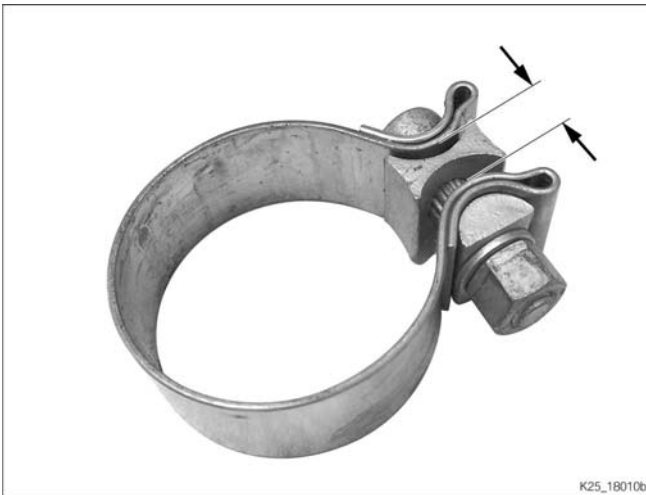
Checking Torca clamp on silencer

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

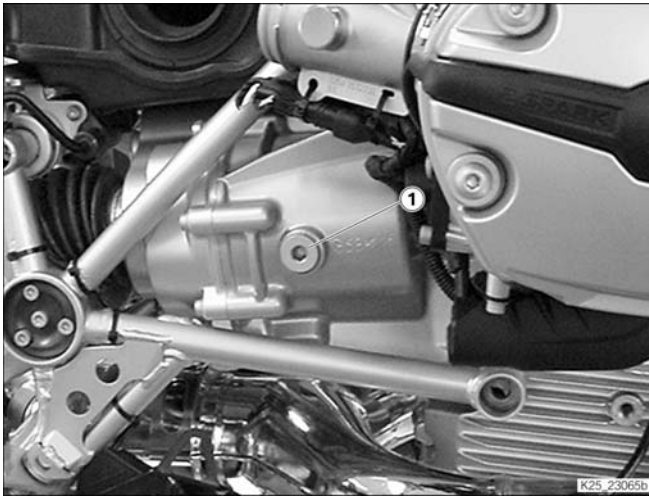


(-) Checking gearbox oil level

- Remove filler plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.

Test

--



Technical data

Oil level, gearbox		to bottom edge of thread of filler screw	
--------------------	--	--	--

Result: Level is not correct.

Measure:

- Top up the gearbox oil to the specified level.
- Fit a new sealing ring to oil filler plug (1) and install and tighten the plug.



Tightening torques

Oil filler plug, gearbox	30 Nm	
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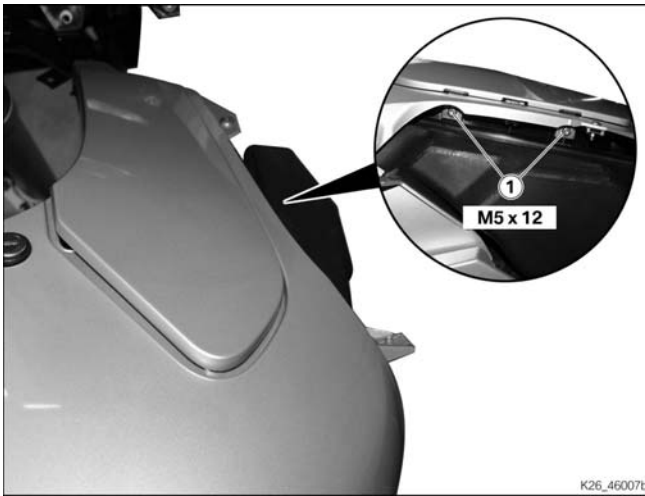
(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **23 12 078 Replacing rotary shaft seal of output shaft**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



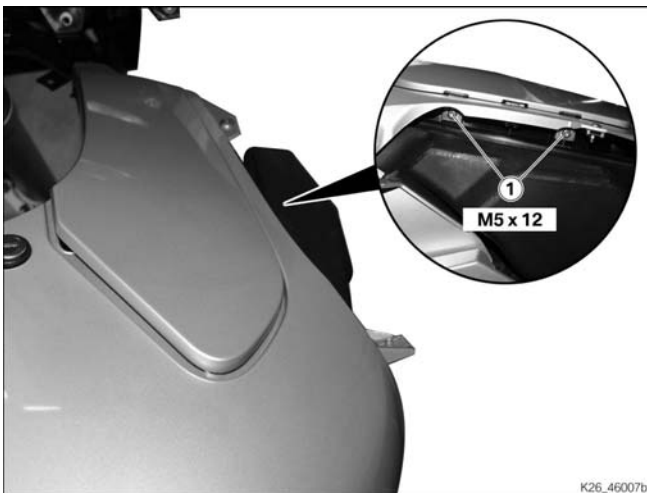
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



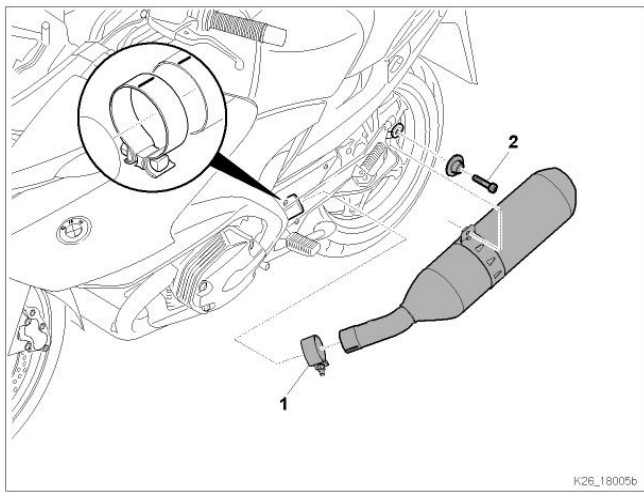
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



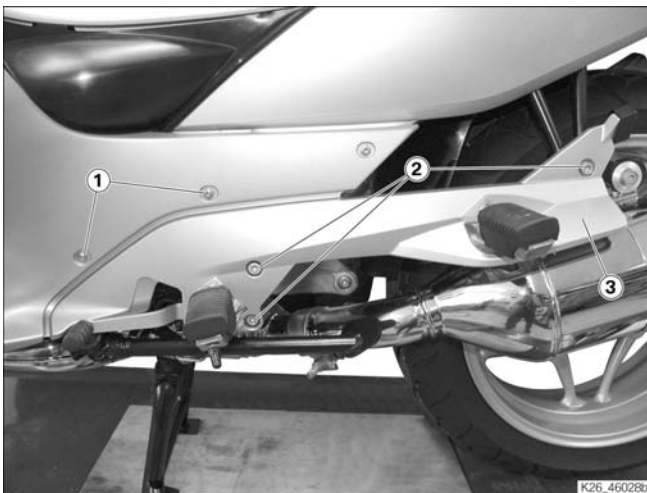
(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



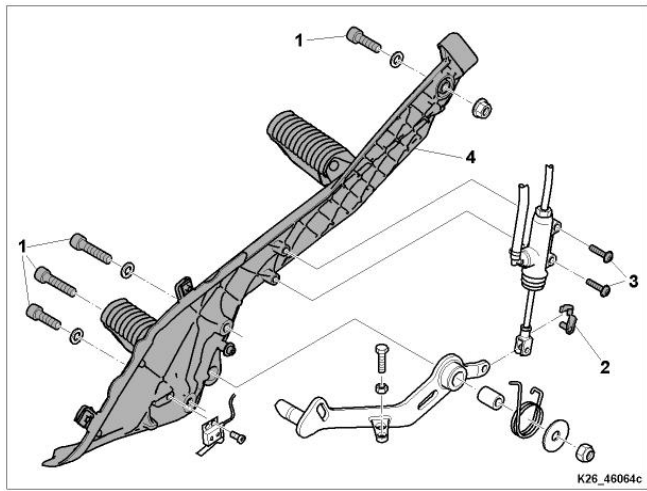
(-) Removing left footrest plate

- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.




(-) Removing right footrest plate

- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.

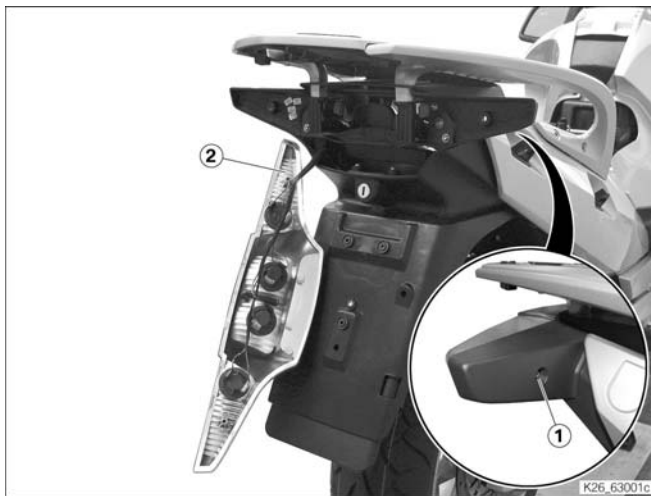
 Technical data			
Release temperature, screws for rear brake master cylinder		100 °C	

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.



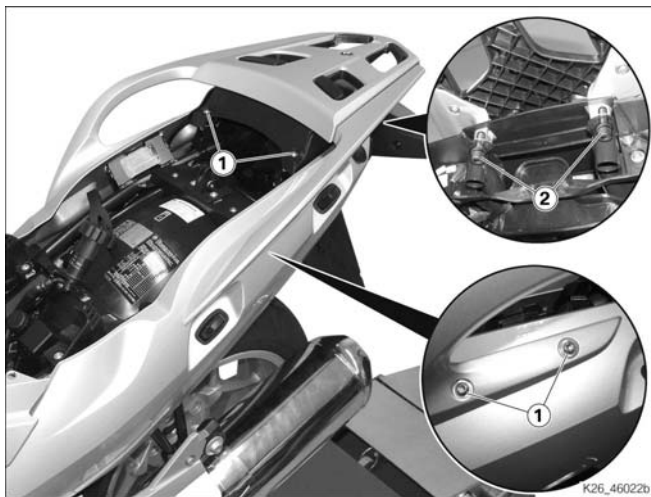
(-) Removing rear light unit

- Remove screws (1).
- Allow rear light unit (2) to dangle from the cable.



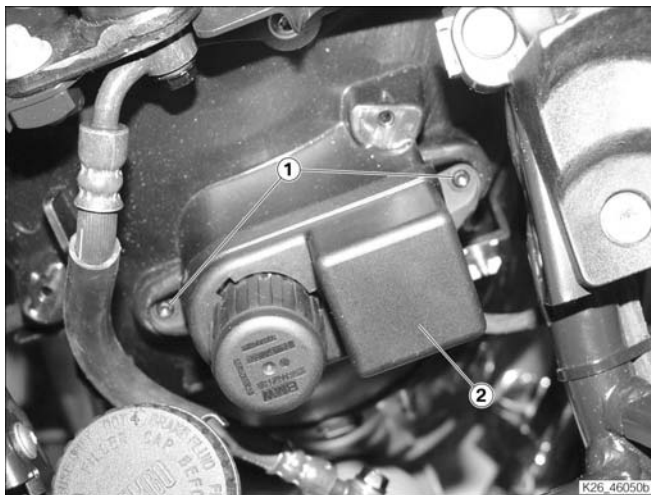
(-) Removing luggage carrier

- Remove screws (1).
- Remove screws (2) on rear left and right.
- Remove the luggage carrier.



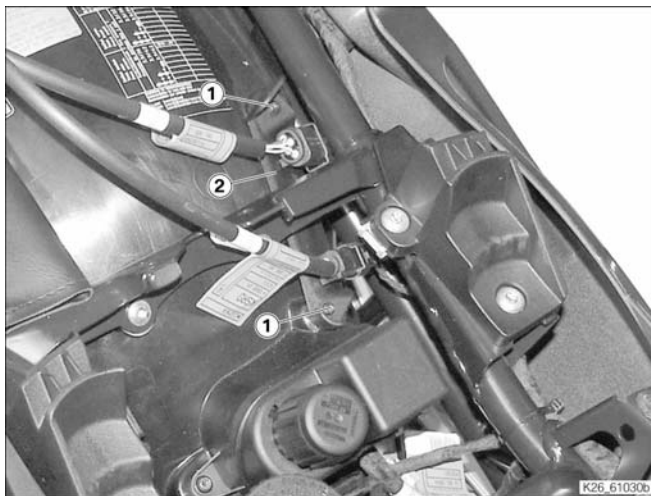
(-) Removing rear mudguard

- Remove screws (1).
- Remove bracket for diagnosis plug (2).



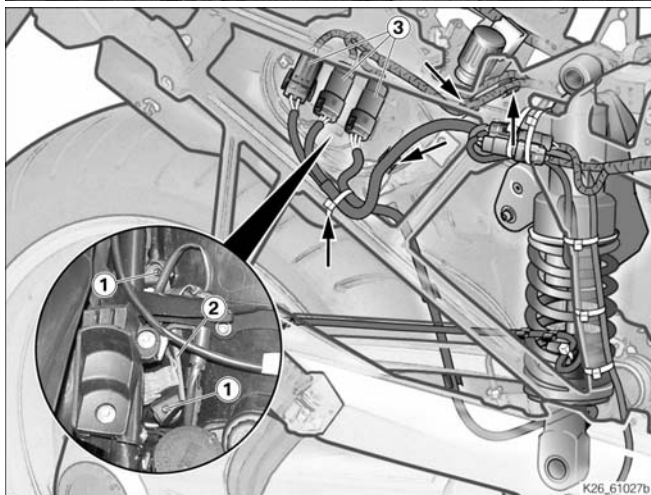
Variant, Seat heating

- Remove screws (1).
- Remove bracket (2).

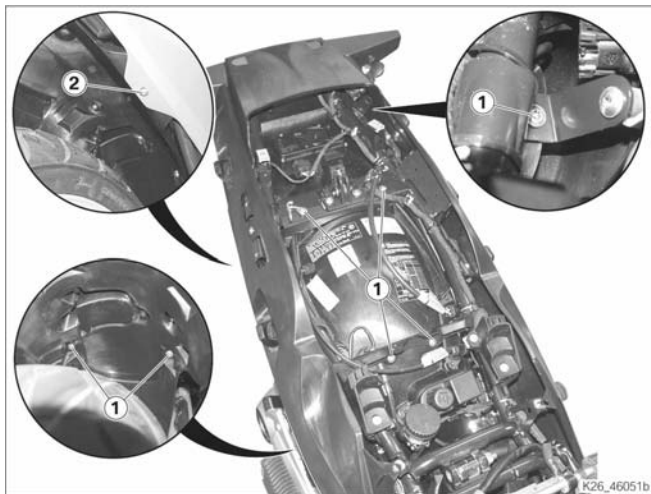


Variant, ESA

- Remove screws (1).
- Remove bracket (2).



- Remove screws (1).
- Remove screws (2) on left and right.



Variant, On-board computer

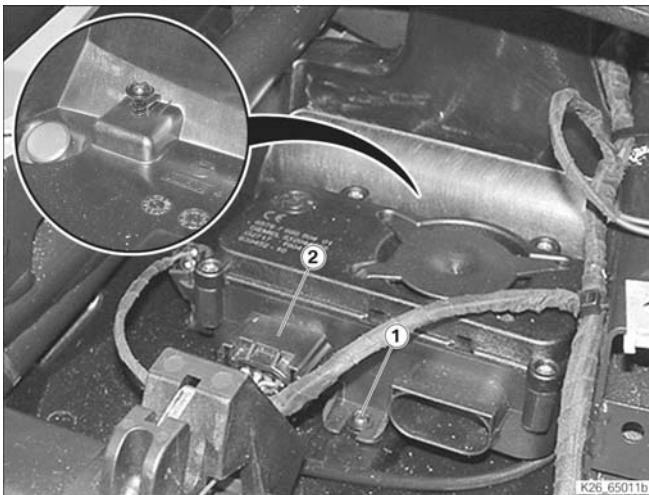
- Disconnect plug (1).



Variant, Anti-theft alarm

► Removing control unit for anti-theft alarm

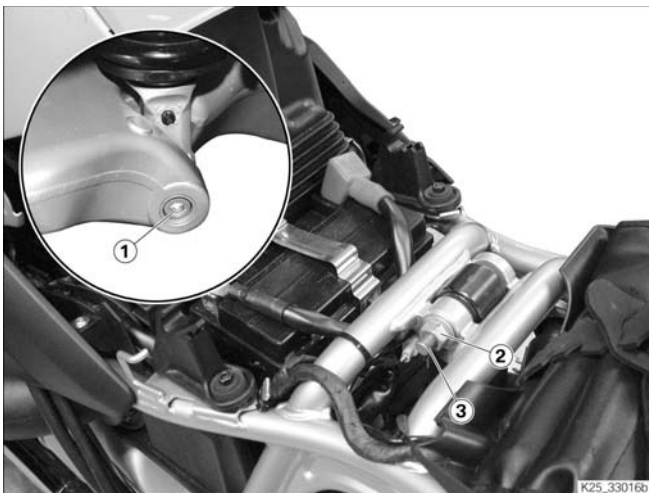
- Remove screw (1).
- Disconnect plug (2).
- Ease the anti-theft alarm forward to remove.



- Remove the rear mudguard.

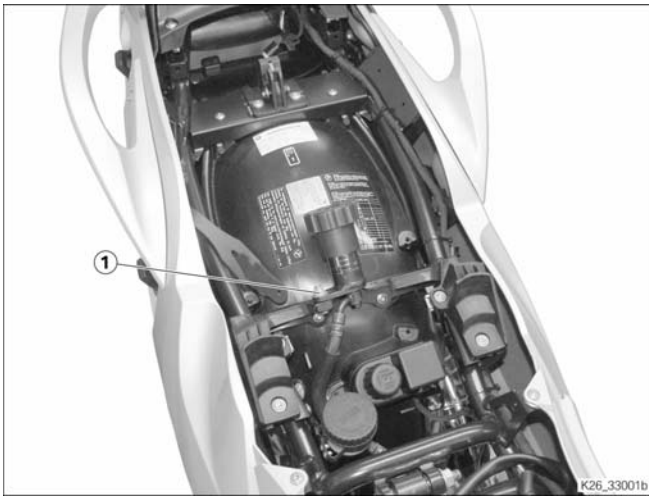
(-) Releasing rear spring strut at top

- Remove nut (2).
- Lift the spring strut and remove screw (3).



(-) Removing swinging arm with rear-wheel drive

Variant, not for ESA

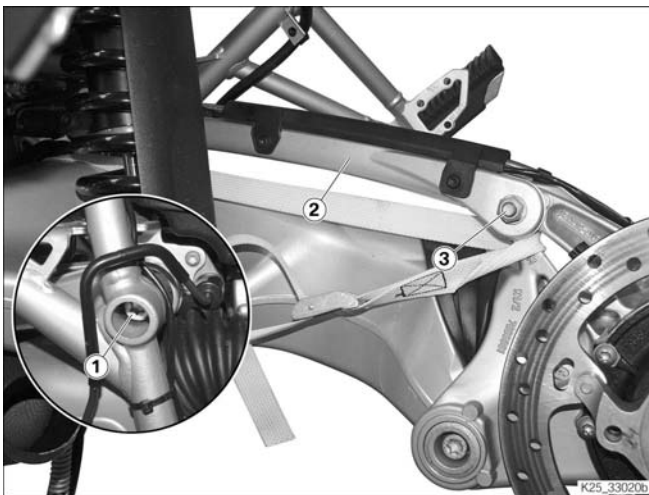


- Remove screw (1) and remove the spring-strut adjuster knob.



► **Releasing Paralever link at rear**

- Use a strap to secure the rear-wheel drive so that it cannot drop.

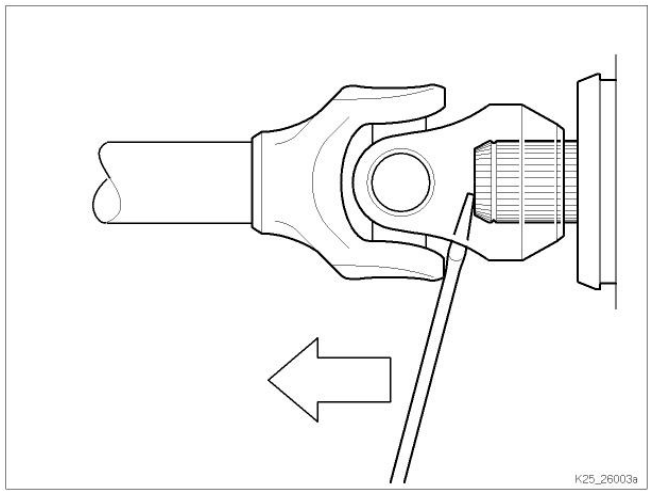
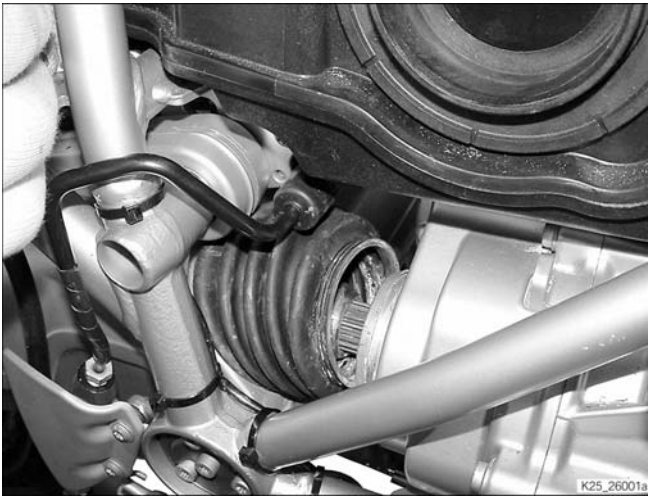


- Remove nut (3) with washer and bolt.
- Use a cable tie to hold the brake caliper up and let it dangle at the rear frame.



► **Pressing universal shaft off gearbox output shaft**

- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.

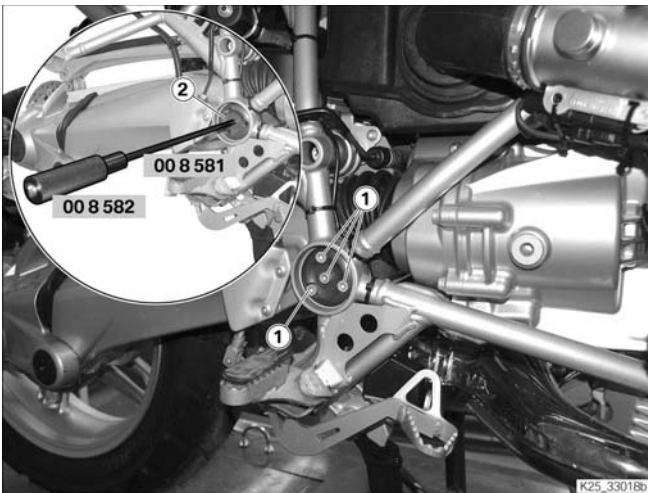


- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the shaft in this position.
- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.



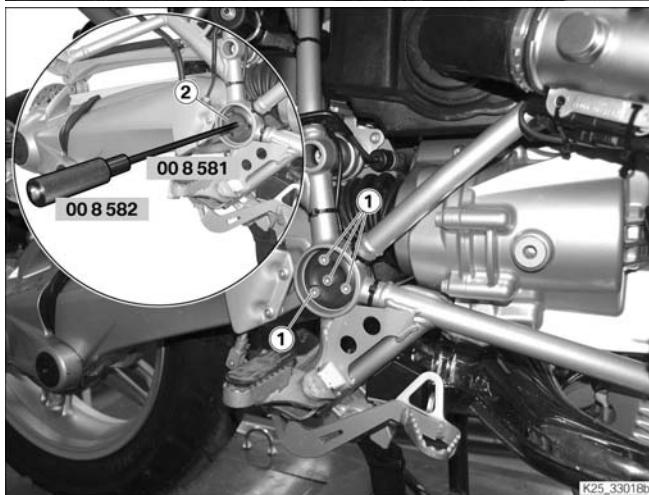
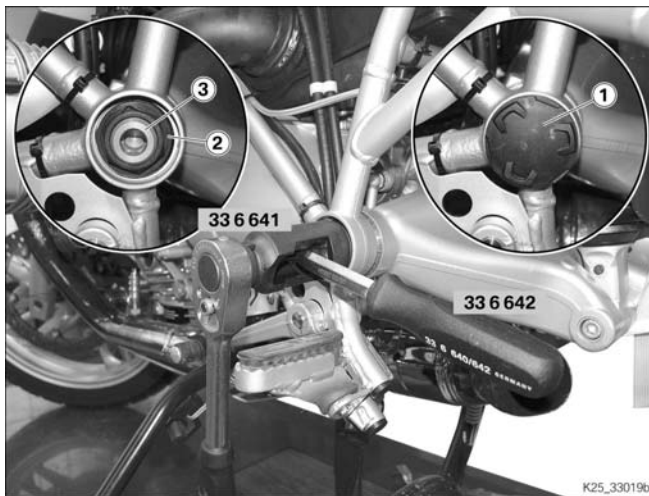
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Remove screws (1).

- Remove cap (1).
- Slacken locknut (2) with Allen wrench (No. 33 6 642) and special socket wrench insert (No. 33 6 641).
- Remove bearing stud (3).



- Screw pull rod (No. 00 8 581) with impact weight (No. 00 8 582) into right bearing stud (2).
- Raise the swinging arm and remove the bearing stud.
- Carefully pull the swinging arm with universal shaft, spring strut and rear wheel to the rear, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

(-) Removing shaft sealing ring of output shaft from housing cover

- Remove shaft sealing ring (1).



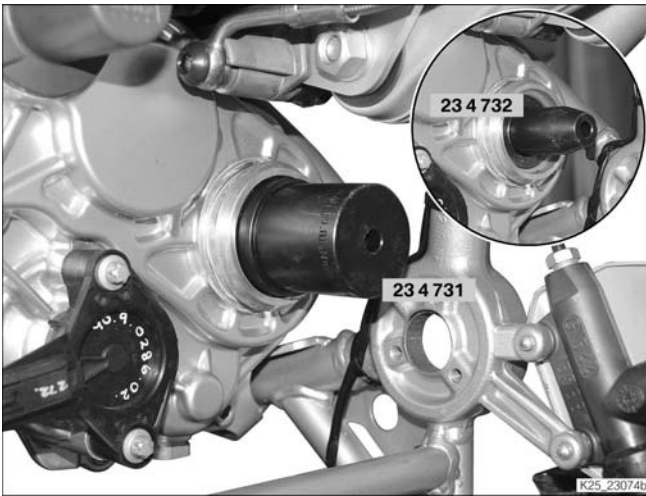
(-) Installing rotary shaft seal of output shaft in housing cover

- Clean the bearing bore in the housing.



Note

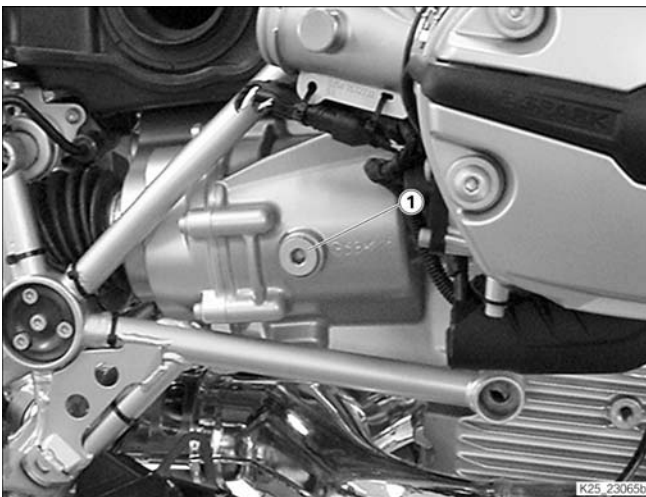
Lightly oil the sealing lips before installing the shaft



sealing rings.


- Install a new shaft sealing ring, using sliding sleeve (No. 23 4 732) and drift (No. 23 4 731) .

(-) Checking gearbox oil level



- Remove filler plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.


Test

 Technical data			
Oil level, gearbox		to bottom edge of thread of filler screw	

Result: Level is not correct.

Measure:

- Top up the gearbox oil to the specified level.
- Fit a new sealing ring to oil filler plug (1) and install and tighten the plug.

 Tightening torques		
Oil filler plug, gearbox	30 Nm	

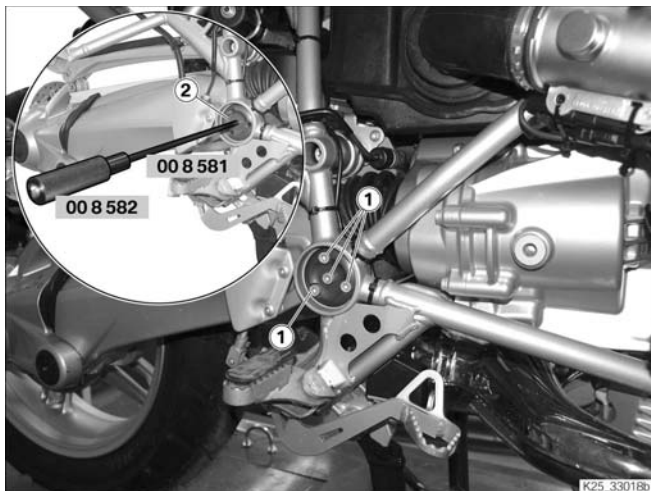
(-) Installing swinging arm with rear-wheel drive

- Carefully manoeuvre the swinging arm with universal shaft, spring strut and rear wheel into position from the rear and slide the universal shaft onto the gearbox output shaft.

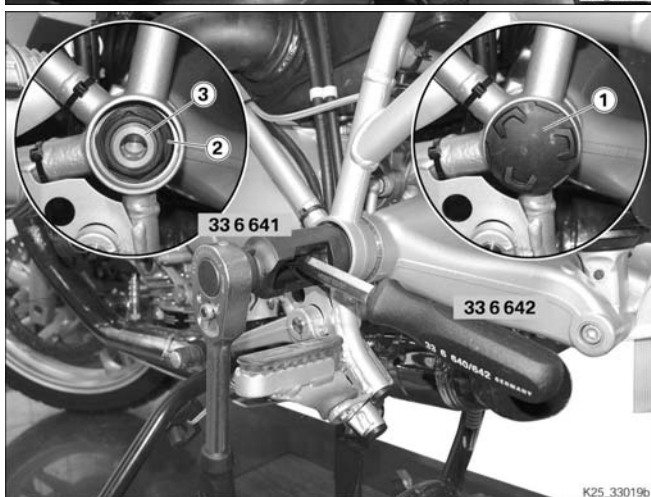


Note

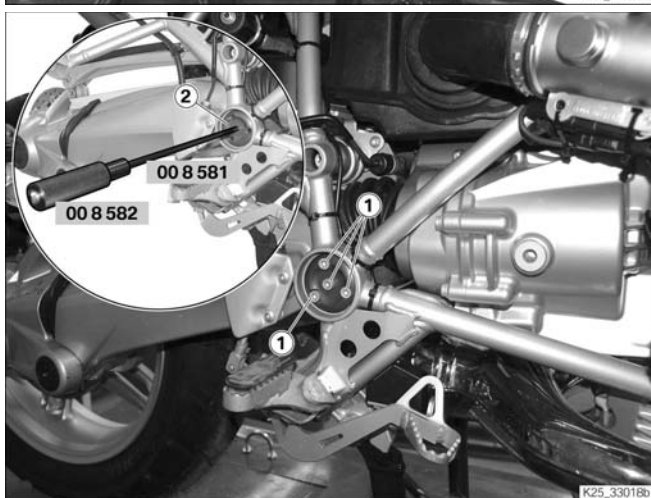
If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.




- Slide the link into the mount on the frame, noting the thrust washers on left and right on the pivot bearing.
- Lift the swinging arm and install bearing stud (2).




- Align the swinging arm and install bearing stud (3).

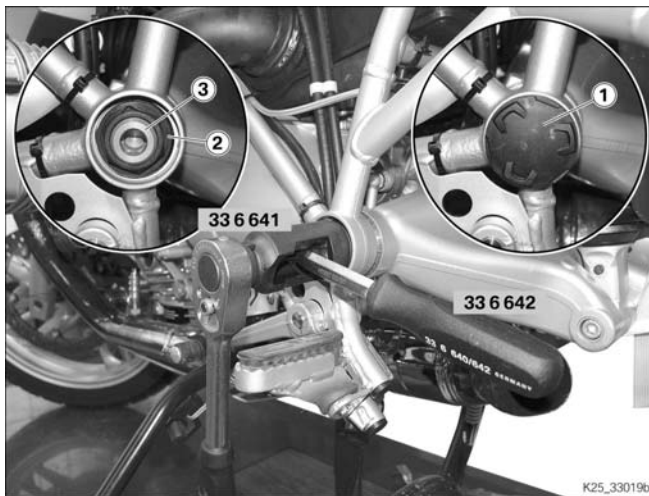


- Install screws (1).


 Tightening torques		
Swinging arm to main frame, right, M6	9 Nm	

- Tighten bearing stud (3).

 Tightening torques		
Bearing stud, swinging arm to main frame, left, M24 x 1.25	7 Nm	



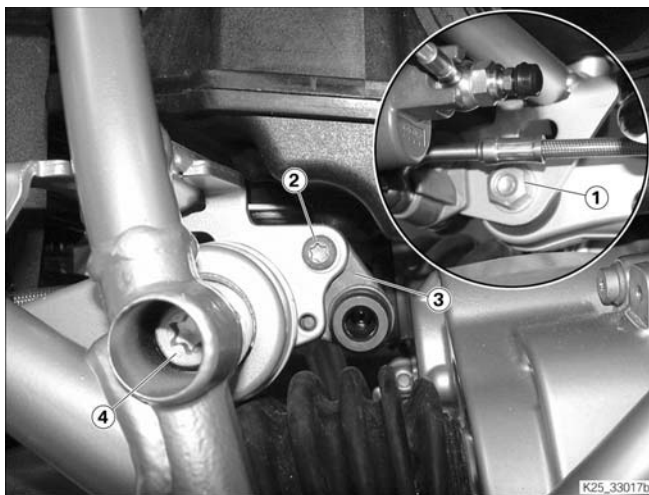
- Tighten locknut (2) with Allen wrench (No. 33 6 642) and special socket wrench insert (No. 33 6 641).


 Tightening torques		
Lock nut, swinging arm to main frame, left, M24 x 1.25	145 Nm	

- Install cap (1).


► **Installing Paralever link at front**

- Introduce the link into the rear frame and align it.
- Install screw (4) in the frame.
- Install nut (1).



 Tightening torques		
Reaction link to frame, M10 x 55-10.9, Replace nut	42 Nm	

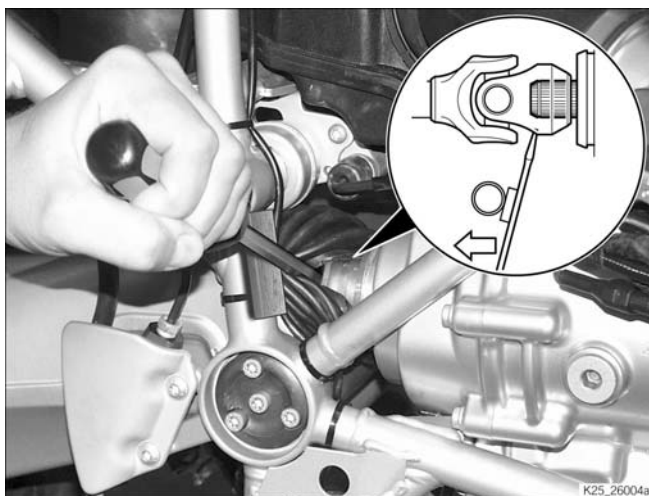
- Hold connector (3) in position and secure it with screw (2).

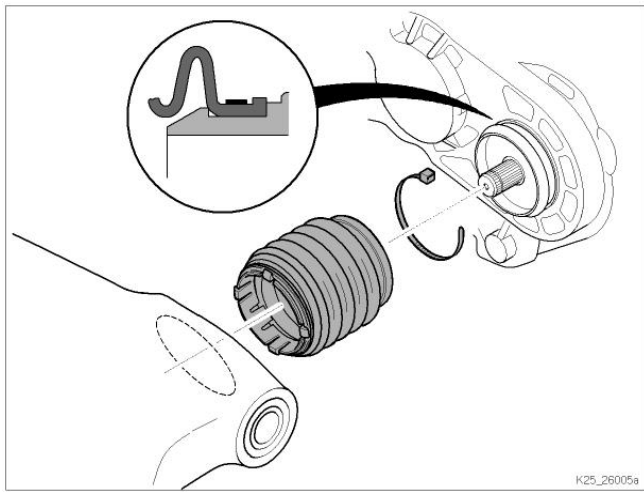
 Tightening torques		
Connecting piece to rear frame, M6 x 16	8 Nm	



► **Pressing universal shaft onto gearbox output shaft**

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.





- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.



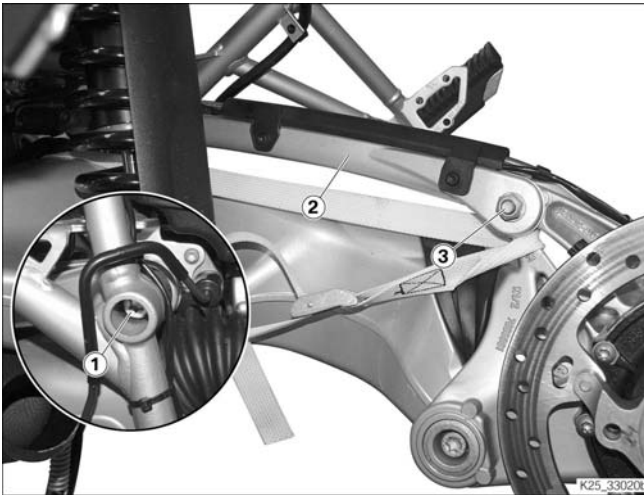
Consumables/lubricants

Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174
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- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.



▶ Installing Paralever link at rear



- Release the brake caliper from the rear frame.
- Introduce link (2) into the rear-wheel drive and align it.
- Push the stud through toward the motorcycle side and tighten nut (3).



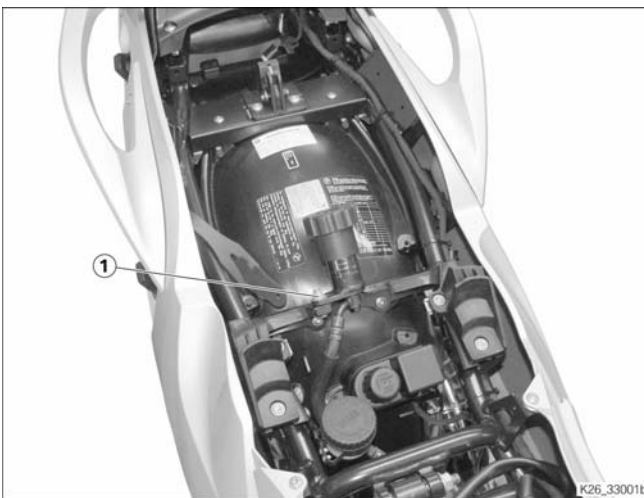
Tightening torques

Link to final drive housing, M10 x 55, Replace nut	43 Nm	
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Variant, not for ESA

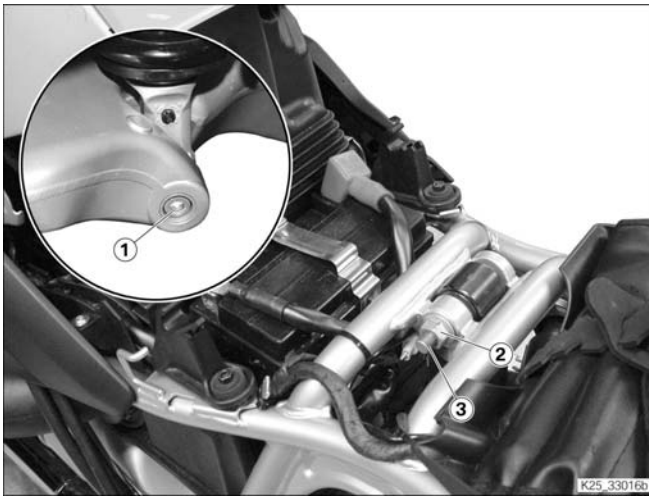
- Secure the adjuster knob to the holder with screw (1).



(-) Securing rear spring strut at top

- Hold the spring strut in position and install screw (3).
- Install **new** nut (2) and tighten.





Tightening torques

Spring strut to main frame, M10 x 1.25, Replace nut Mechanical thread lock	50 Nm	
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(-) Installing rear mudguard

- Install the rear mudguard.

Variant, Anti-theft alarm

▶ **Installing control unit for anti-theft alarm**

- Push anti-theft alarm (3) into the guides from the front.
- Install screw (1).
- Connect plug (2).

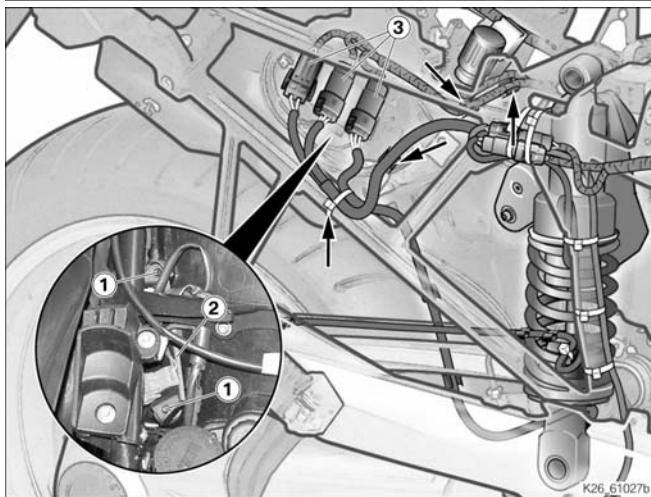
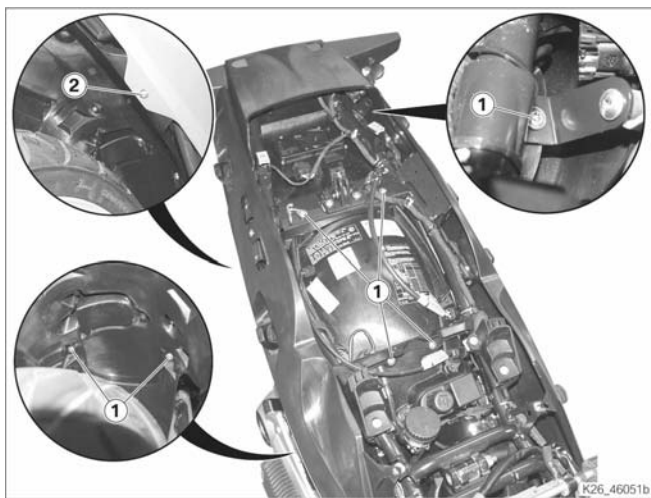


Variant, On-board computer

- Connect plug (1).



- Install screws (2) on left and right.
- Install screws (1).



Variant, ESA

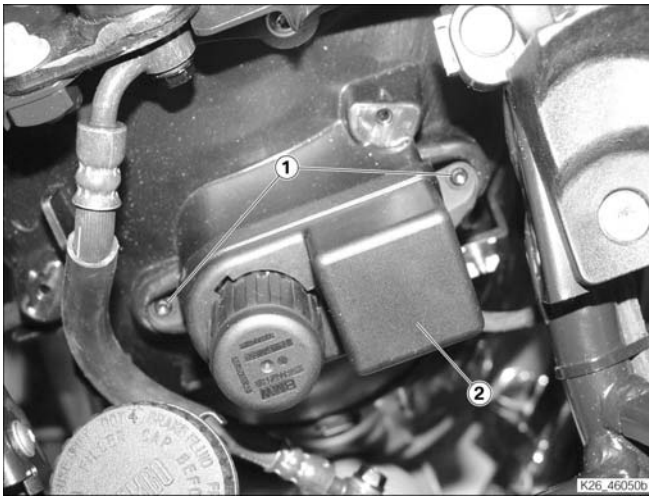
- Fit bracket (2) in position.
- Install screws (1).



Variant, Seat heating

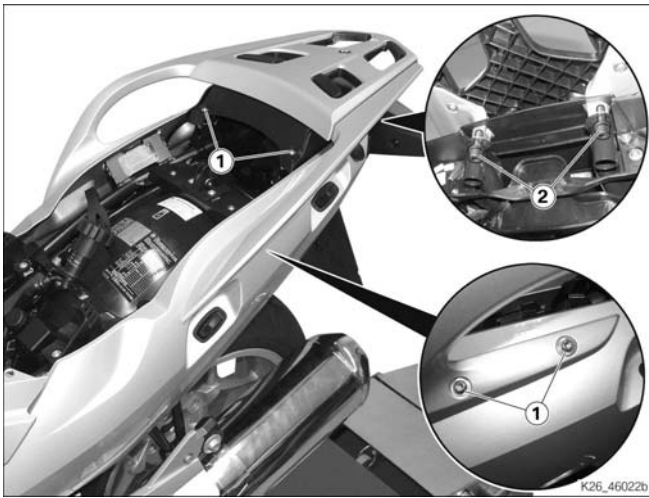
- Fit bracket (2) in position.
- Install screws (1).


- Install bracket for diagnosis plug (2).
- Install screws (1).




(-) Installing luggage carrier

- Place luggage rack in position.
- Install new screws (1).



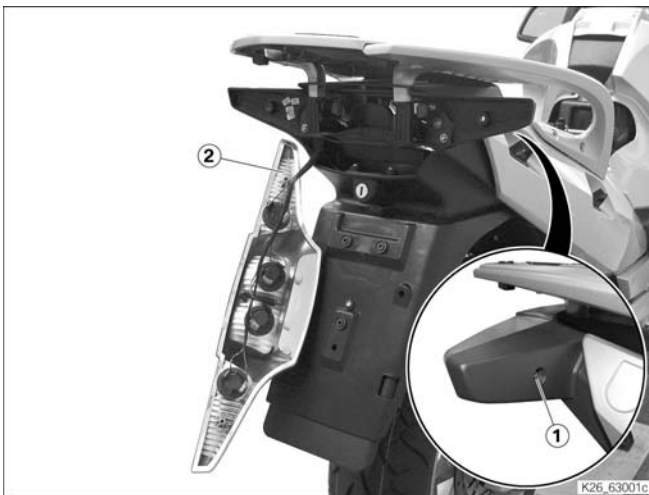
 Tightening torques		
Luggage rack, centre to rear section of frame, M6 x 35, Replace screws Micro-encapsulated	8 Nm	

- Install new screws (2) at rear left and right.

 Tightening torques		
Luggage rack from below to rear section of frame, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

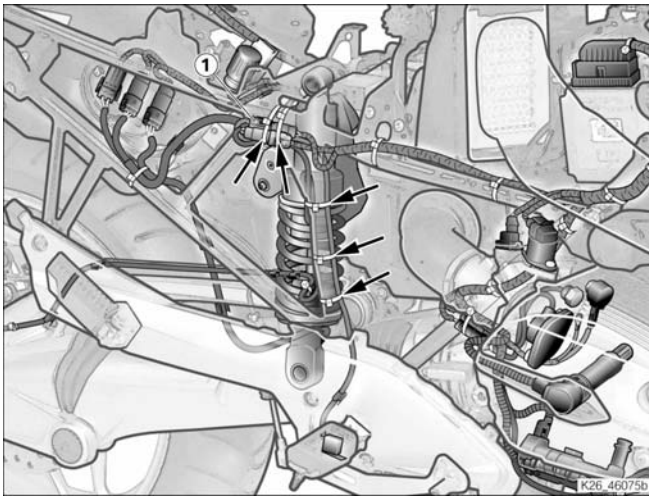
(-) Securing rear light unit

- Hold the rear light unit (2) in position.
- Install screws (1).

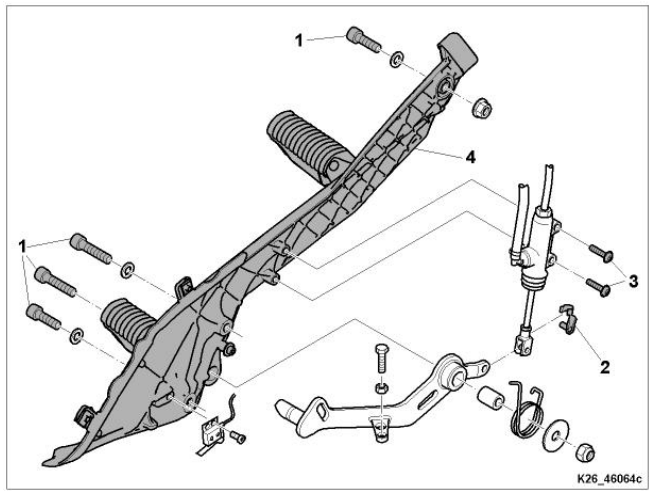


(-) Installing right footrest plate


- Thread through cable at frame and secure with cable




ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

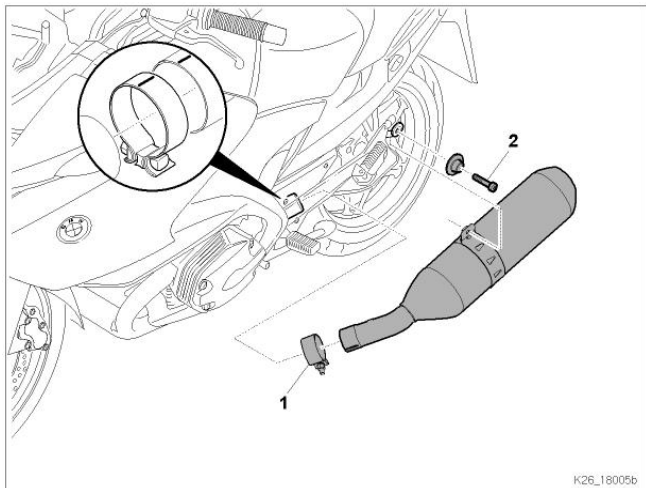
 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.






(-) Installing silencer

- Grease the inner face of Torca clamp (1).


 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

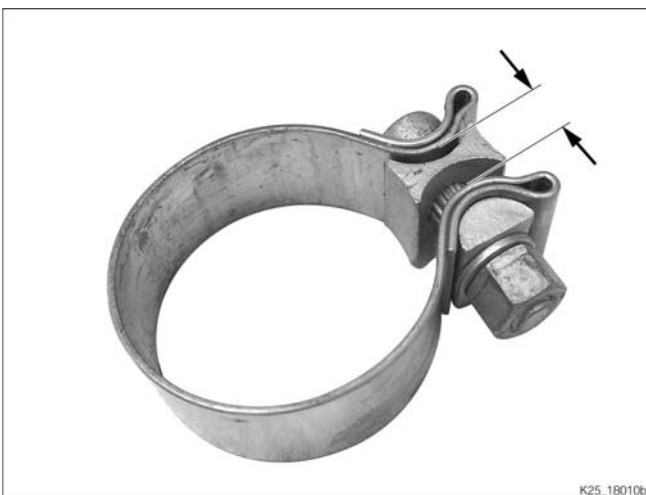
- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 <p>Tightening torques</p>		
End silencer to footrest support, M8	19 Nm	



- Align Torca clamp to marks (1) and secure hand-tight.

 <p>Tightening torques</p>		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




► Checking Torca clamp on silencer

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 <p>Tightening torques</p>		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final

torque is applied.

Measure:

- Replace the Torca clamp.




▶ Checking distance between silencer and rear wheel

Test

- Check distance (arrows) between silencer and rear wheel.



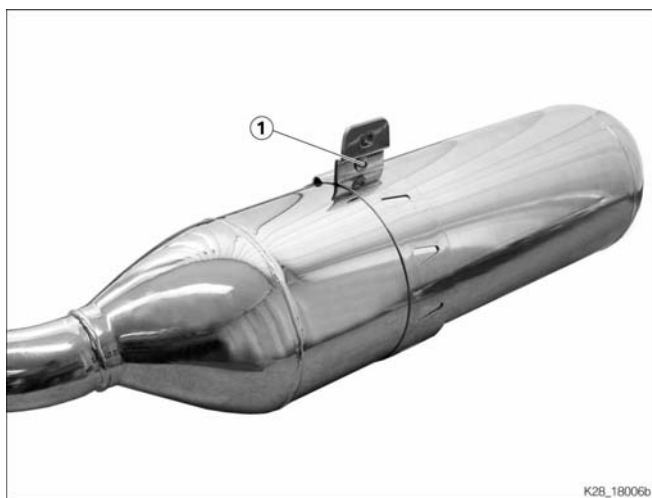
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ Adjusting silencer

- Undo Torca clamp.
- Remove screws (1).




Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.





Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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Checking Torca clamp on silencer

- Tighten the Torca clamp.

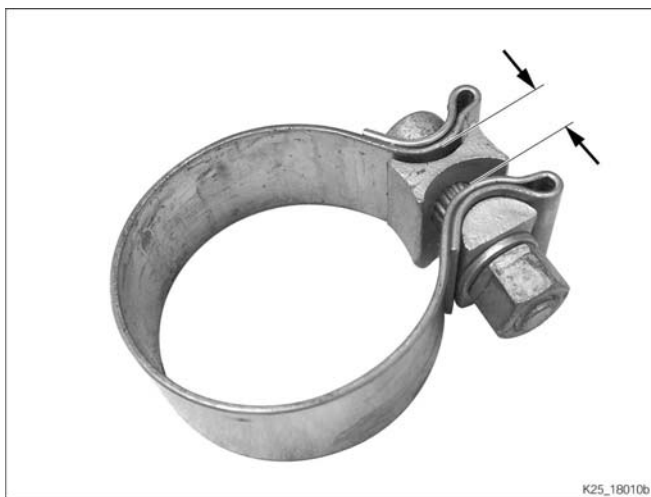
Test

- Check that a gap is visible at the clamp seat before final torque is applied.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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K25_18010b

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.

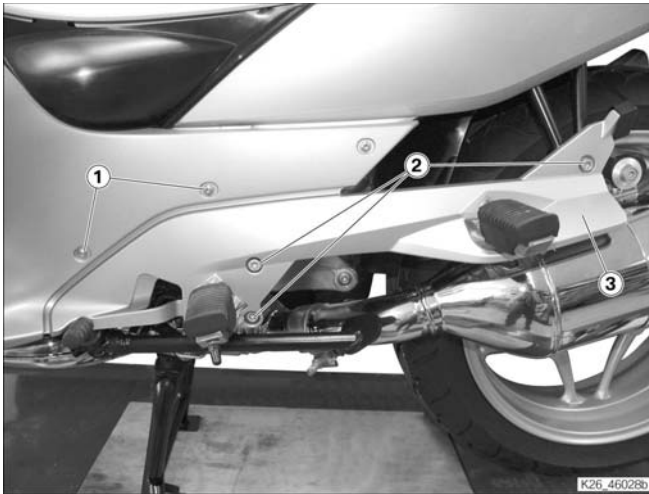


Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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K26_18001b



◀
(-) Installing left footrest plate

- Install footrest plate (3).
- Install screws (2).

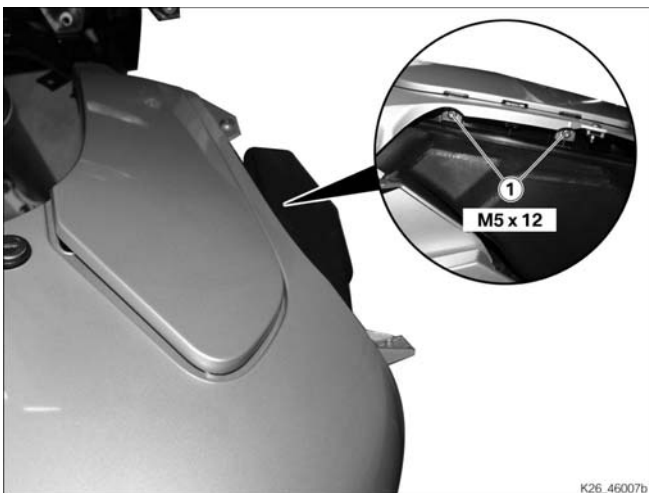
 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

- Install screws (1).



(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

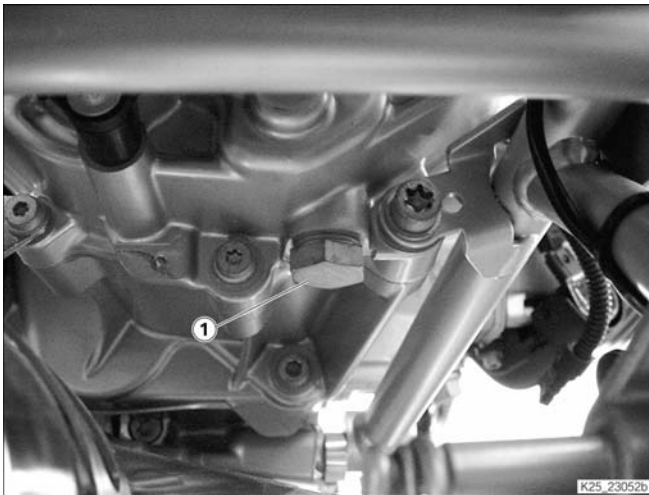
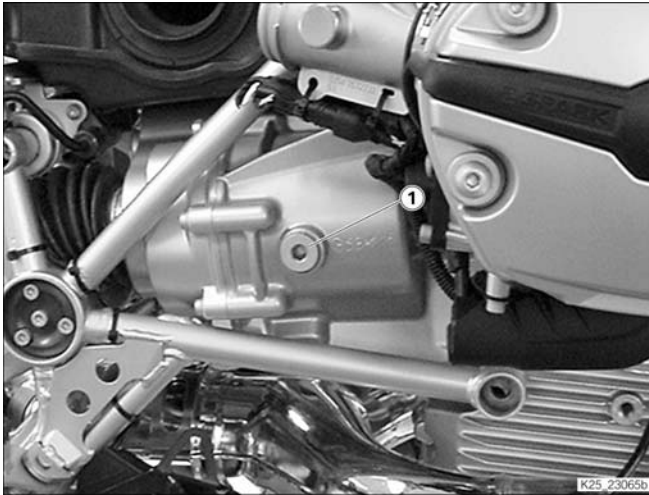


Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

23 12 090 Replacing radial shaft sealing ring of selector drum

(-) Draining gearbox oil



Warning

Nature: Parts of the exhaust system can be hot.

Avoidance: Do not touch hot parts of the exhaust system.

- Place a suitable tray underneath the gearbox.
- Remove oil filler plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.

- Remove drain plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.
- Remove all chips of metal from the drain plug.
- Fit a new sealing ring to the oil drain plug and install and tighten the plug.



Tightening torques

Oil drain plug, gearbox	30 Nm	
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(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.

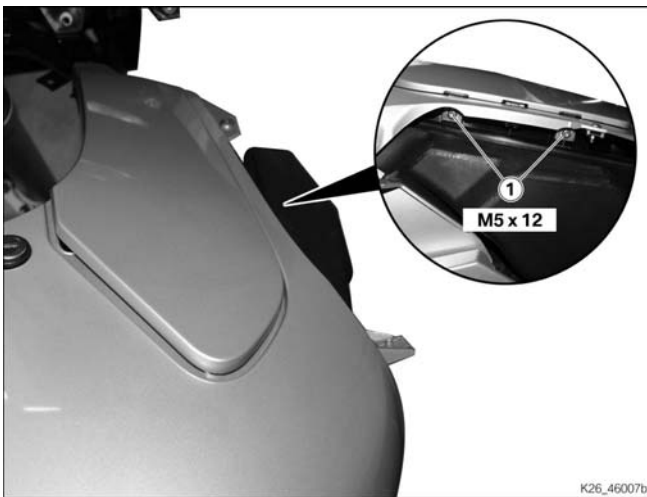
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



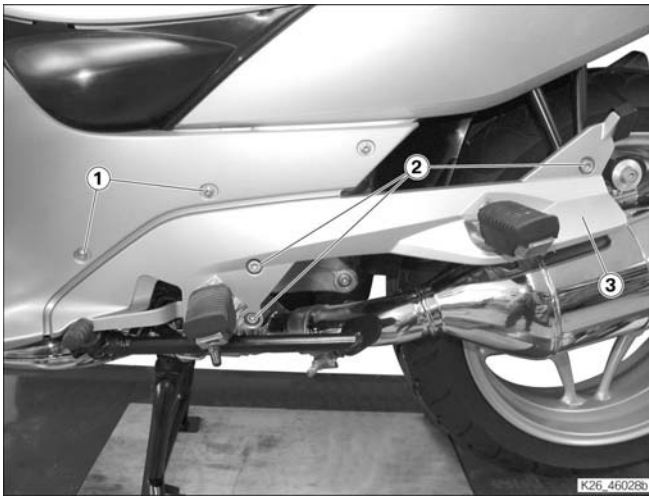
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



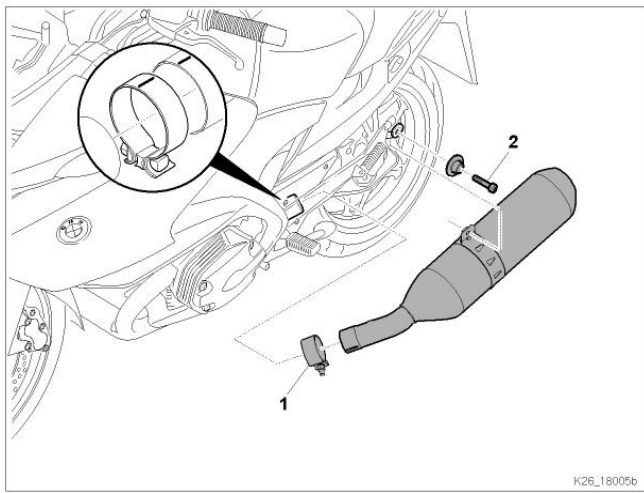
(-) Removing left footrest plate

- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

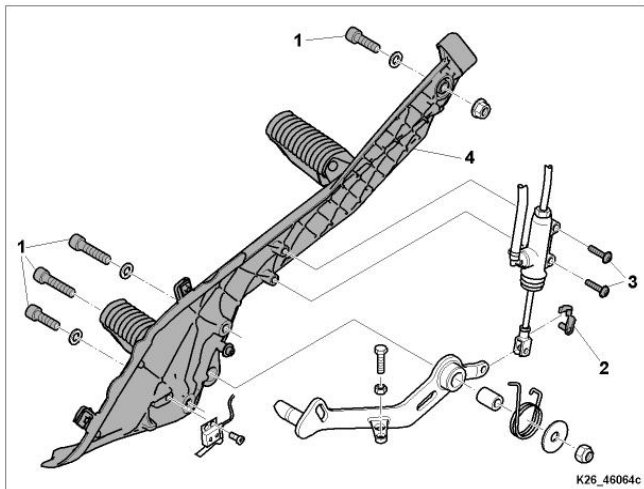


(-) Removing right footrest plate

- Undo screws (1) holding bottom section of fairing.



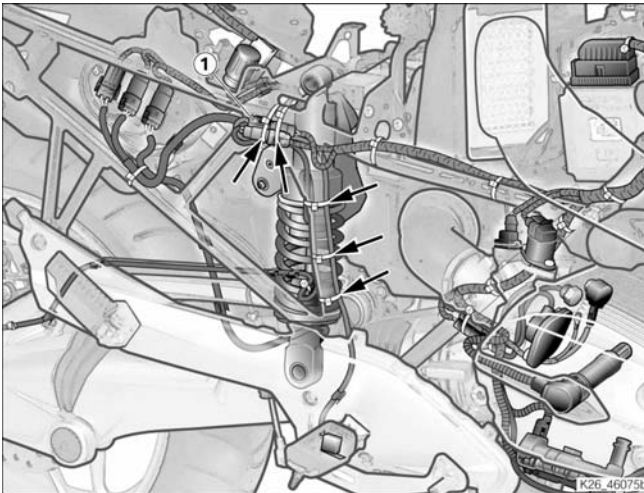
- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.



Technical data

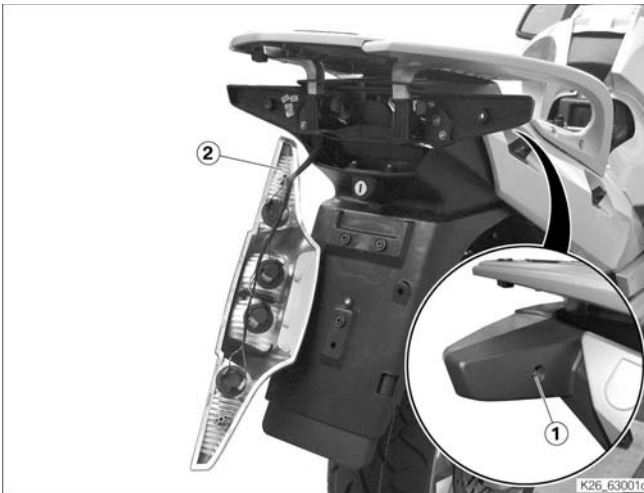
Release temperature, screws for rear brake master cylinder		100 °C	
--	--	--------	--

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.



- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.

(-) Removing rear light unit



- Remove screws (1).
- Allow rear light unit (2) to dangle from the cable.

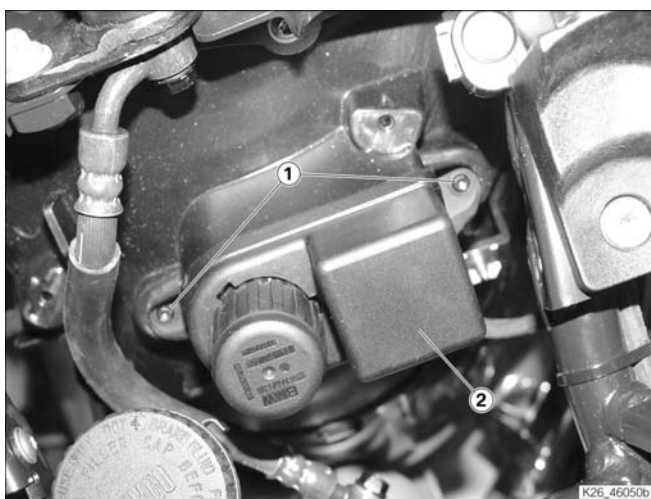
(-) Removing luggage carrier

- Remove screws (1).
- Remove screws (2) on rear left and right.
- Remove the luggage carrier.



(-) Removing rear mudguard

- Remove screws (1).
- Remove bracket for diagnosis plug (2).



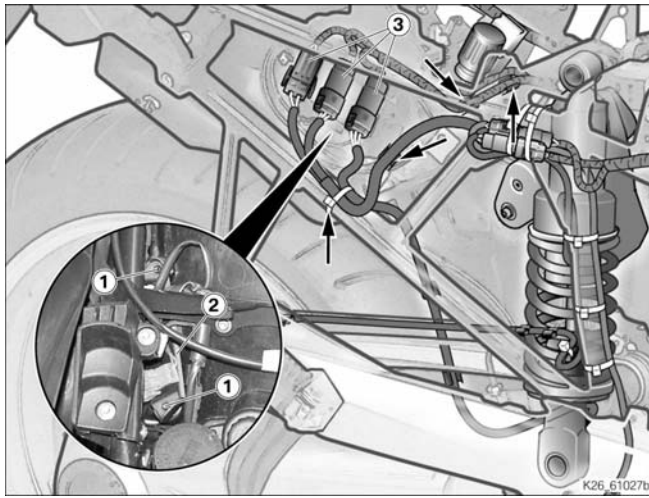
Variant, Seat heating

- Remove screws (1).
- Remove bracket (2).

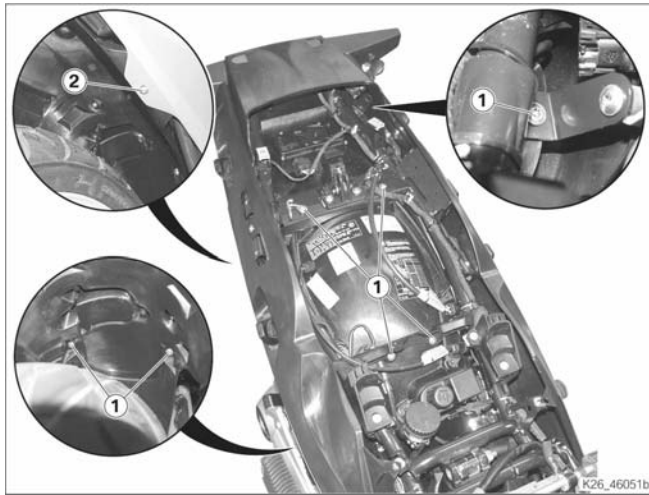


Variant, ESA

- Remove screws (1).
- Remove bracket (2).

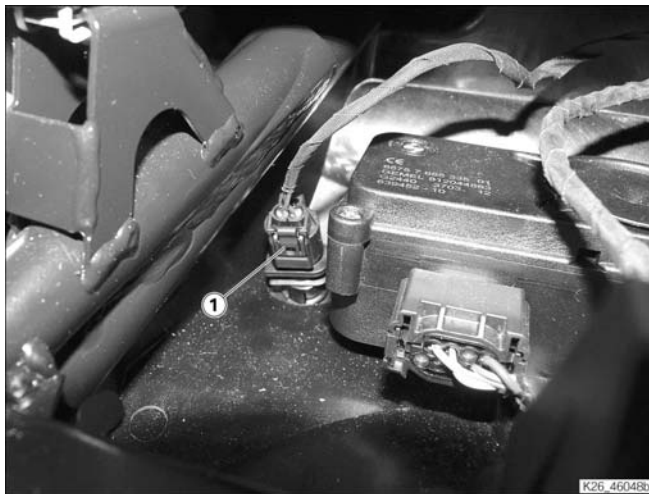


- Remove screws (1).
- Remove screws (2) on left and right.



Variant, On-board computer

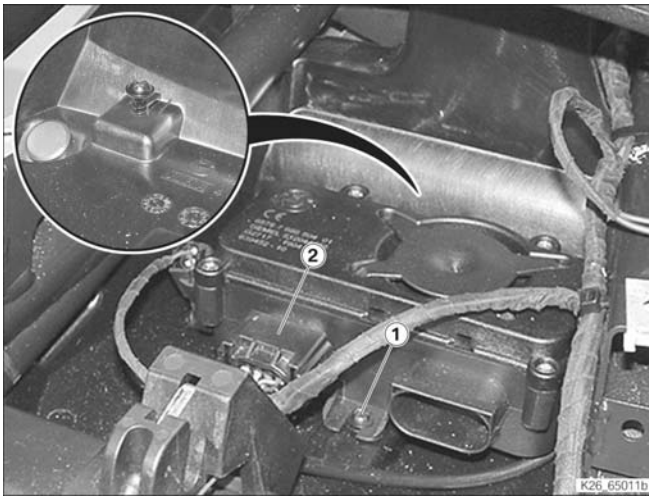
- Disconnect plug (1).



Variant, Anti-theft alarm

► **Removing control unit for anti-theft alarm**

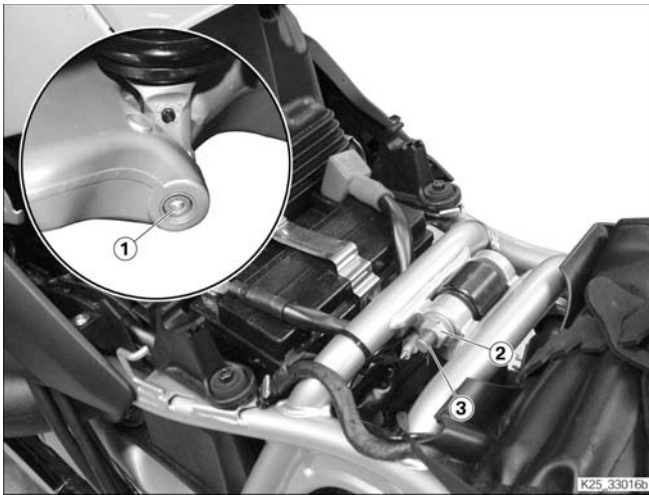
- Remove screw (1).
- Disconnect plug (2).
- Ease the anti-theft alarm forward to remove.



- Remove the rear mudguard.

(-) Releasing rear spring strut at top

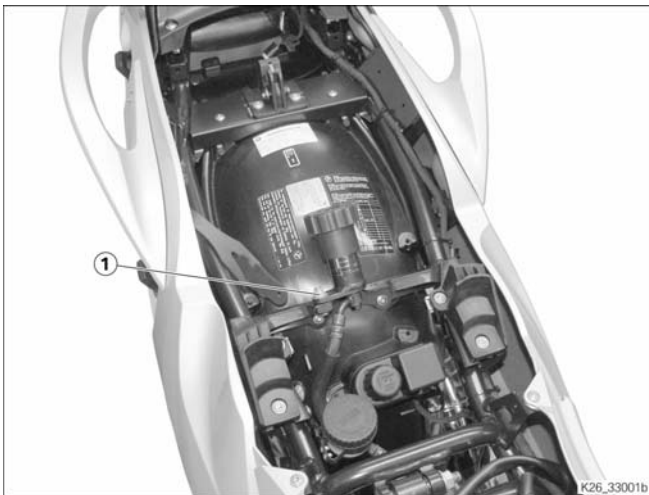
- Remove nut (2).
- Lift the spring strut and remove screw (3).



(-) Removing swinging arm with rear-wheel drive

Variant, not for ESA

- Remove screw (1) and remove the spring-strut adjuster knob.

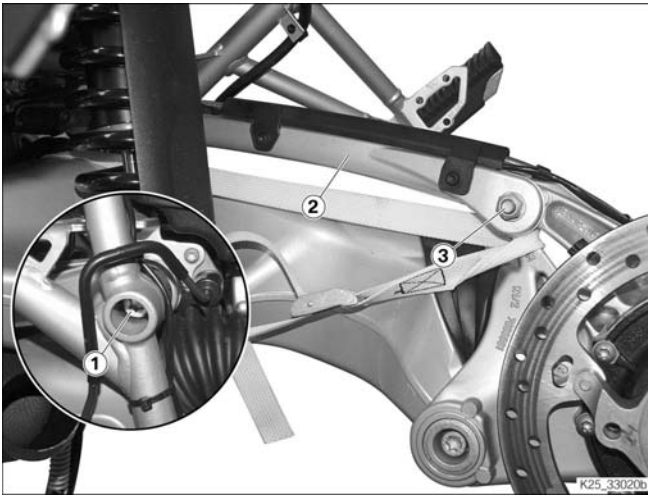


► Releasing Paralever link at rear

- Use a strap to secure the rear-wheel drive so that it



cannot drop.



- Remove nut (3) with washer and bolt.
- Use a cable tie to hold the brake caliper up and let it dangle at the rear frame.

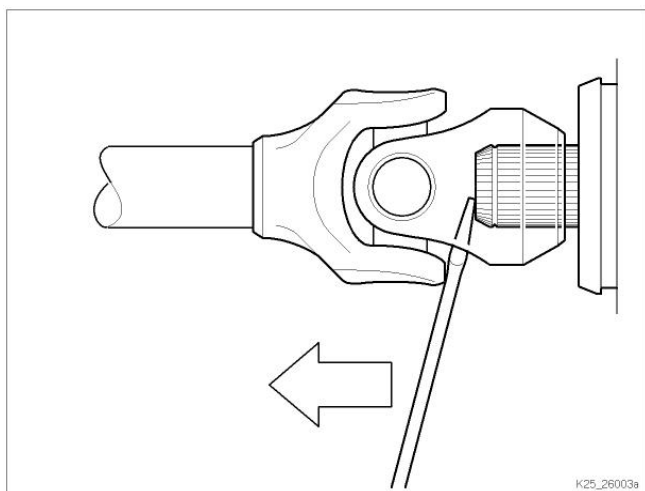


► **Pressing universal shaft off gearbox output shaft**

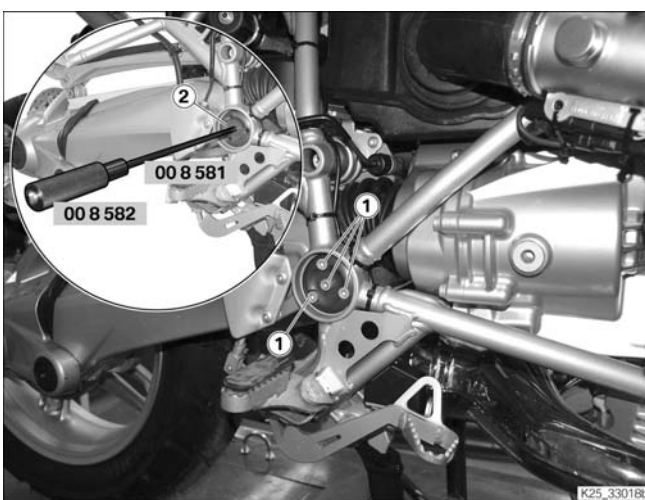


- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.

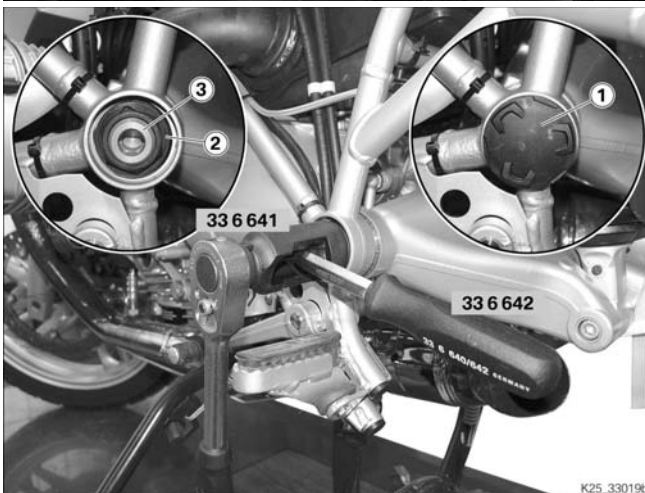
- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the shaft in this position.
- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.

**Note**

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



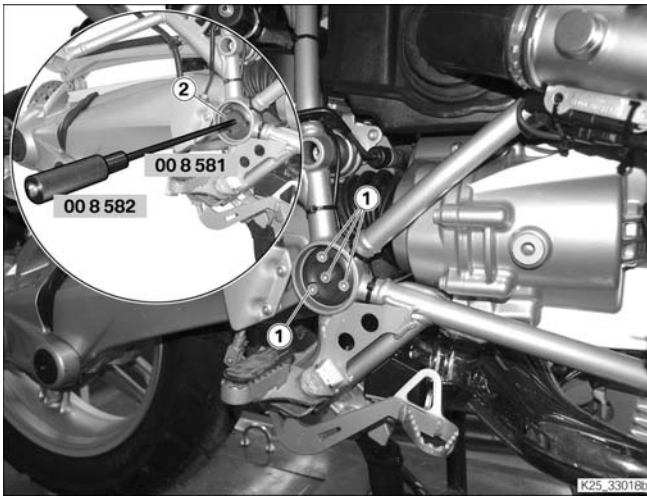
- Remove screws (1).



- Remove cap (1).
- Slacken locknut (2) with Allen wrench (No. 33 6 642) and special socket wrench insert (No. 33 6 641) .
- Remove bearing stud (3).

- Screw pull rod (No. 00 8 581) with impact weight (No. 00 8 582) into right bearing stud (2).
- Raise the swinging arm and remove the bearing stud.
- Carefully pull the swinging arm with universal shaft, spring strut and rear wheel to the rear, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.

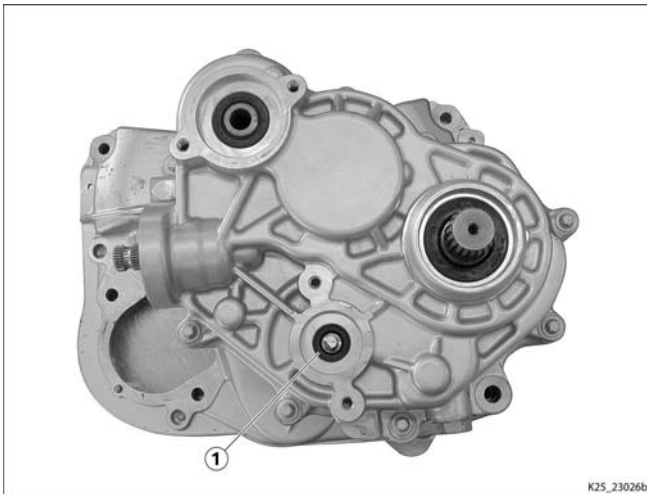
Note



If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

(-) Removing shaft sealing ring of selector drum from housing cover

- Using a suitable tool, carefully remove shaft sealing ring (1).



(-) Installing rotary shaft seal of selector drum in housing cover

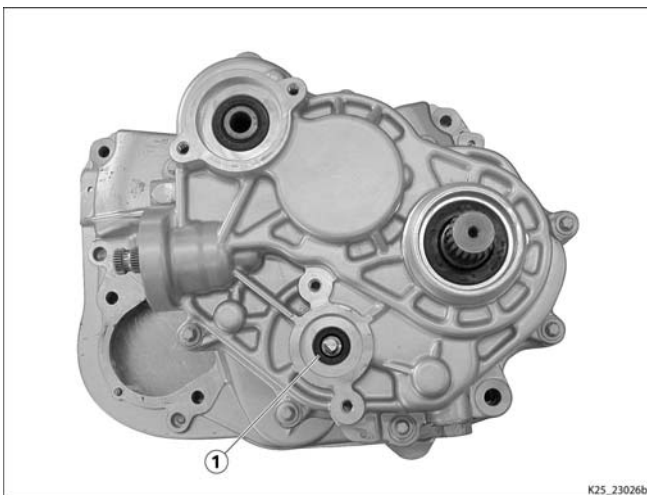
- Clean the bearing bore in the housing.



Note

Lightly oil the sealing lips before installing the shaft sealing rings.

- Install a new shaft sealing ring, using drift (No. 23 4 740).




(-) Filling gearbox with oil to correct level

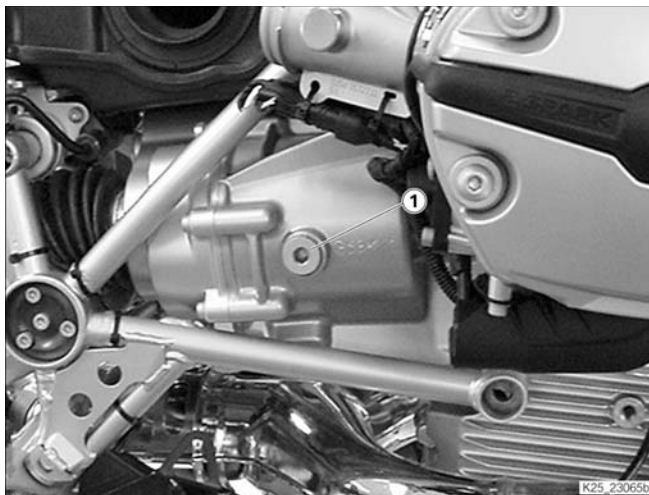
Precondition

- Drain plug is installed.




- Using a funnel of similar instrument, pour the correct quantity of gearbox oil into the gearbox.

 Technical data			
Oil capacity, gearbox	To bottom edge of thread of filler opening	0.9 l	
Consumables/lubricants			
Brand name hypoid-gear lubricant SAE 90 API GL 5			



- Fit a new sealing ring to oil filler plug (1) and install and tighten the plug.

 Tightening torques		
Oil filler plug, gearbox	30 Nm	

(-) Installing swinging arm with rear-wheel drive

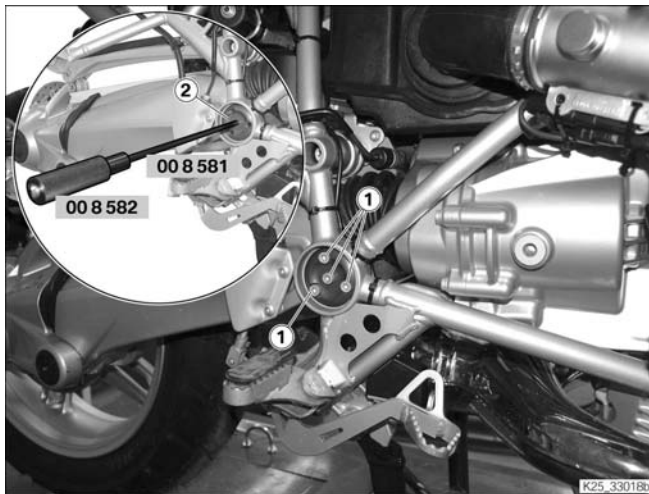
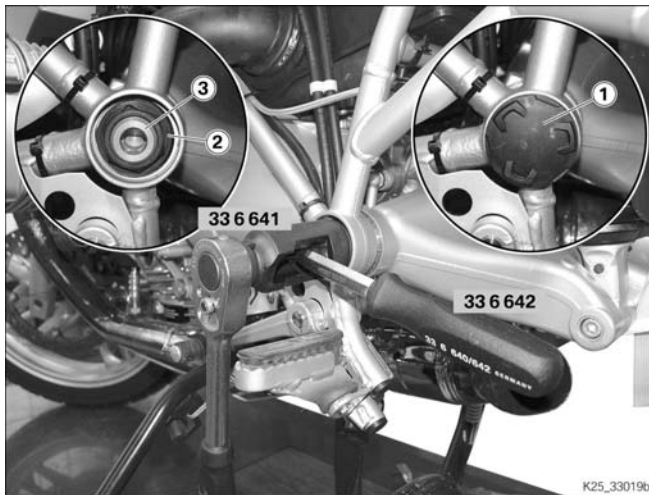
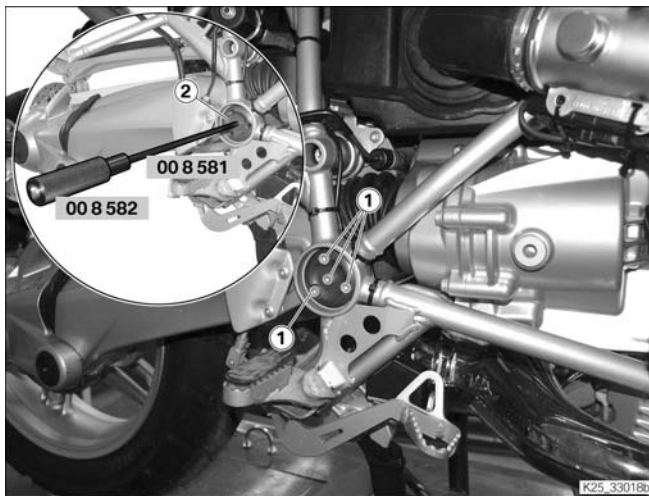
- Carefully manoeuvre the swinging arm with universal shaft, spring strut and rear wheel into position from the rear and slide the universal shaft onto the gearbox output shaft.



Note


If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

- Slide the link into the mount on the frame, noting the thrust washers on left and right on the pivot bearing.
- Lift the swinging arm and install bearing stud (2).




- Align the swinging arm and install bearing stud (3).

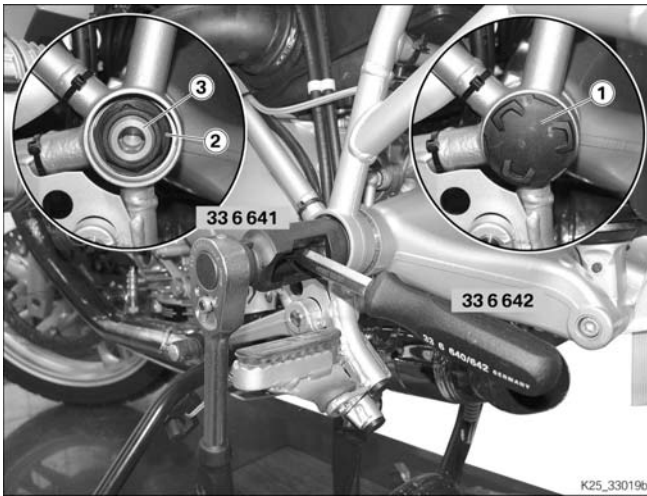
- Install screws (1).


 Tightening torques		
Swinging arm to main frame, right, M6	9 Nm	

- Tighten bearing stud (3).

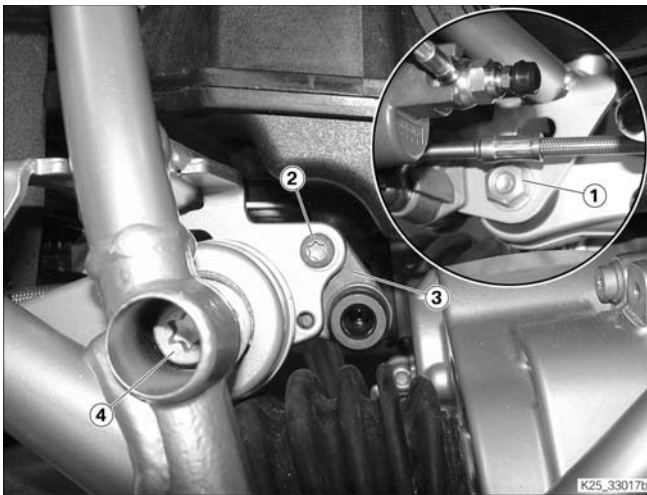
 Tightening torques		
Bearing stud, swinging arm to main frame, left, M24 x 1.25	7 Nm	

- Tighten locknut (2) with Allen wrench (No. 33 6 642) and special socket wrench insert (No. 33 6 641).




 Tightening torques		
Lock nut, swinging arm to main frame, left, M24 x 1.25	145 Nm	

- Install cap (1).




► **Installing Paralever link at front**

- Introduce the link into the rear frame and align it.
- Install screw (4) in the frame.
- Install nut (1).

 Tightening torques		
Reaction link to frame, M10 x 55-10.9, Replace nut	42 Nm	

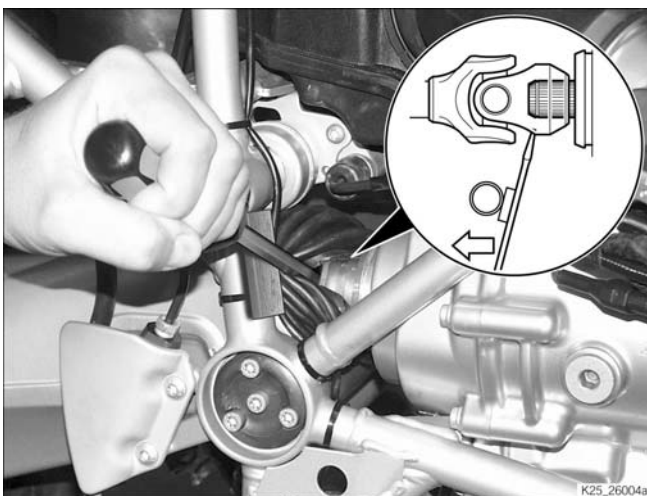
- Hold connector (3) in position and secure it with screw (2).

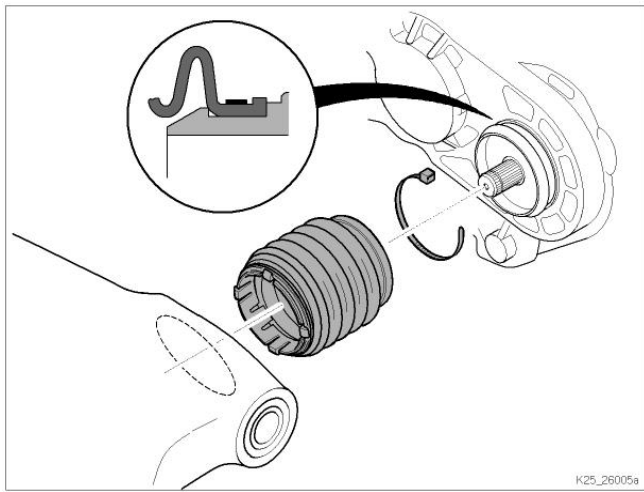
 Tightening torques		
Connecting piece to rear frame, M6 x 16	8 Nm	



► **Pressing universal shaft onto gearbox output shaft**

- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.





- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.



Consumables/lubricants

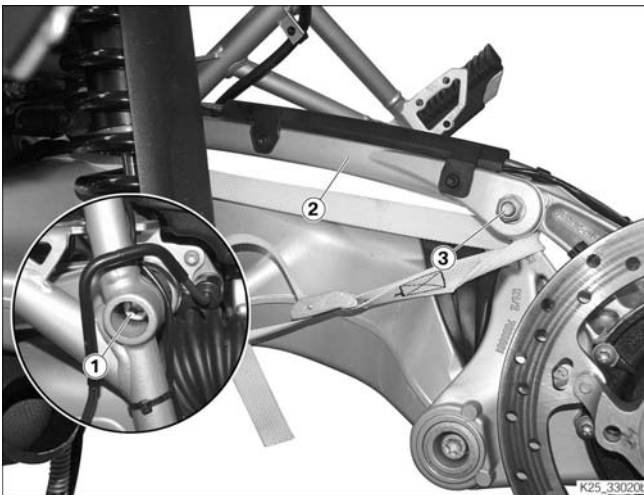
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174
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- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.



▶ Installing Paralever link at rear

- Release the brake caliper from the rear frame.
- Introduce link (2) into the rear-wheel drive and align it.
- Push the stud through toward the motorcycle side and tighten nut (3).



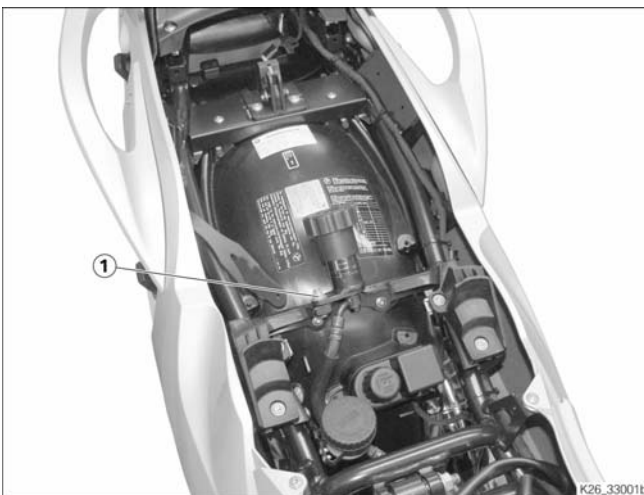
Tightening torques

Link to final drive housing, M10 x 55, Replace nut	43 Nm	
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Variant, not for ESA

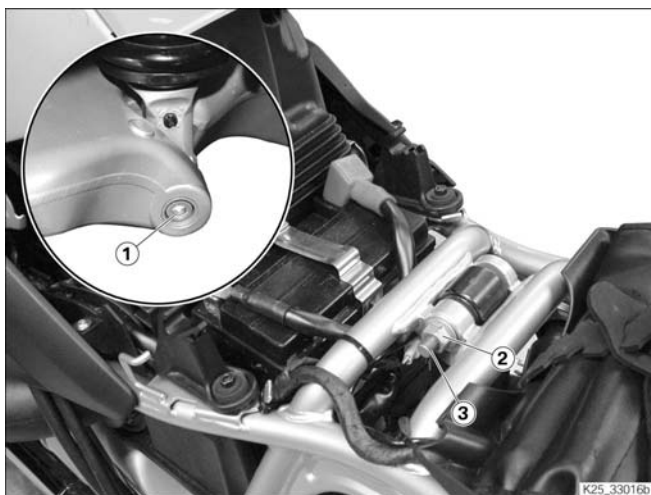
- Secure the adjuster knob to the holder with screw (1).



(-) Securing rear spring strut at top

- Hold the spring strut in position and install screw (3).
- Install **new** nut (2) and tighten.





Tightening torques

Spring strut to main frame, M10 x 1.25, Replace nut Mechanical thread lock	50 Nm	
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(-) Installing rear mudguard

- Install the rear mudguard.

Variant, Anti-theft alarm

▶ Installing control unit for anti-theft alarm

- Push anti-theft alarm (3) into the guides from the front.
- Install screw (1).
- Connect plug (2).

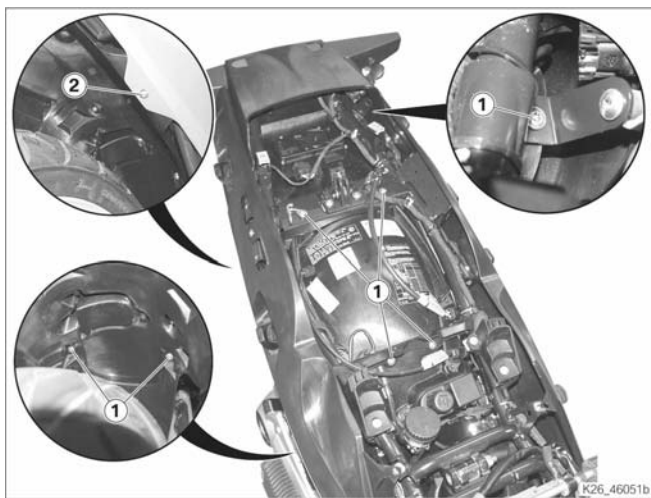


Variant, On-board computer

- Connect plug (1).



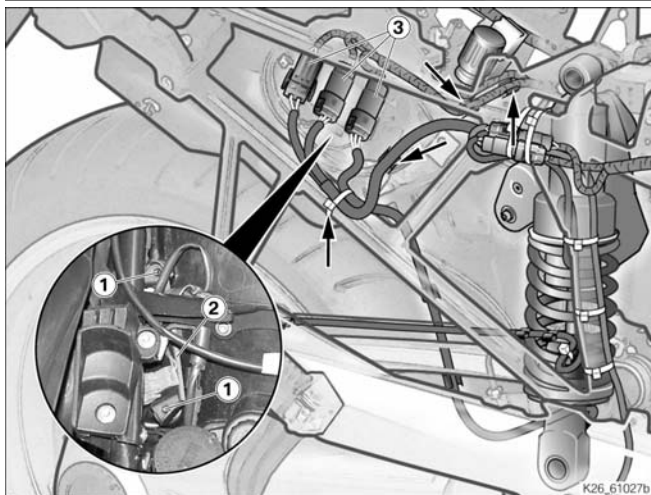
- Install screws (2) on left and right.
- Install screws (1).



K26_46051b

Variant, ESA

- Fit bracket (2) in position.
- Install screws (1).



K26_61027b

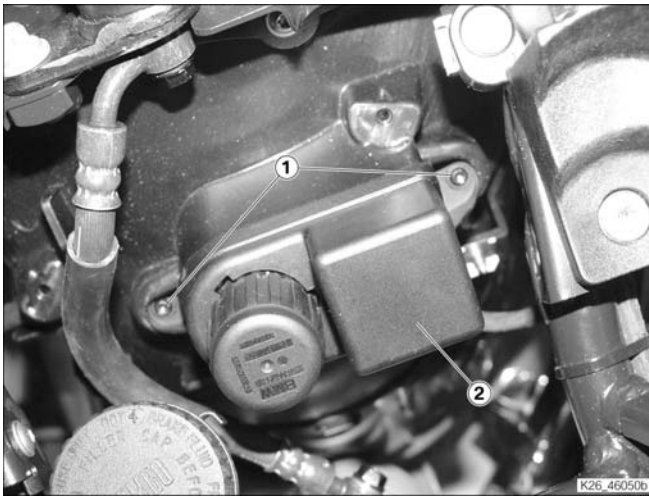
Variant, Seat heating

- Fit bracket (2) in position.
- Install screws (1).



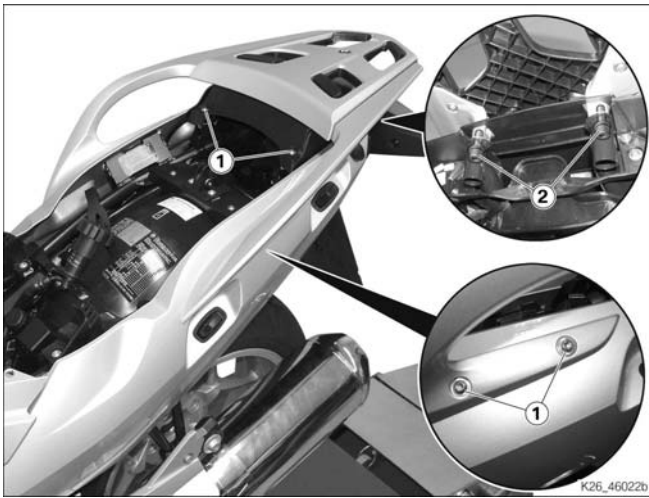
K26_61030b


- Install bracket for diagnosis plug (2).
- Install screws (1).




(-) Installing luggage carrier

- Place luggage rack in position.
- Install new screws (1).



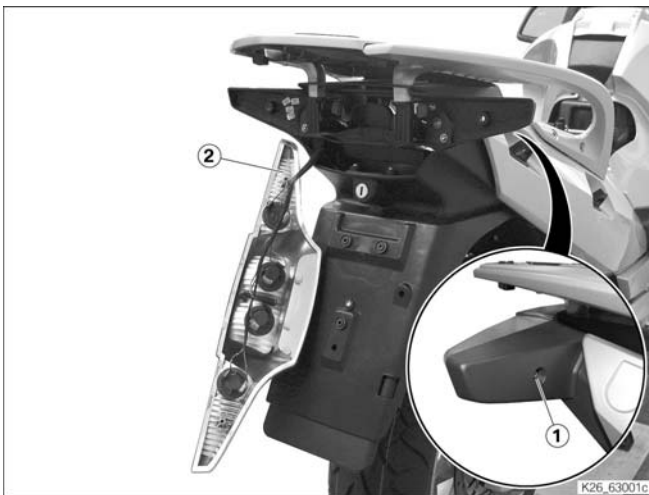
 Tightening torques		
Luggage rack, centre to rear section of frame, M6 x 35, Replace screws Micro-encapsulated	8 Nm	

- Install new screws (2) at rear left and right.

 Tightening torques		
Luggage rack from below to rear section of frame, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

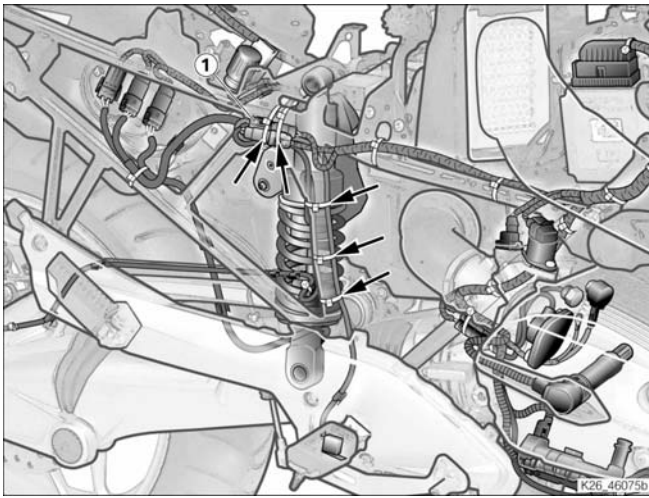
(-) Securing rear light unit

- Hold the rear light unit (2) in position.
- Install screws (1).

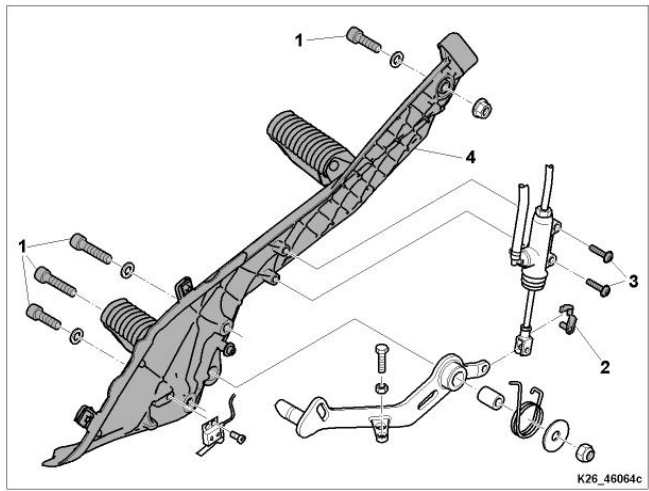


(-) Installing right footrest plate


- Thread through cable at frame and secure with cable




ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

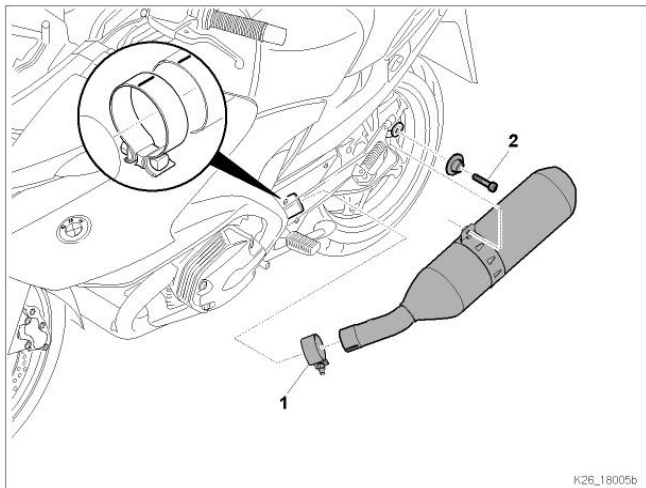
 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	


- Install screws (1) holding bottom section of fairing.






(-) Installing silencer

- Grease the inner face of Torca clamp (1).


 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

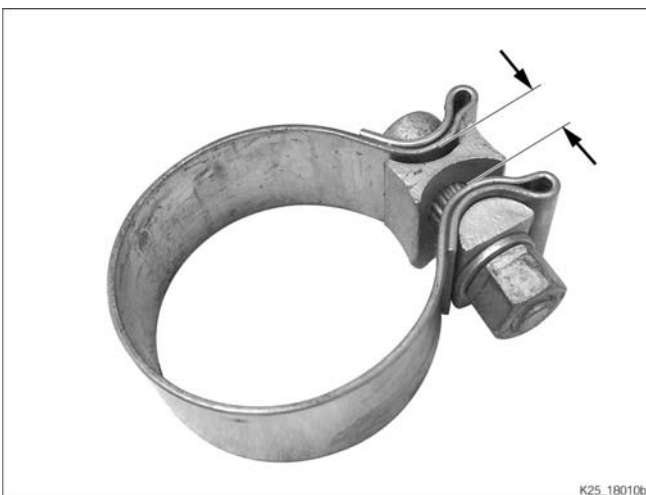
- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 <p>Tightening torques</p>		
End silencer to footrest support, M8	19 Nm	



- Align Torca clamp to marks (1) and secure hand-tight.

 <p>Tightening torques</p>		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




► Checking Torca clamp on silencer

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 <p>Tightening torques</p>		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final

torque is applied.

Measure:

- Replace the Torca clamp.




▶ **Checking distance between silencer and rear wheel**

Test

- Check distance (arrows) between silencer and rear wheel.



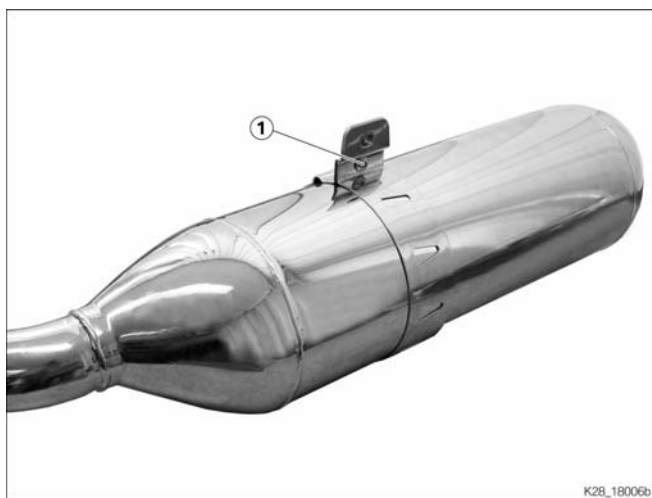
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.

- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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Checking Torca clamp on silencer

- Tighten the Torca clamp.

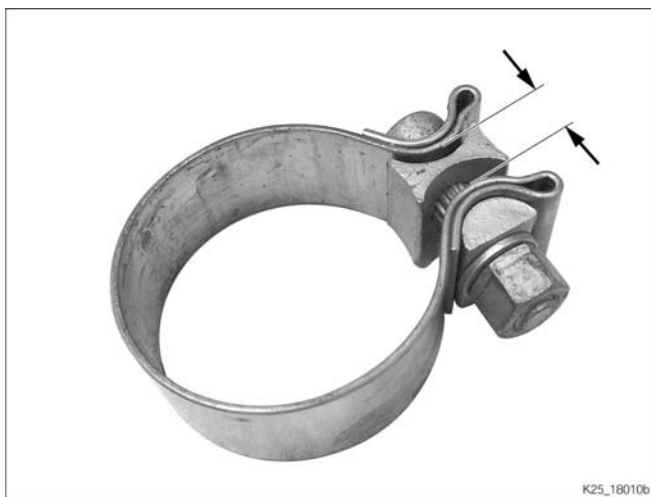
Test

- Check that a gap is visible at the clamp seat before final torque is applied.



Tightening torques

Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	
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K25_18010b

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.

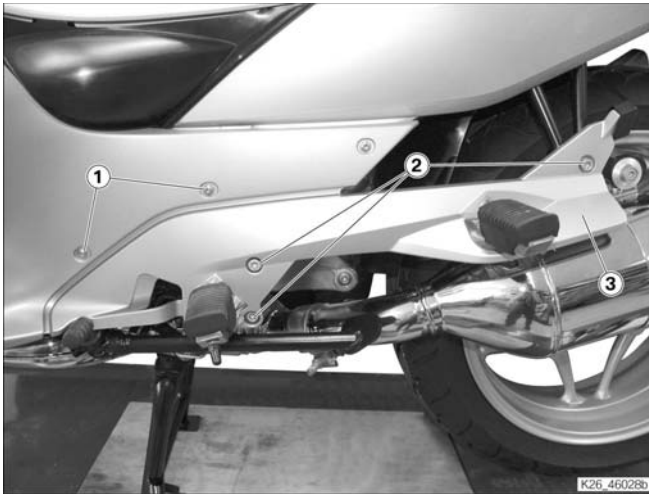


Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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K26_18001b



◀
(-) Installing left footrest plate

- Install footrest plate (3).
- Install screws (2).

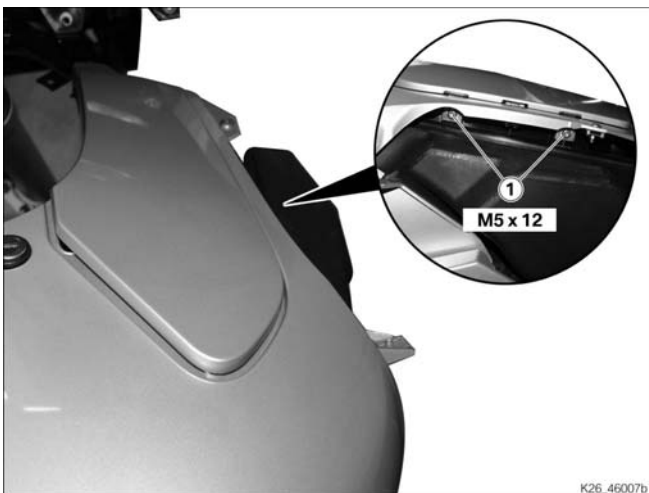
 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

- Install screws (1).



(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **23 12 111 Replacing shaft sealing ring of foot-operated selector shaft**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



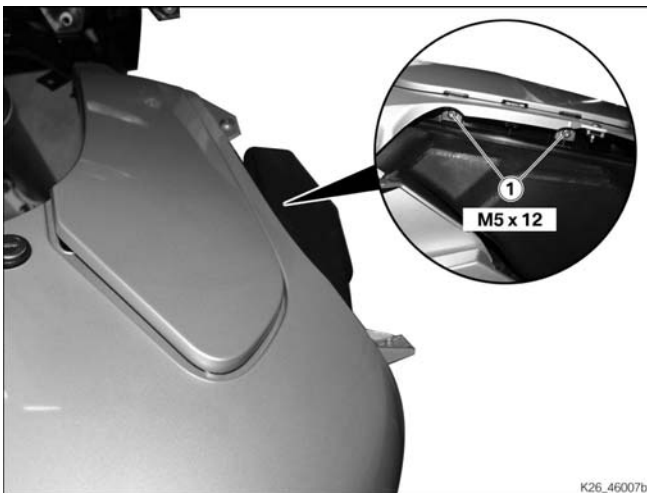
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



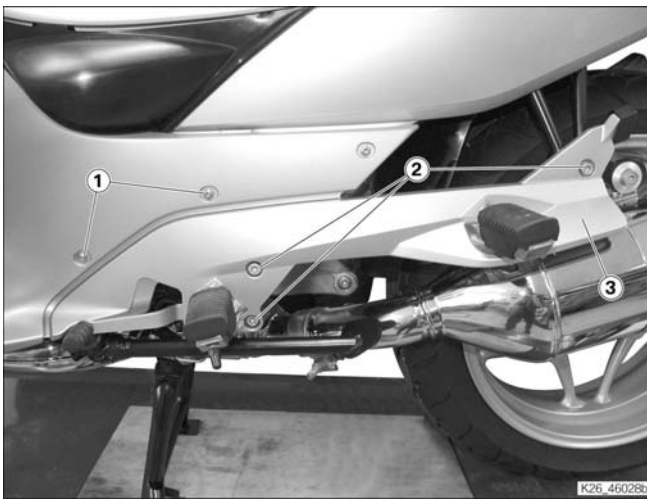
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



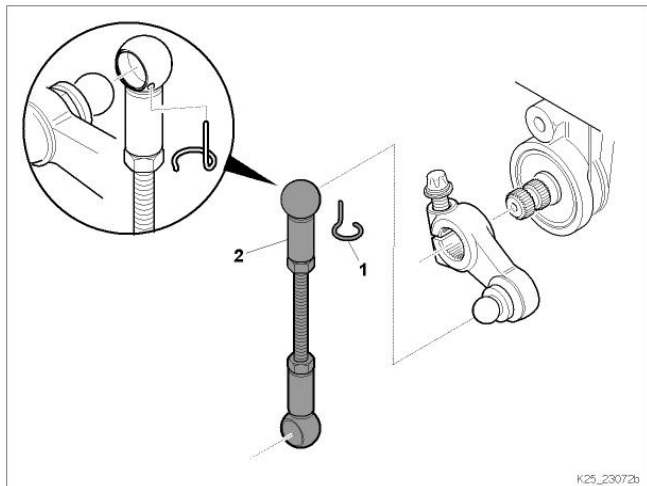
(-) Removing left footrest plate

- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.



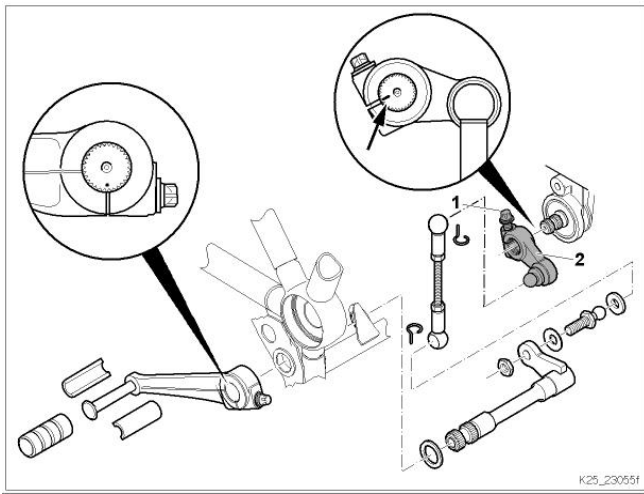
(-) Disengaging selector rod from shift lever

- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.



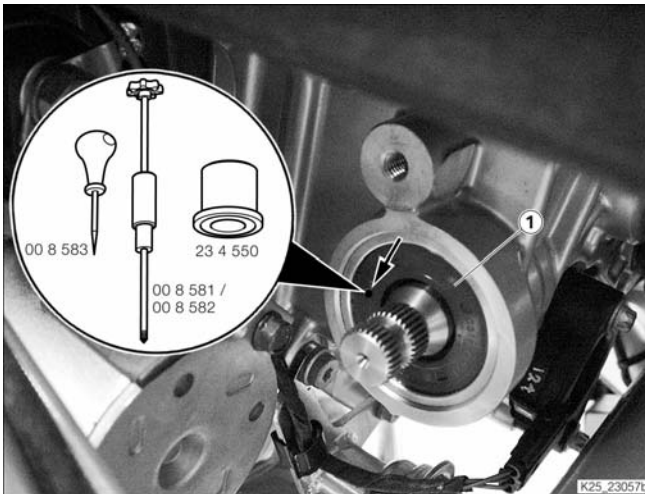
(-) Removing shift lever from selector shaft

- Remove screw (1) from the shift lever.
- Pull shift lever (2) off the selector shaft.



(-) Removing shaft sealing ring of selector shaft from housing cover

- Shaft sealing ring (1) has to be pierced with mandrel (No. 00 8 583) at the position as indicated (arrow), in order to avoid damaging the housing.
- Remove shaft sealing ring (1) with puller (No. 00 8 581), (No. 00 8 582).



(-) Installing shaft sealing ring of selector shaft in housing cover

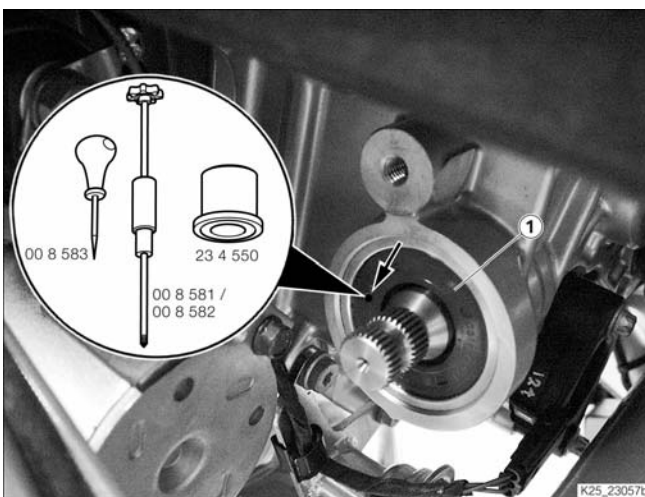
- Clean the bearing bore in the housing.



Note

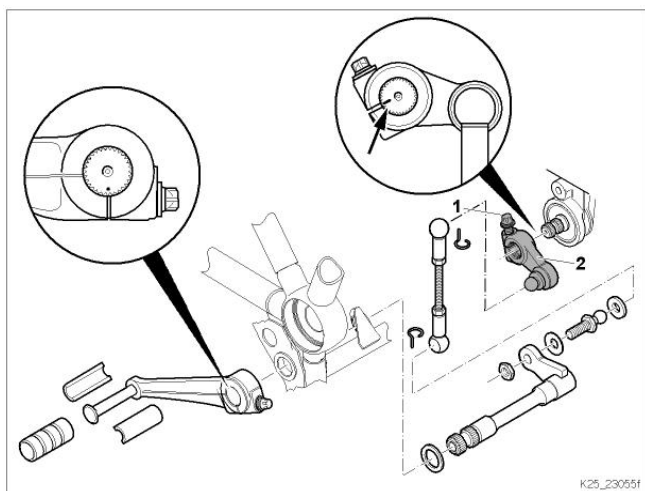
Lightly oil the sealing lips before installing the shaft sealing rings.

- Install a new shaft sealing ring, using drift (No. 23 4 550).




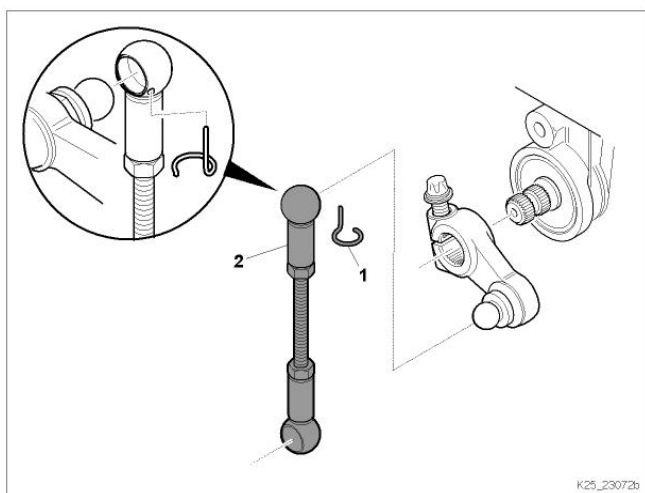
(-) Connecting shift lever to selector shaft

- Position shift lever (2) on the selector shaft.
- Make sure that the mark (arrow) is aligned with the gap on the shift lever.




- Install screw (1) in the selector shaft.

 Tightening torques		
Selector lever to selector shaft, M6 x 25	8 Nm	

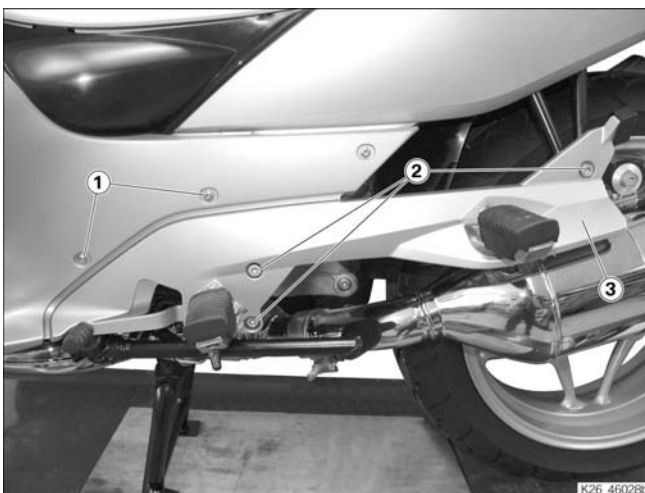


(-) Securing selector rod to shift lever

- Grease the ball head of the shift lever and the ball socket of selector rod (2).


 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).



(-) Installing left footrest plate

- Install footrest plate (3).
- Install screws (2).

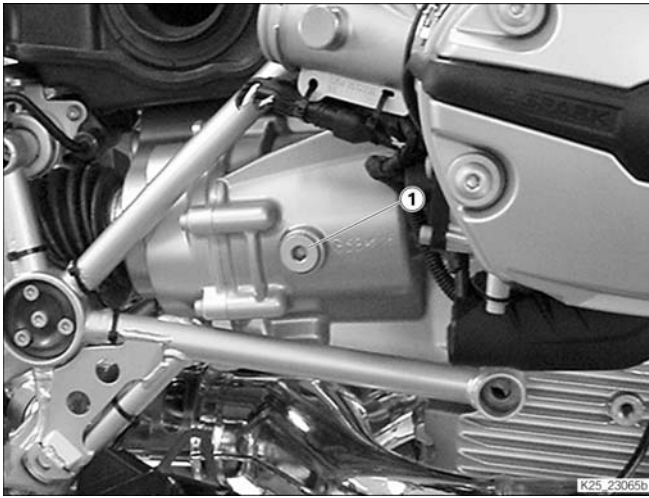
 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

- Install screws (1).

(-) Checking gearbox oil level

- Remove filler plug (1).
- Cut off the old sealing ring and dispose of it in an environmentally friendly manner.

Test



Technical data

Oil level, gearbox		to bottom edge of thread of filler screw	
--------------------	--	--	--

Result: Level is not correct.

Measure:

- Top up the gearbox oil to the specified level.
- Fit a new sealing ring to oil filler plug (1) and install and tighten the plug.



Tightening torques

Oil filler plug, gearbox	30 Nm	
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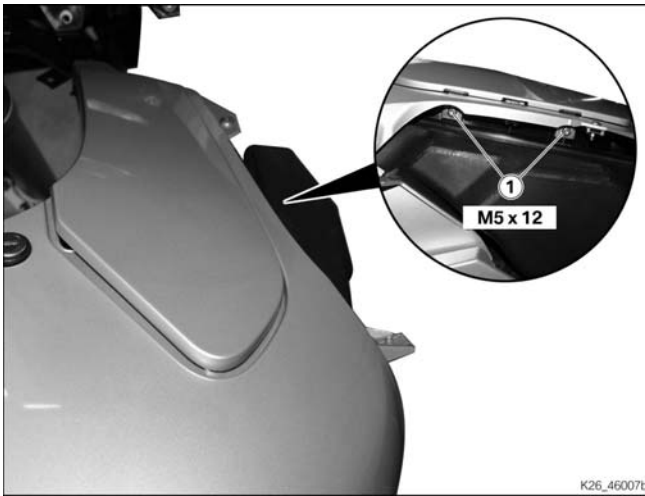
(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

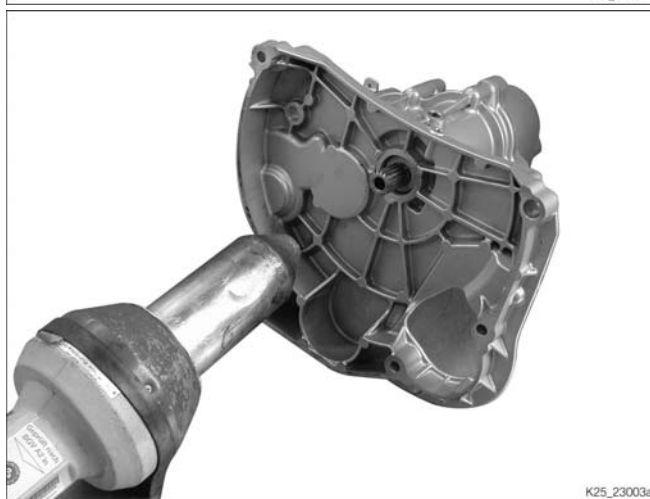
📁 23 12 640 Replacing bearings of all gearbox shafts (gearbox removed)


(-) Removing gearbox housing

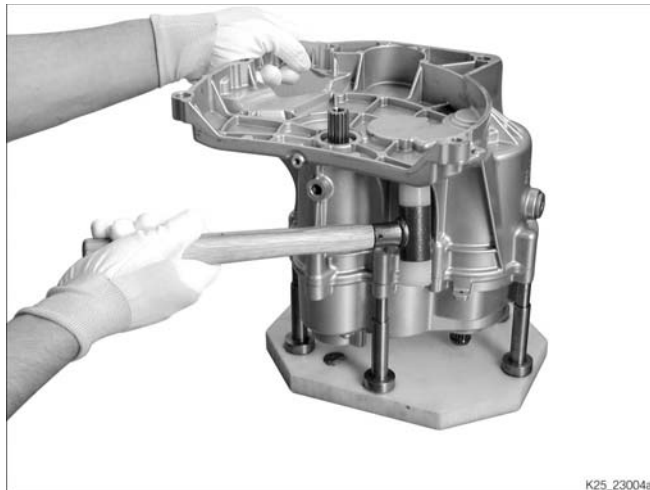
- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



- Heat the bearing seats in the gearbox housing.



 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

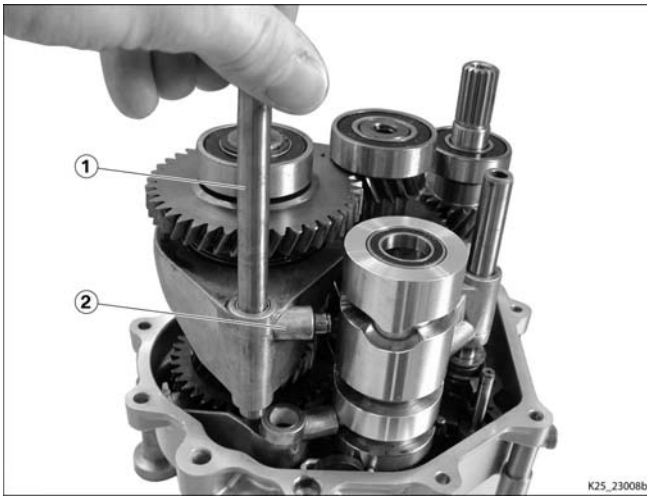
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



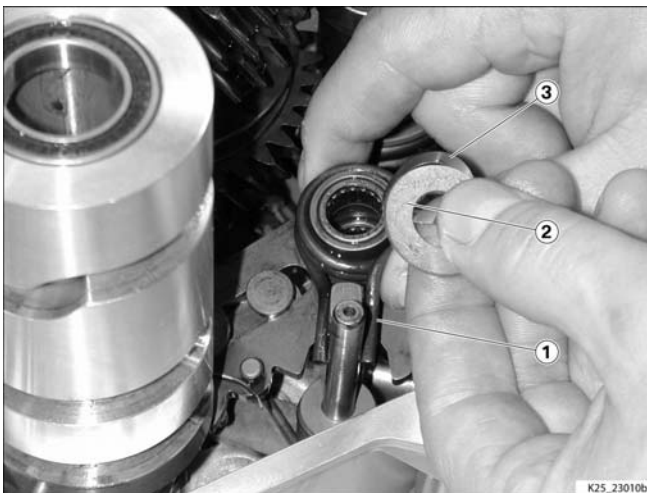
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).

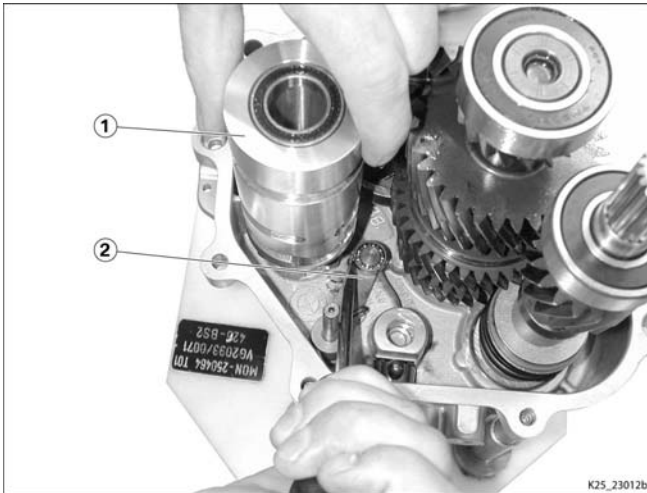


(-) Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.

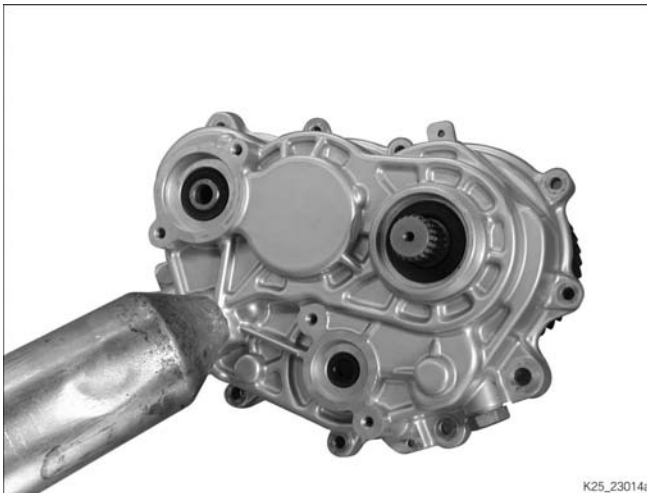


K25_23011b



K25_23012b

- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



K25_23014a

(-) Removing gearbox shafts

- Remove the housing cover with gear set from gearbox adapter (No. 23 1 661) (No. 23 1 662) and carefully lay it on its side.



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

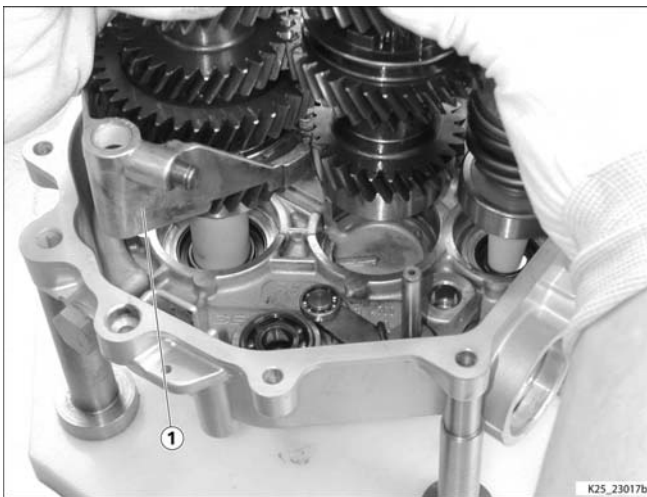
Release temperature, gearbox housing		100 - 120 °C	
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- Remove input shaft (1) with intermediate shaft (2) and output shaft (3) together from the housing cover.



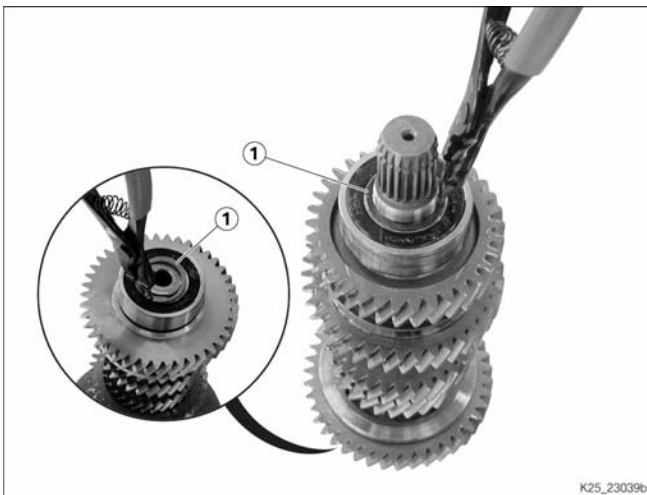
(-) Removing selector fork, 2nd/3rd gears

- Remove selector fork (1) for 2nd/3rd gears.

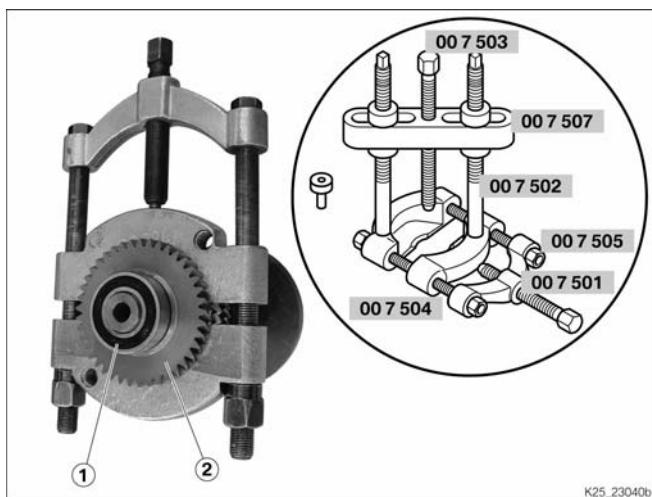


(-) Removing grooved ball bearing of output shaft (bearing end)

- Remove circlip (1) in front of shaft bearing.

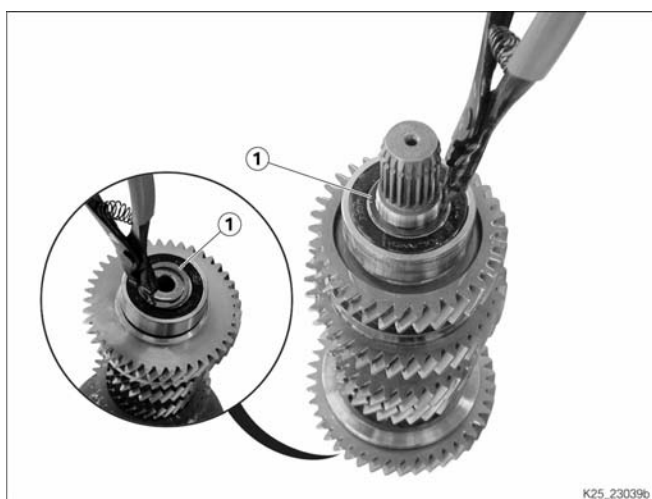


- Pull off grooved ball bearing (1) with universal puller (No. 00 7 501), (No. 00 7 502), (No. 00 7 503), (No. 00 7 504), (No. 00 7 505), (No. 00 7 506) together with gear shift wheel for 1st gear (2).

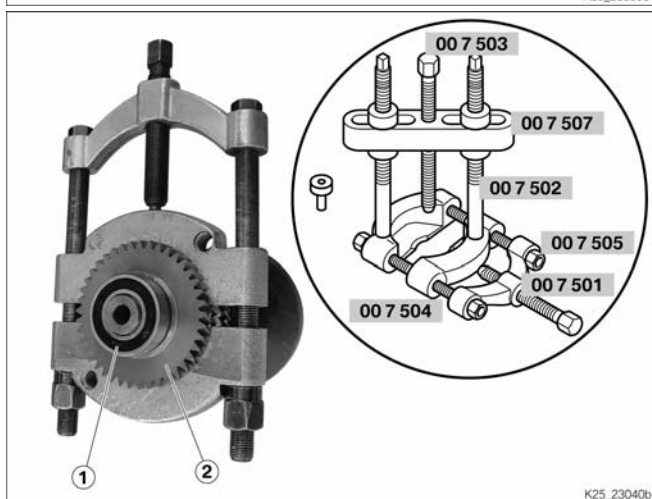


(-) Removing grooved ball bearing of output shaft (output splines)

- Remove circlip (1) in front of shaft bearing.

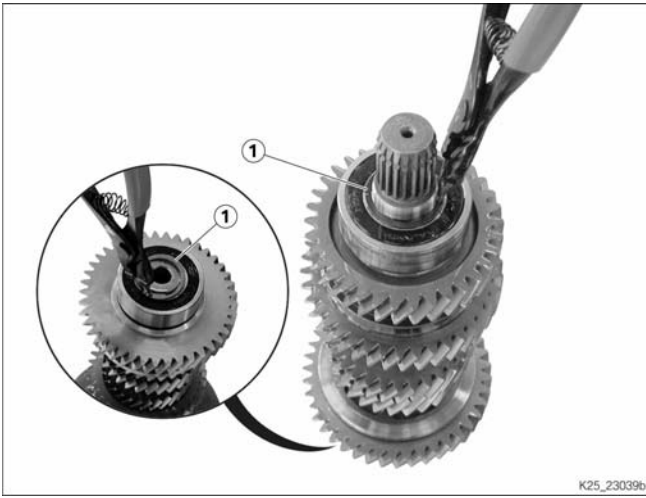


- Pull off grooved ball bearing (1) with universal puller (No. 00 7 501), (No. 00 7 502), (No. 00 7 503), (No. 00 7 504), (No. 00 7 505), (No. 00 7 506) together with gear shift wheel for 3rd gear (2).

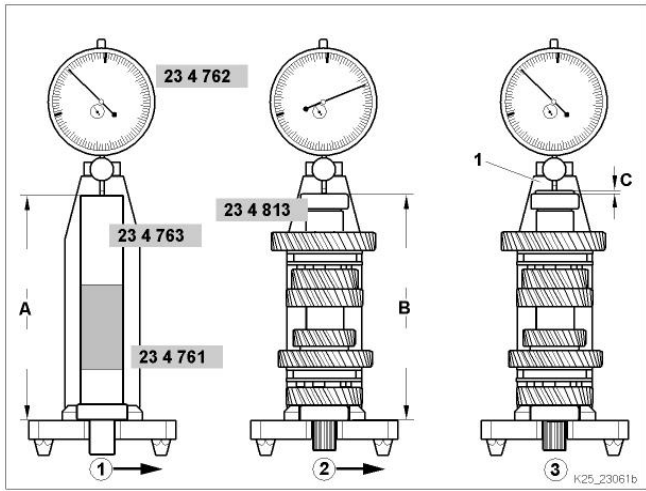


(-) Installing grooved ball bearing of output shaft (bearing end)

- Press the grooved ball bearing onto the output shaft.
- Calculate the thickness of circlip (1); the circlip must fit snugly in the groove.
- Install new circlip (1) in front of the shaft bearing, making sure that it is seated correctly.



(-) Installing grooved ball bearing of output shaft (output splines)




► Measuring fully assembled length of output shaft

- Place zero gauge (No. 23 4 763) in the measuring stand.
- Install dial gauge (No. 23 4 762) in the rear locating bore in measuring stand (No. 23 4 761) and set to preload.
- Using the dial gauge, zero to distance (A) of zero gauge (No. 23 4 763) .
- Remove zero gauge (No. 23 4 763) from the measuring stand.
- Mount measuring disc (No. 23 4 813) on the output shaft.
- Lay the grooved ball bearing on measuring disc (No. 23 4 813) .
- Place the output shaft in measuring stand (No. 23 4 761) .
- Use dial gauge (No. 23 4 762) to measure deviation from zero of distance (B) at the bearing race.
- The deviation from zero equals the thickness (C) of shim (1).
- Place shim (1) of correct thickness on the bearing race.

Test

- Check deviation from zero.

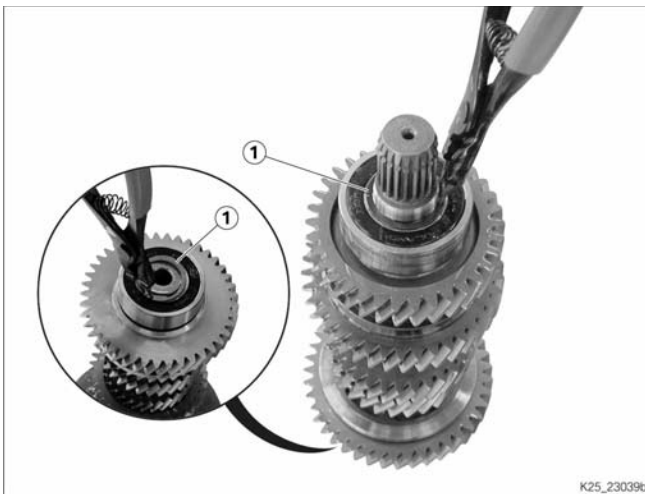
 Technical data			
Deviation from zero of the gearbox shafts Value definition: Only if the appropriate zero gauge is		0 - -0.05 mm	

used			
Fully assembled length of gearbox output shaft		182.64 - 182.69 mm	
Value definition: Overall length			

Result: Deviation from zero is greater than maximum permissible value.

Measure:

- Check needle roller bearings, backup washers, shims and gear shift wheel for wear and replace parts as necessary.
- Remove the output shaft from measuring stand (No. 23 4 761) .
- Remove measuring disc (No. 23 4 813) with shim (1) and grooved ball bearing.



- Press on the grooved ball bearing together with a thrust washer of the correct thickness.
- Calculate the thickness of circlip (1); the circlip must fit snugly in the groove.
- Install new circlip (1) in front of the shaft bearing, making sure that it is seated correctly.

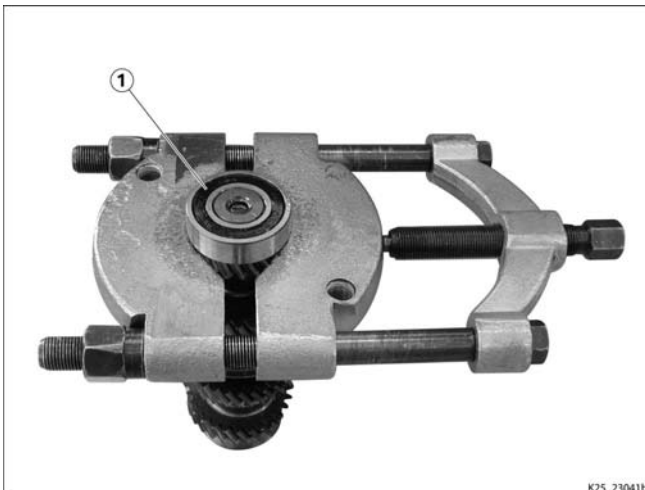
(-) Removing grooved ball bearings of intermediate shaft

- Remove both grooved ball bearings (1) using universal puller (No. 00 7 501) , (No. 00 7 502) , (No. 00 7 503) , (No. 00 7 504) , (No. 00 7 505) , (No. 00 7 506) .

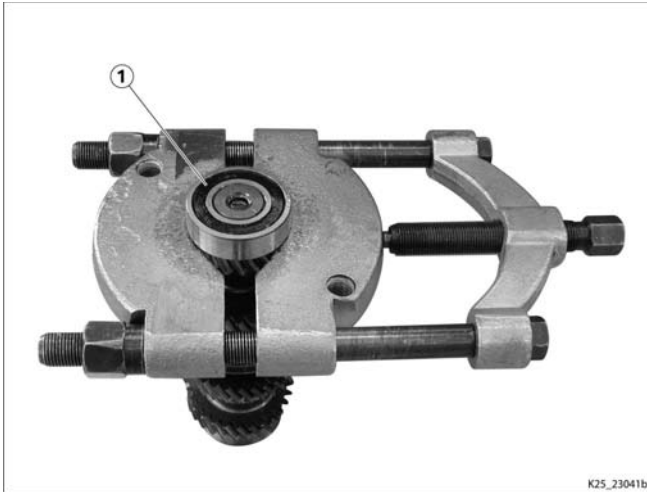


Note

Do not attempt to disassemble the intermediate shaft past removal of the grooved ball bearings using conventional tools; if replacement is necessary the shaft must be replaced as a complete unit.

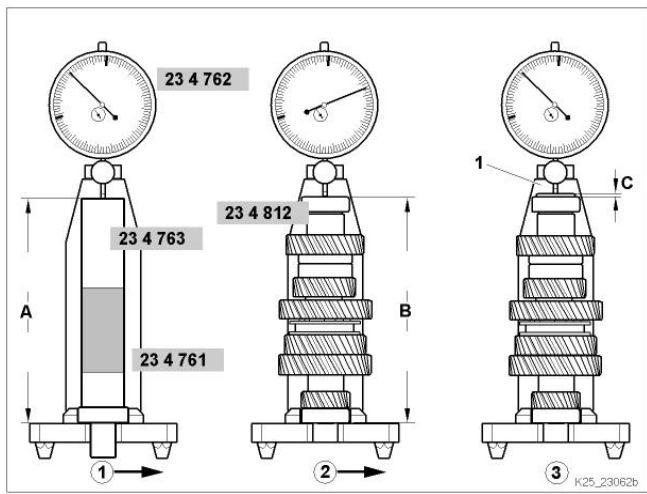


(-) Installing grooved ball bearings of



intermediate shaft

- Press input-end grooved ball bearing (1) onto the intermediate shaft.




► Measuring fully assembled length of intermediate shaft

- Place zero gauge (No. 23 4 763) in the measuring stand.
- Install dial gauge (No. 23 4 762) in the rear locating bore in measuring stand (No. 23 4 761) and set to preload.
- Using the dial gauge, zero to distance (A) of zero gauge (No. 23 4 763) .
- Remove zero gauge (No. 23 4 763) from the measuring stand.
- Mount measuring disc (No. 23 4 812) on the output shaft.
- Lay the grooved ball bearing on measuring disc (No. 23 4 812) .
- Insert the intermediate shaft into measuring stand (No. 23 4 761) .
- Use dial gauge (No. 23 4 762) to measure deviation from zero of distance (B) at the bearing race.
- The deviation from zero equals the thickness (C) of shim (1).
- Place shim (1) of correct thickness on the bearing race.

Test

- Check deviation from zero.

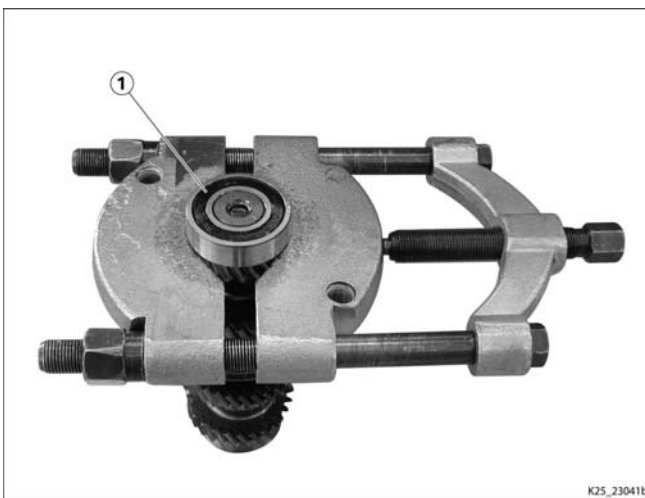
 Technical data			
Deviation from zero of the gearbox shafts Value definition: Only if the appropriate zero gauge is used		0 - -0.05 mm	

Fully assembled length of gearbox intermediate shaft	179.85 - 179.9 mm
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Result: Deviation from zero is greater than maximum permissible value.

Measure:

- Check shims for wear and replace as necessary.
- Remove the intermediate shaft from measuring stand (No. 23 4 761) .
- Remove measuring disc (No. 23 4 812) with shim (1) and grooved ball bearing.



K25_23041b



K25_23042b

- Install shim (1) of correct thickness.
- Press the output-side grooved ball bearing on to the intermediate shaft.

(-) Removing grooved ball bearing of input shaft (input splines)

- Clamp the input shaft into the vice with soft jaws and with the input end facing upwards.
- Remove grooved ball bearing (1) using universal puller (No. 00 7 501) , (No. 00 7 502) , (No. 00 7 503) , (No. 00 7 504) , (No. 00 7 505) , (No. 00 7 506) acting on input end.



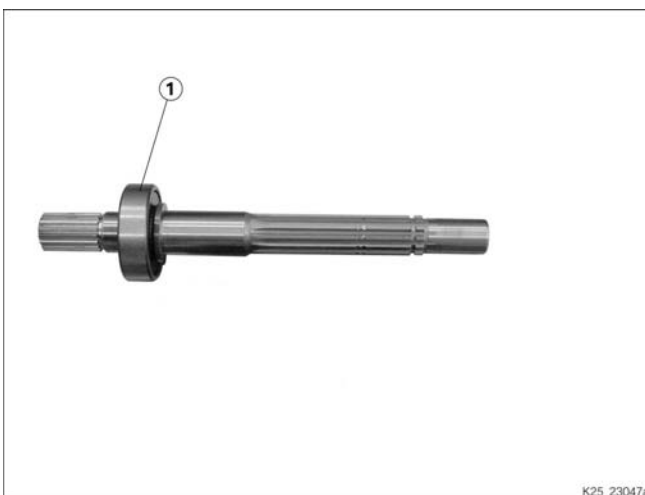
(-) Removing grooved ball bearing of input shaft (bearing end)

- Clamp the input shaft into the vice with soft jaws and with the output end facing upwards.
- Remove grooved ball bearing (1) using universal puller (No. 00 7 501), (No. 00 7 502), (No. 00 7 503), (No. 00 7 504), (No. 00 7 505), (No. 00 7 506) acting on output end.



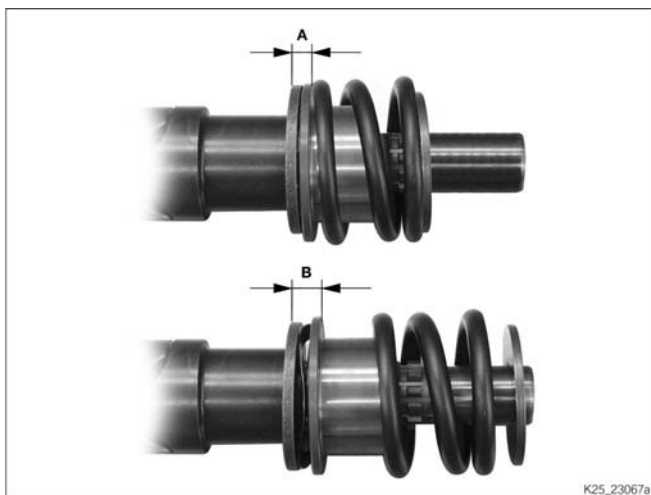
(-) Installing grooved ball bearing of input shaft (input splines)

- Press grooved ball bearing (1) onto the input end of the input shaft.




(-) Installing grooved ball bearing of input shaft (bearing end)

► Checking axial play of spring segment



Test

- Press the sleeve against the spring stop washer and use the dial gauge to measure distance (A).
- Carefully relieve the pressure on the sleeve and use the dial gauge to measure distance (B).
- The difference between A and B equals the axial play of the spring segment.

 Technical data			
Endplay of spring segment at gearbox input shaft	Pre-damper stroke	0.4 - 0.6 mm	
	Damper stroke, total (not measurable)	2.8 - 3.4 mm	

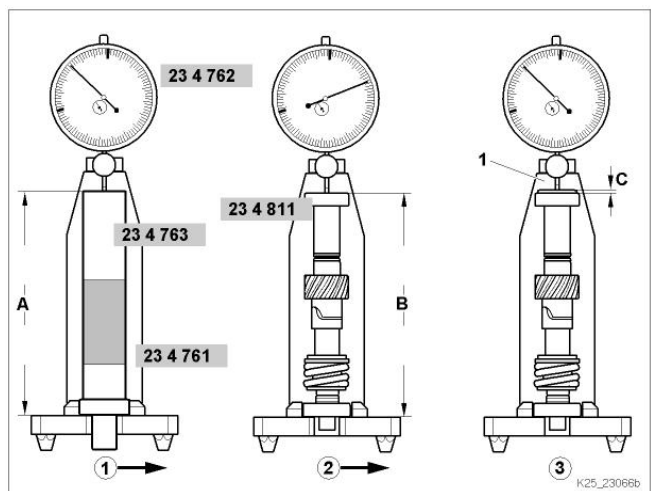
Result: Result is out of tolerance.

Measure:

- Check spring stop washer, spring washer, sleeve and predamper spacer for wear and replace worn parts as necessary.




Measuring fully assembled length of input shaft



- Place zero gauge (No. 23 4 763) in the measuring stand.
- Install dial gauge (No. 23 4 762) in the rear locating bore in measuring stand (No. 23 4 761) and set to preload.
- Using the dial gauge, zero to distance (A) of zero gauge (No. 23 4 763) .
- Remove zero gauge (No. 23 4 763) from the measuring stand.
- Mount measuring disc (No. 23 4 811) on the input shaft.
- Lay the grooved ball bearing on measuring disc (No. 23 4 811) .
- Place the input shaft in measuring stand (No. 23 4 761) .
- Use dial gauge (No. 23 4 762) to measure deviation from zero of distance (B) at the bearing race.
- The deviation from zero equals the thickness (C) of shim (1).
- Place shim (1) of correct thickness on the bearing race.

Test

- Check deviation from zero.

 Technical data			
Deviation from zero of the		0 - -0.05 mm	

gearbox shafts Value definition: Only if the appropriate zero gauge is used			
Fully assembled length of gearbox input shaft		163.1 - 163.15 mm	

Result: Deviation from zero is greater than maximum permissible value.

Measure:

- Check needle roller bearings, backup washers, shims and gear shift wheel for wear and replace parts as necessary.
- Remove the input shaft from measuring stand (No. 23 4 761).
- Remove measuring disc (No. 23 4 811) with shim (1) and grooved ball bearing.



- Install shim (1) of correct thickness.
- Press grooved ball bearing (2) onto the bearing end of the input shaft.



(-) Installing shift fork, 2nd/3rd gears

- Mount selector fork (1) for 2nd/3rd gears on the output shaft.



(-) Installing gearbox shafts

- Install the housing cover in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



Warning

Nature: Heated/hot parts can cause burns.

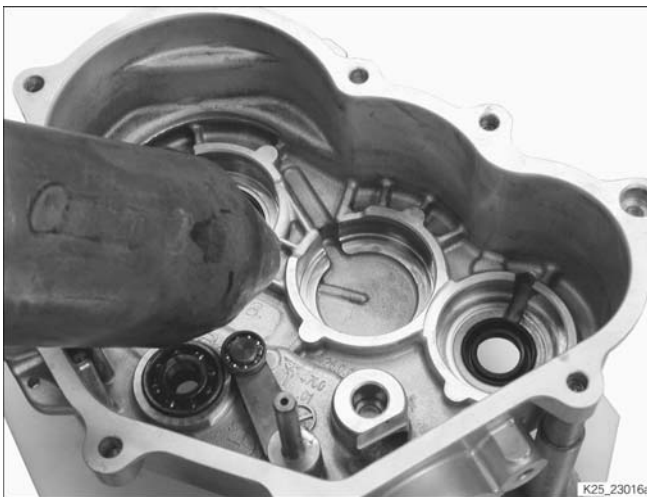
Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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Attention

Nature: Shafts not correctly seated in their guides are subject to accelerated wear.

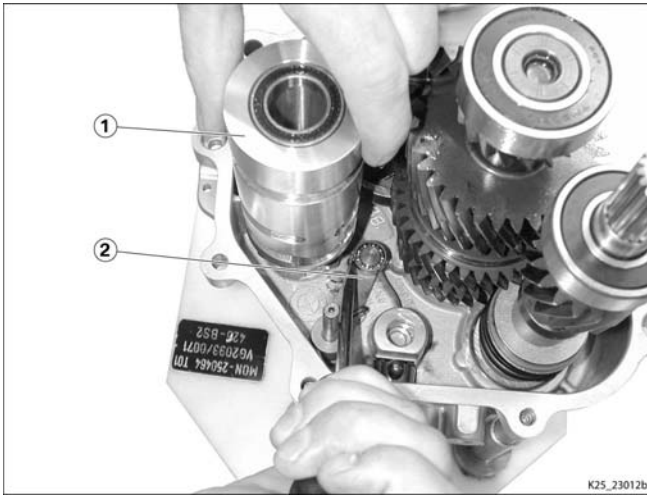
Avoidance: Check that the gearbox shafts are correctly seated.

- Install output shaft (3) with sliding sleeve (No. 23 4 732) , intermediate shaft (2) and input shaft (1) together in the housing cover.



(-) Installing selector drum

- Affix shim (1) to the selector drum with a blob of grease.



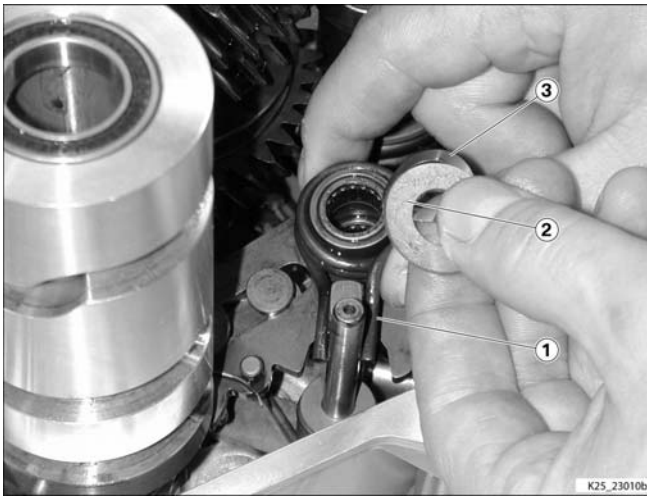
- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.



- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.

(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).



- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



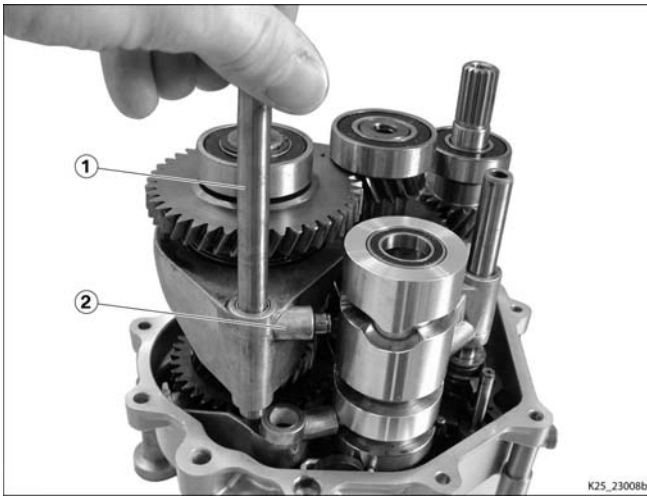
(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.



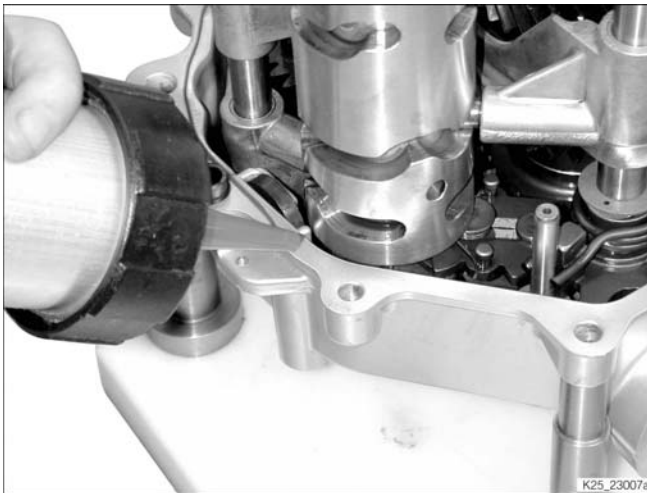
- Clean the sealing face of the gearbox housing.

⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203

Sealing compound

⚠ Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.



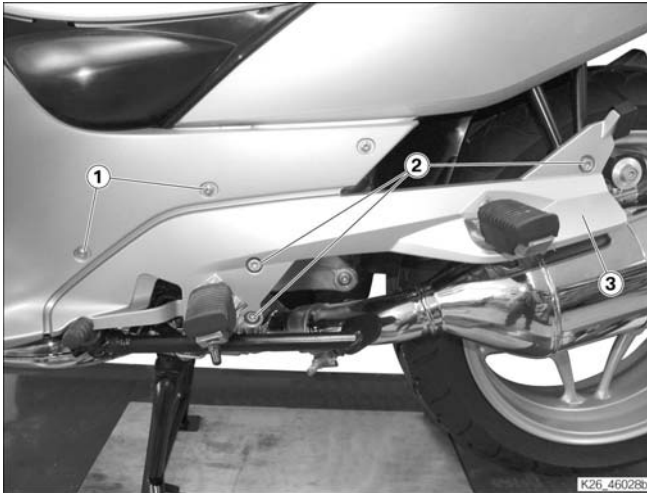
Tightening torques

Gearbox cover to gearbox housing	9 Nm	
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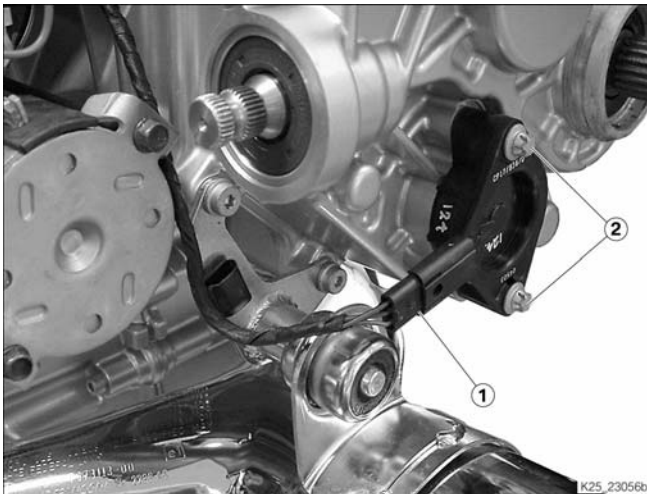
 **23 14 051 Replacing potentiometer for gear indicator**

(-) Removing left footrest plate



- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.


(-) Removing gearbox potentiometer



- Disconnect plug (1) of the gearbox potentiometer.
- Release the cable from the cable clips.
- Remove screws (2) from the gearbox potentiometer.
- Remove the gearbox potentiometer, noting the O-ring.

(-) Installing gearbox potentiometer

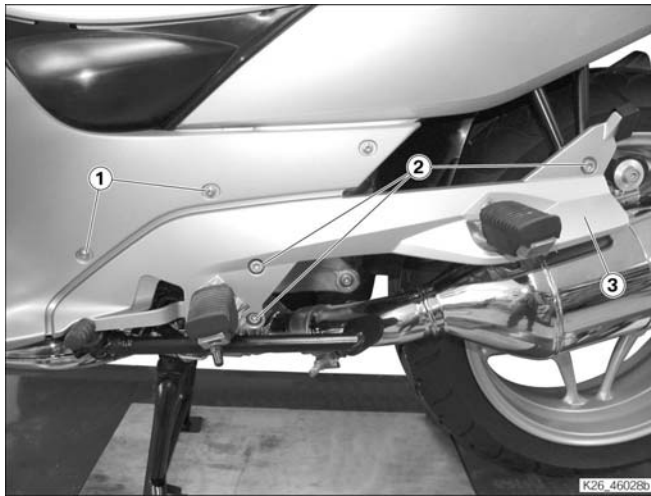
- Install the gearbox potentiometer, noting the O-ring.
- Install screws (2).

 Tightening torques		
Gear potentiometer to gearbox	9 Nm	


- Connect plug (1) to the gearbox potentiometer.
- Clip the cable into the cable clips.

(-) Installing left footrest plate

- Install footrest plate (3).



- Install screws (2).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

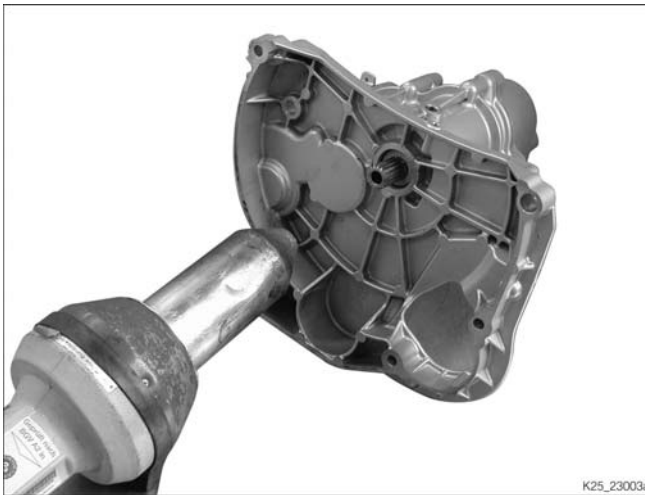
- Install screws (1).

 **23 21 510 Replacing input shaft (gearbox removed)**


(-) Removing gearbox housing

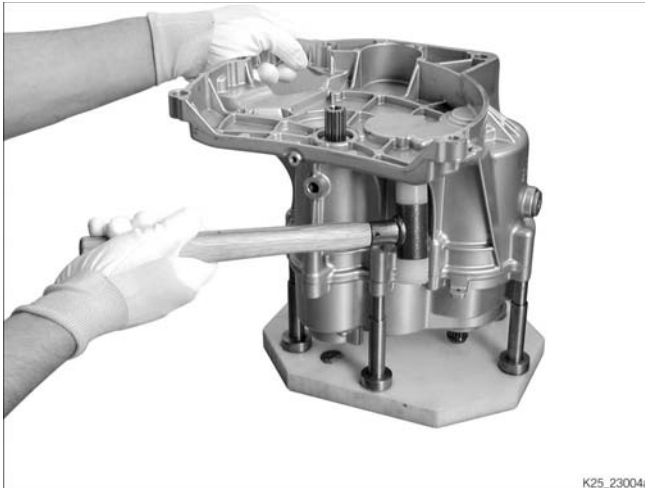


- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

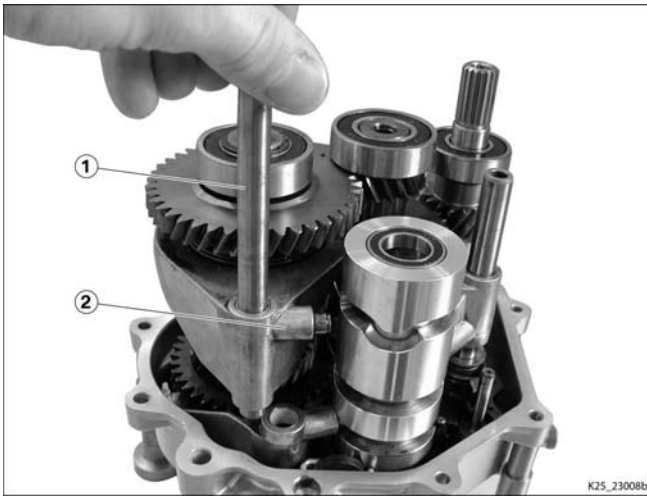
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



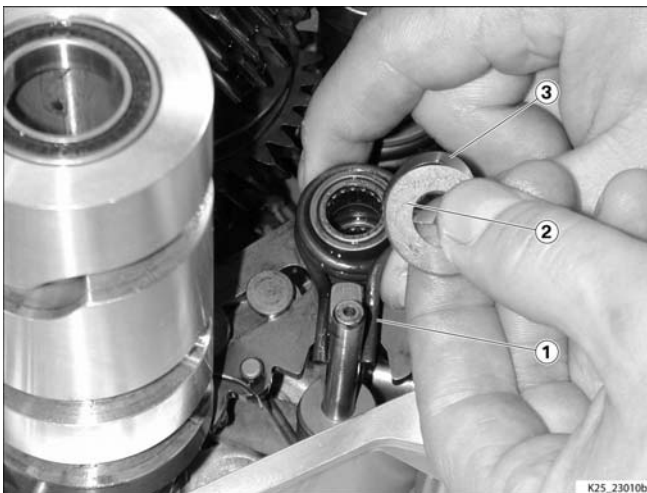
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).

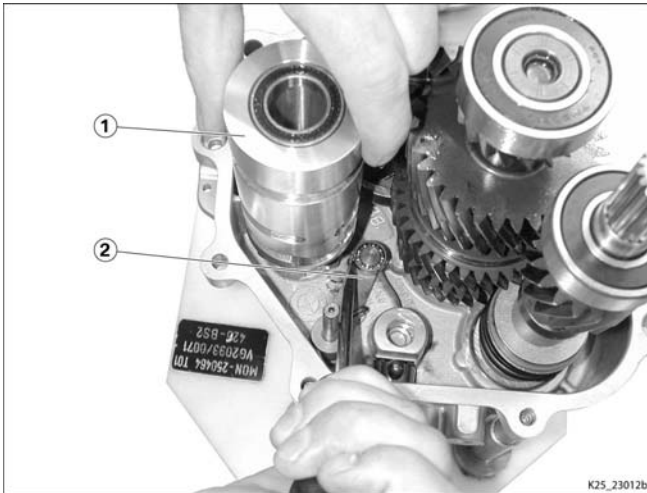


(-) Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.

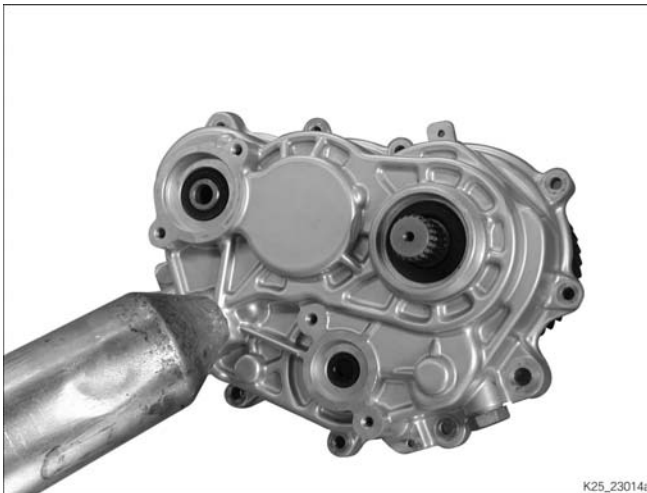


K25_23011b



K25_23012b

- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



K25_23014a

(-) Removing gearbox shafts

- Remove the housing cover with gear set from gearbox adapter (No. 23 1 661) (No. 23 1 662) and carefully lay it on its side.



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

Release temperature, gearbox housing		100 - 120 °C	
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- Remove input shaft (1) with intermediate shaft (2) and output shaft (3) together from the housing cover.



(-) Installing gearbox shafts

- Install the housing cover in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



Warning

Nature: Heated/hot parts can cause burns.

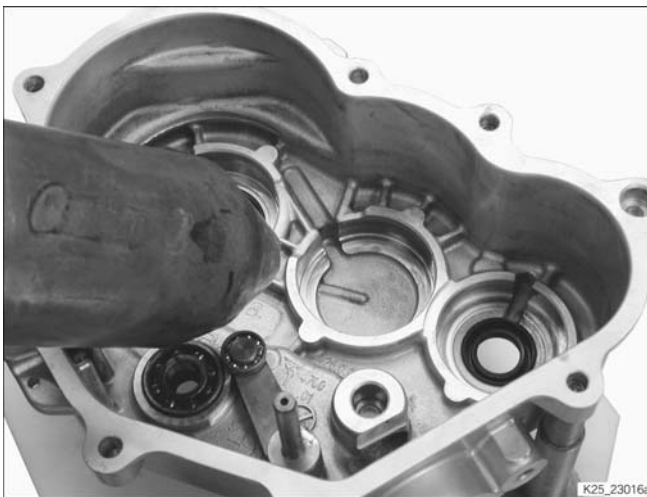
Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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Attention

Nature: Shafts not correctly seated in their guides are subject to accelerated wear.

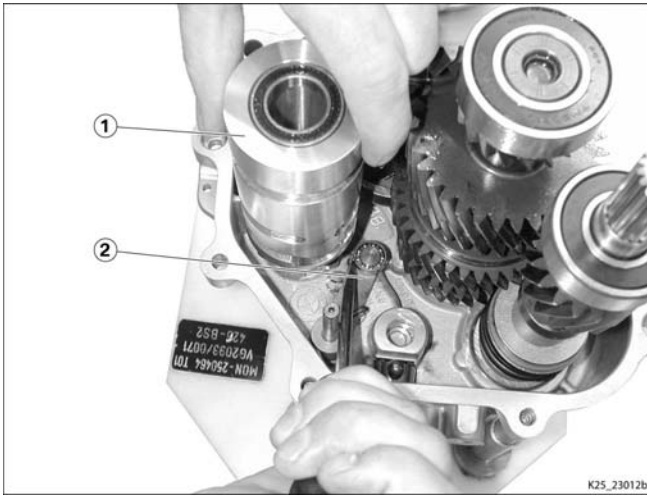
Avoidance: Check that the gearbox shafts are correctly seated.

- Install output shaft (3) with sliding sleeve (No. 23 4 732) , intermediate shaft (2) and input shaft (1) together in the housing cover.



(-) Installing selector drum

- Affix shim (1) to the selector drum with a blob of grease.



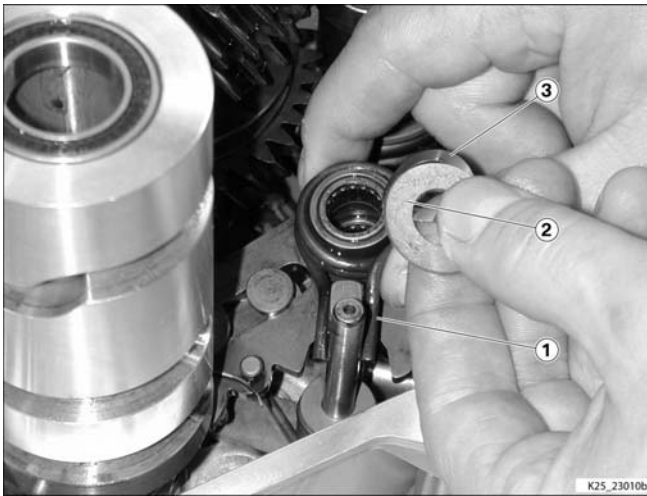
- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.



- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.

(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).



- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



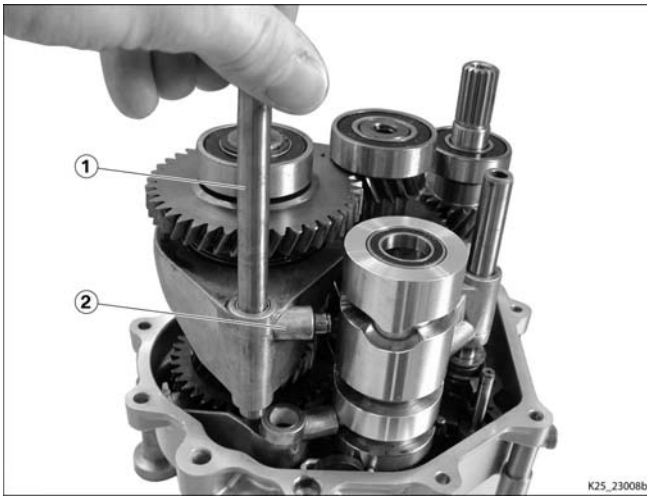
(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.



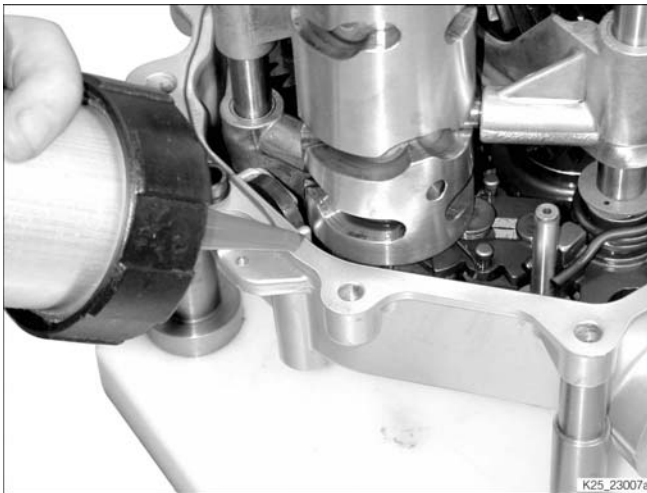
- Clean the sealing face of the gearbox housing.

⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203

Sealing compound

⚠ Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.



Tightening torques

Gearbox cover to gearbox housing	9 Nm	
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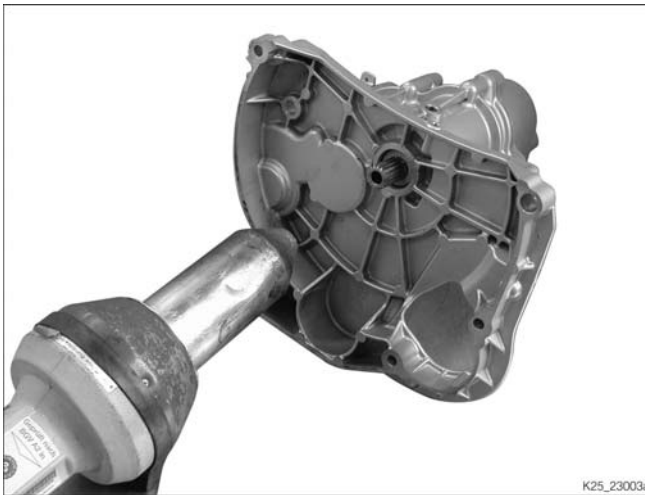


📁 23 21 530 Replacing intermediate shaft (gearbox removed)


(-) Removing gearbox housing

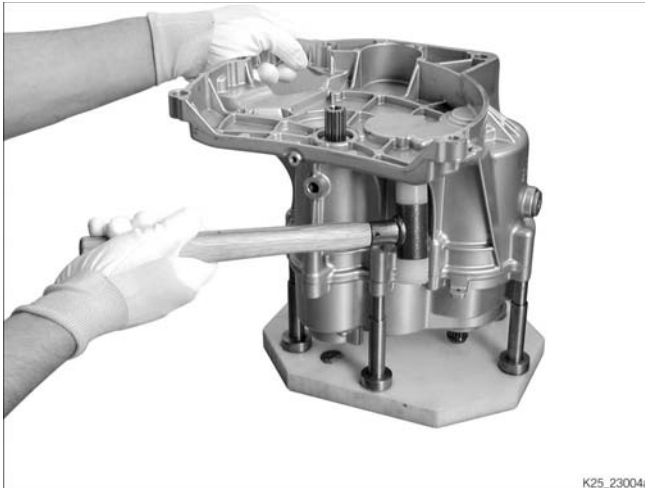


- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

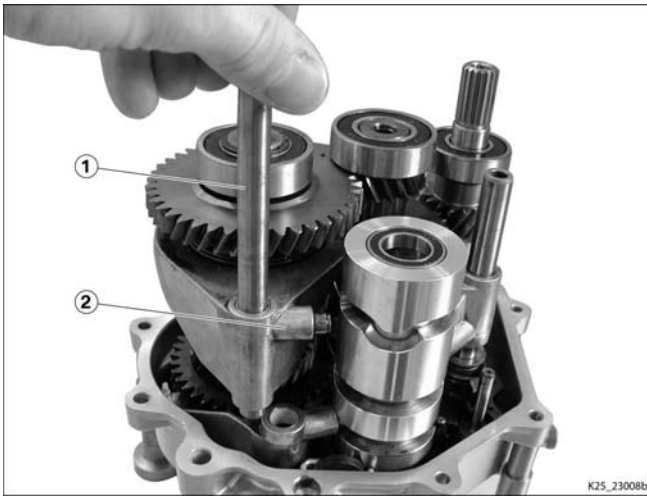
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



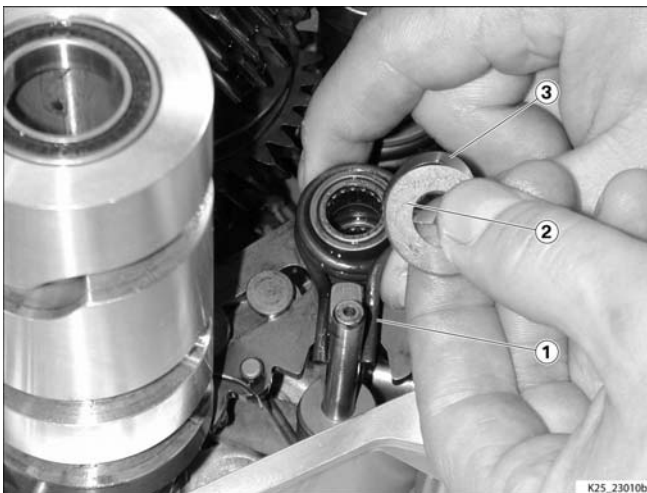
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).

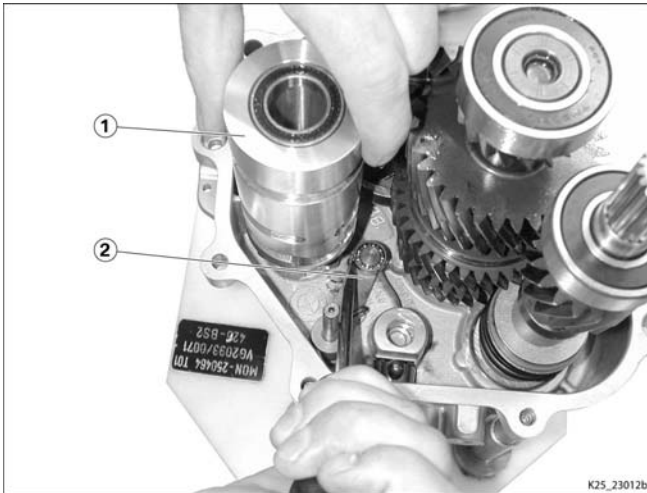


(-) Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.

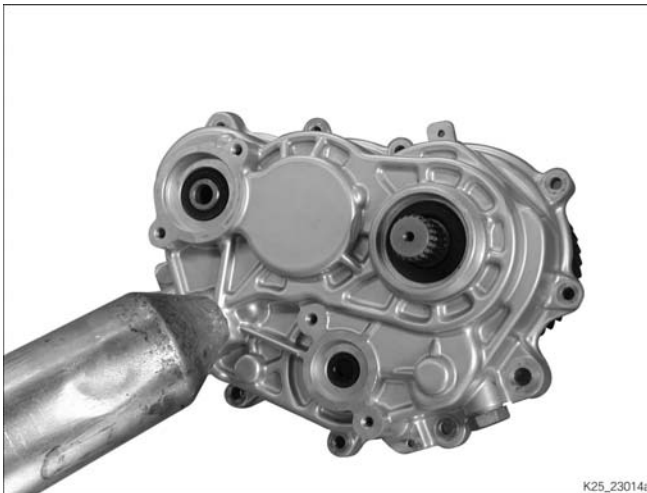


K25_23011b



K25_23012b

- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



K25_23014a

(-) Removing gearbox shafts

- Remove the housing cover with gear set from gearbox adapter (No. 23 1 661) (No. 23 1 662) and carefully lay it on its side.




Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	

- Remove input shaft (1) with intermediate shaft (2) and output shaft (3) together from the housing cover.



(-) Installing gearbox shafts

- Install the housing cover in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



Warning

Nature: Heated/hot parts can cause burns.

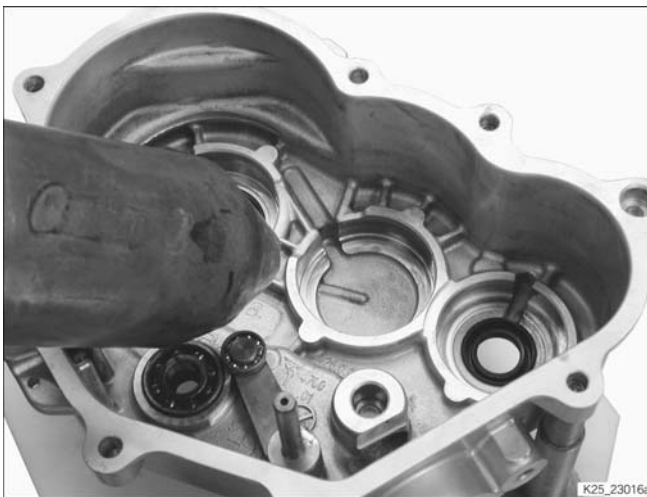
Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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Attention

Nature: Shafts not correctly seated in their guides are subject to accelerated wear.

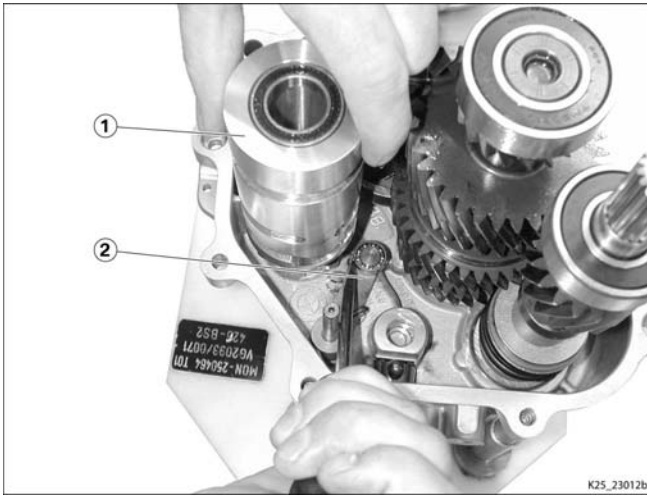
Avoidance: Check that the gearbox shafts are correctly seated.

- Install output shaft (3) with sliding sleeve (No. 23 4 732) , intermediate shaft (2) and input shaft (1) together in the housing cover.



(-) Installing selector drum

- Affix shim (1) to the selector drum with a blob of grease.



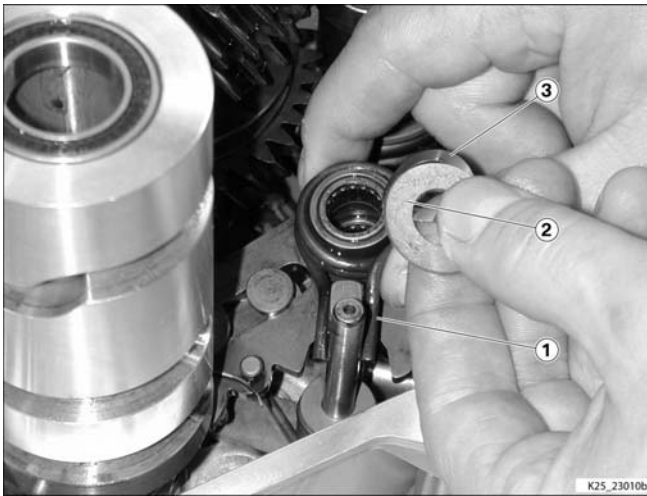
- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.



- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.

(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).



- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



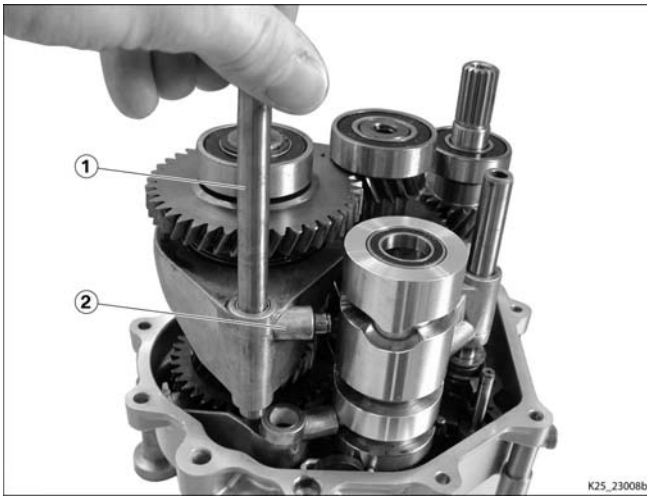
(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).

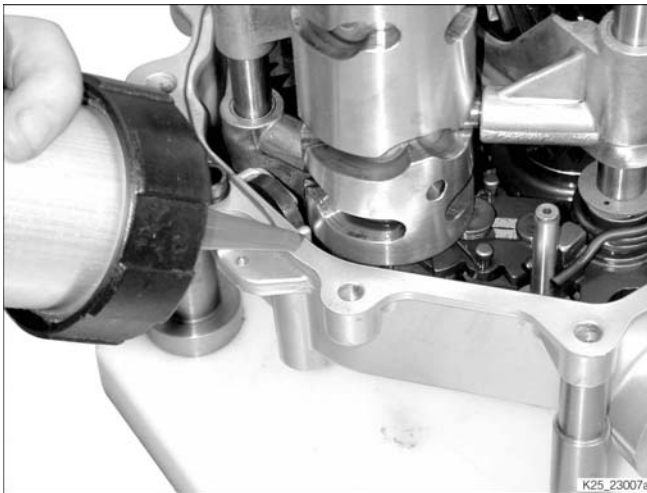


(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.



⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203

Sealing compound



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
-------------------------------------	--	--------------	--

- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.



Tightening torques

Gearbox cover to gearbox housing	9 Nm	
----------------------------------	------	--

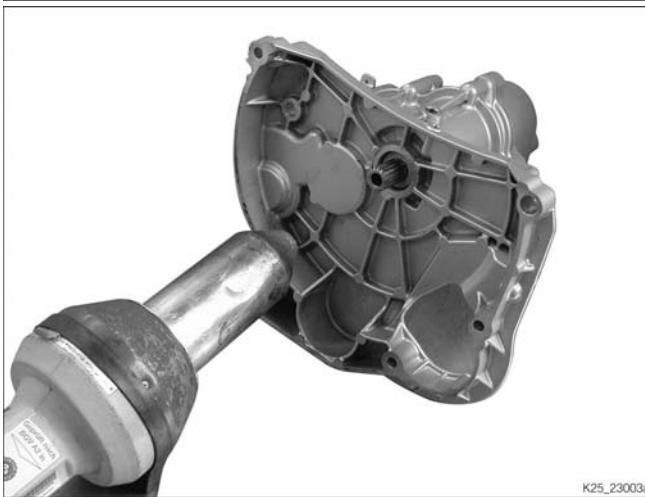


 **23 21 540 Replacing output shaft (gearbox removed)**


(-) Removing gearbox housing

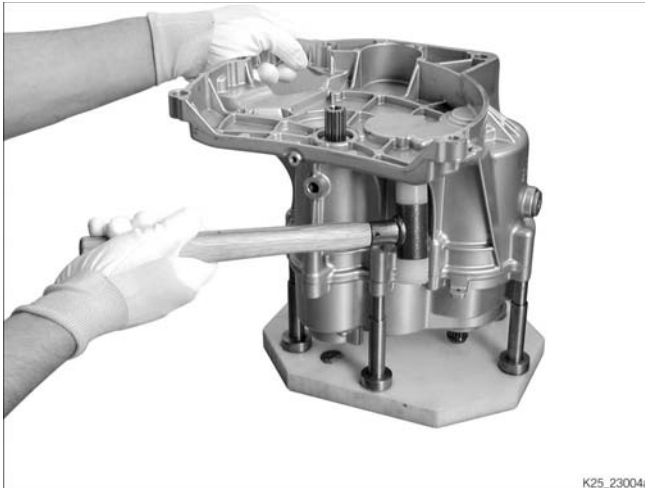


- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

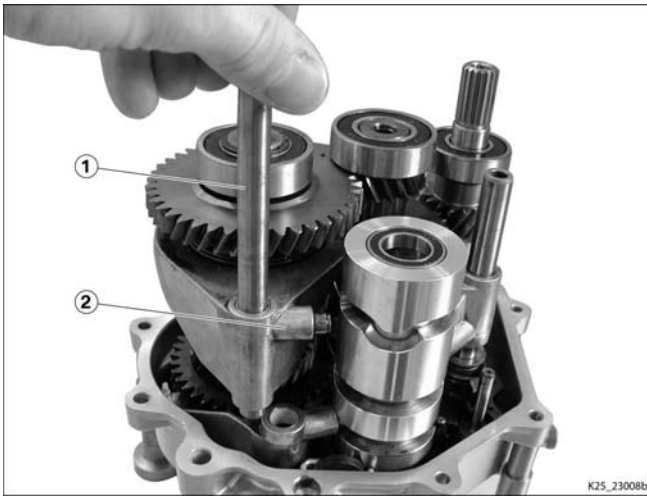
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



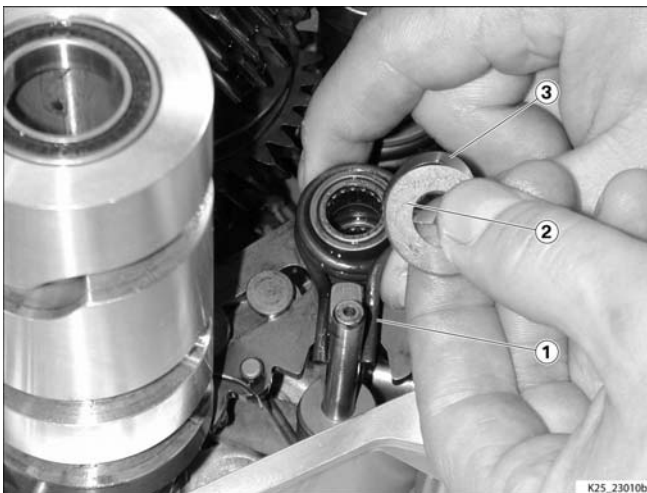
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



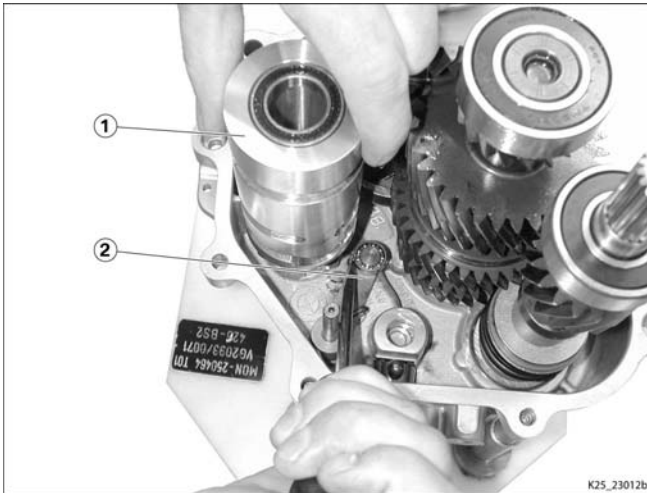
(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).

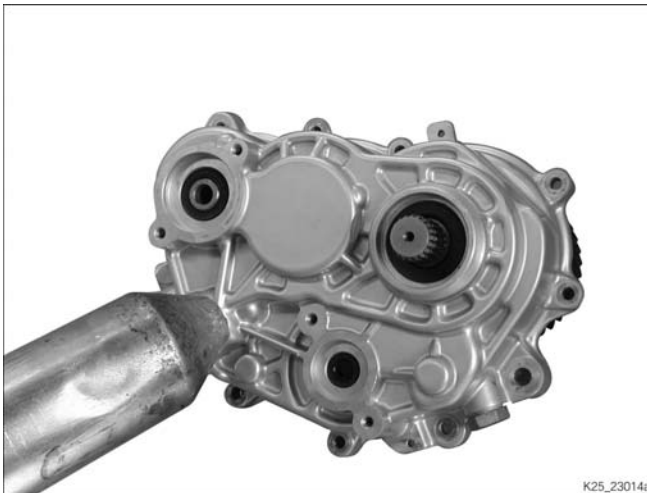


(-) Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.



- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



(-) Removing gearbox shafts

- Remove the housing cover with gear set from gearbox adapter (No. 23 1 661) (No. 23 1 662) and carefully lay it on its side.




Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.

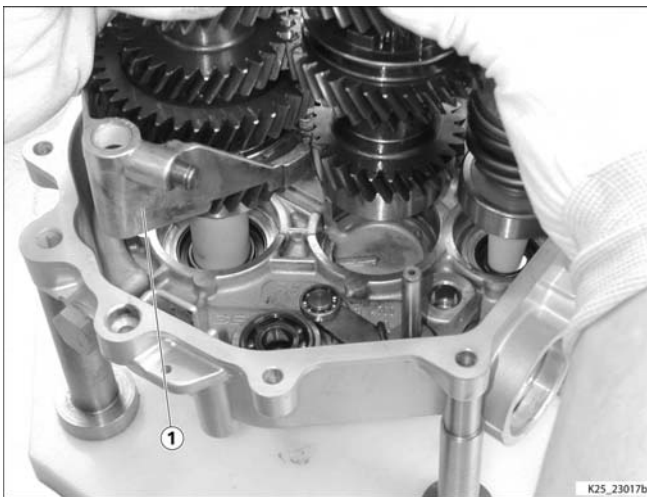
 Technical data			
Release temperature, gearbox housing		100 - 120 °C	

- Remove input shaft (1) with intermediate shaft (2) and output shaft (3) together from the housing cover.



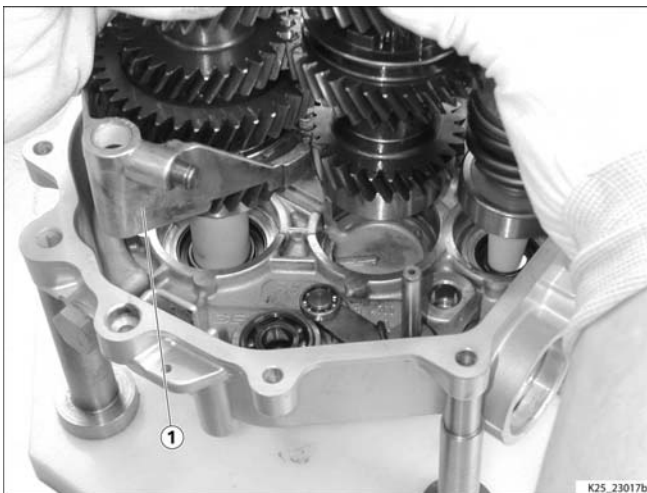
(-) Removing selector fork, 2nd/3rd gears

- Remove selector fork (1) for 2nd/3rd gears.



(-) Installing shift fork, 2nd/3rd gears

- Mount selector fork (1) for 2nd/3rd gears on the output shaft.



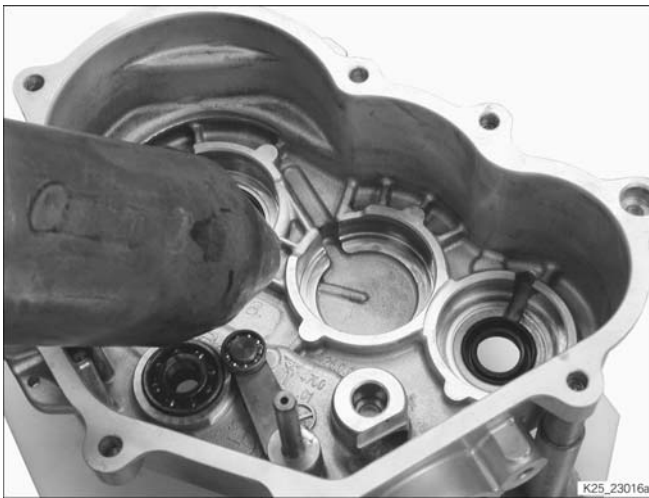
(-) Installing gearbox shafts

- Install the housing cover in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



Warning

Nature: Heated/hot parts can cause burns.



Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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Attention

Nature: Shafts not correctly seated in their guides are subject to accelerated wear.

Avoidance: Check that the gearbox shafts are correctly seated.

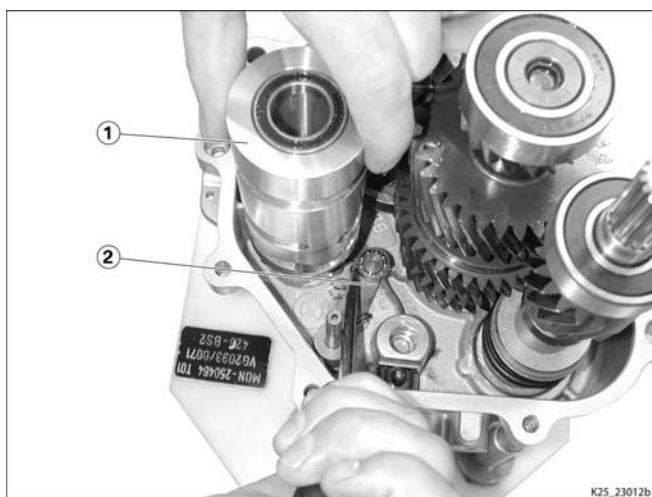
- Install output shaft (3) with sliding sleeve (No. 23 4 732), intermediate shaft (2) and input shaft (1) together in the housing cover.



(-) Installing selector drum

- Affix shim (1) to the selector drum with a blob of grease.

- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.

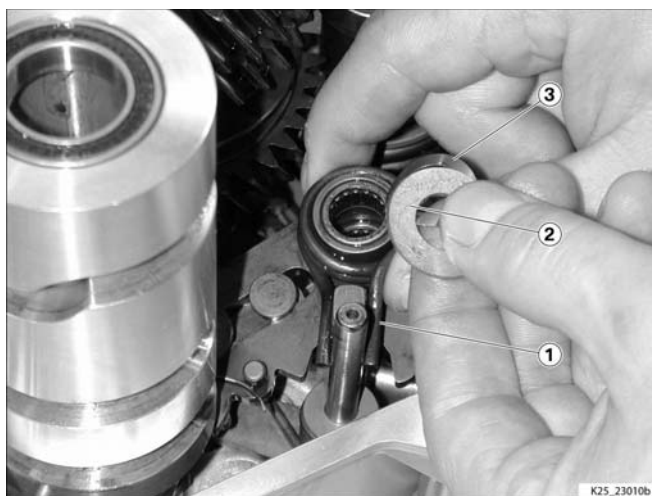


- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.



(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).



- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



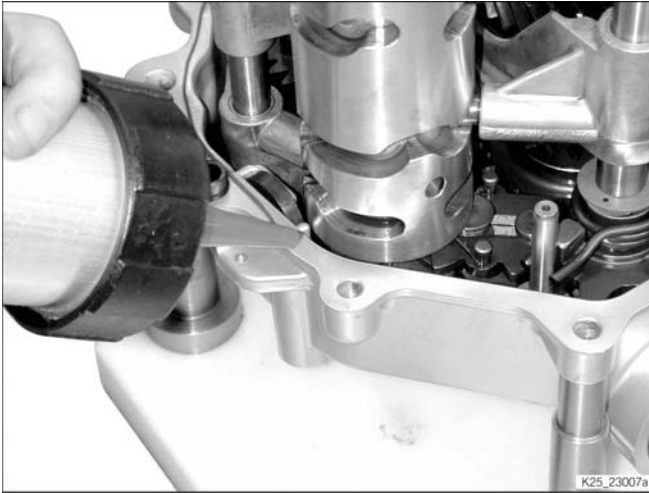
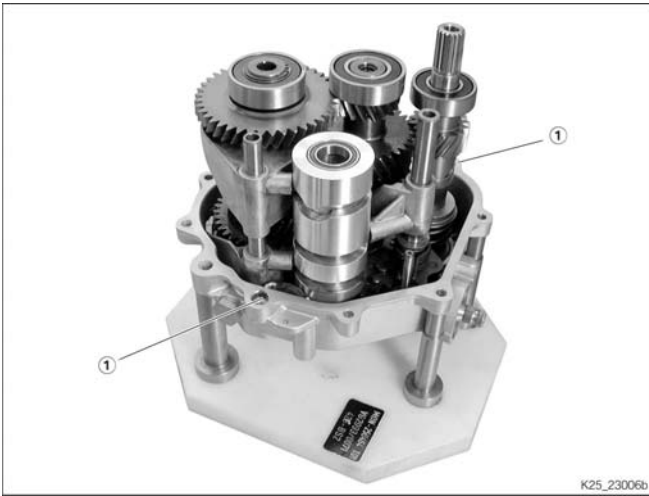
(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.

⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203	Sealing compound	
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⚠ Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.



Tightening torques

Gearbox cover to gearbox housing	9 Nm	
----------------------------------	------	--

📁 23 21 751 Removing and installing, disassembling and assembling input shaft (gearbox removed)



K25_23002b


(-) Removing gearbox housing

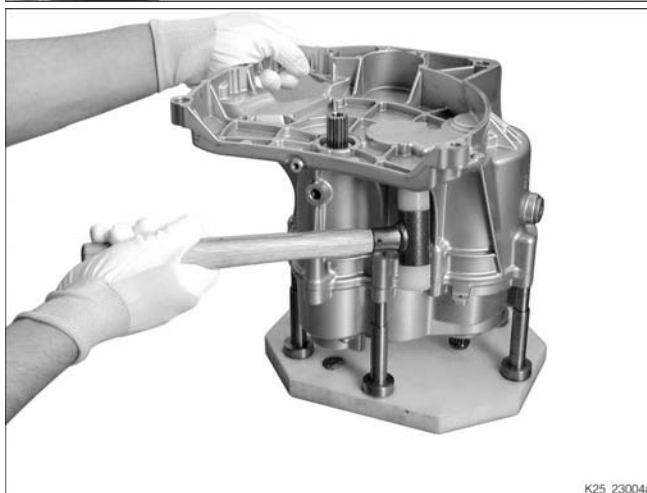
- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



K25_23003a

- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



K25_23004a



Warning

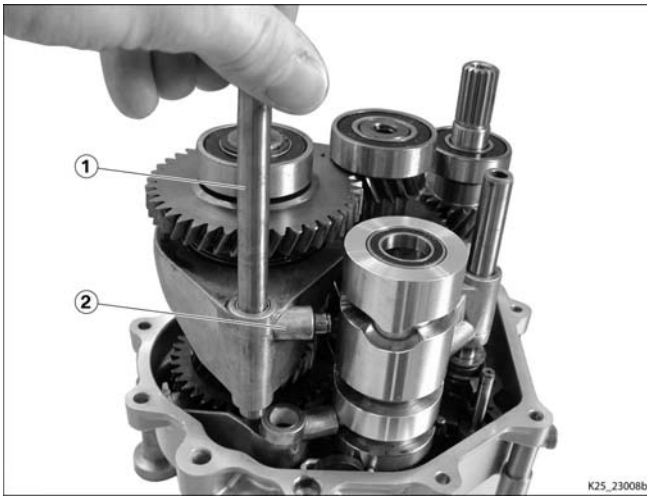
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



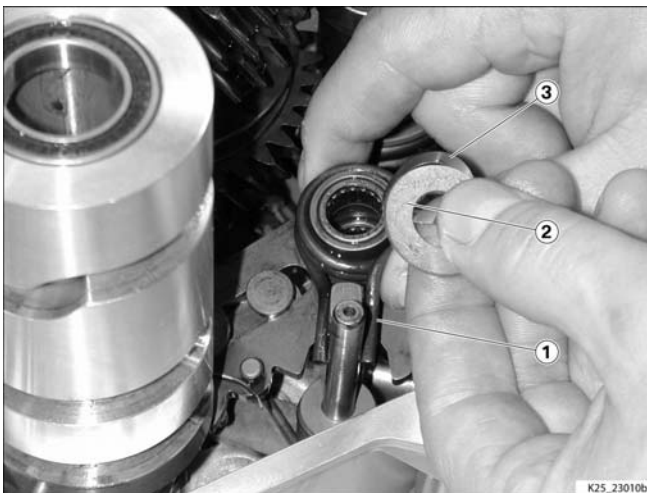
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).

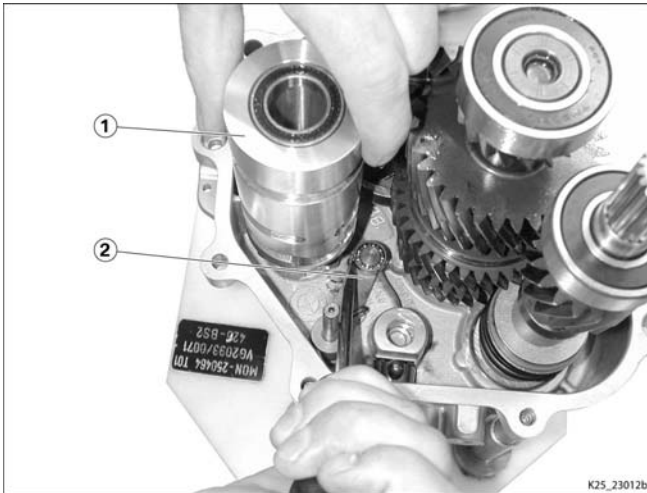


(-) Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.

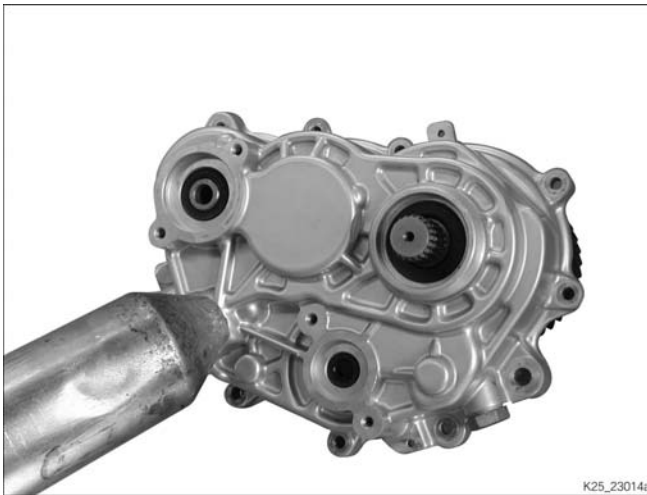


K25_23011b



K25_23012b

- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



K25_23014a

(-) Removing gearbox shafts

- Remove the housing cover with gear set from gearbox adapter (No. 23 1 661) (No. 23 1 662) and carefully lay it on its side.



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

Release temperature, gearbox housing		100 - 120 °C	
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- Remove input shaft (1) with intermediate shaft (2) and output shaft (3) together from the housing cover.



(-) Removing grooved ball bearing of input shaft (input splines)



- Clamp the input shaft into the vice with soft jaws and with the input end facing upwards.
- Remove grooved ball bearing (1) using universal puller (No. 00 7 501), (No. 00 7 502), (No. 00 7 503), (No. 00 7 504), (No. 00 7 505), (No. 00 7 506) acting on input end.

(-) Removing grooved ball bearing of input shaft (bearing end)



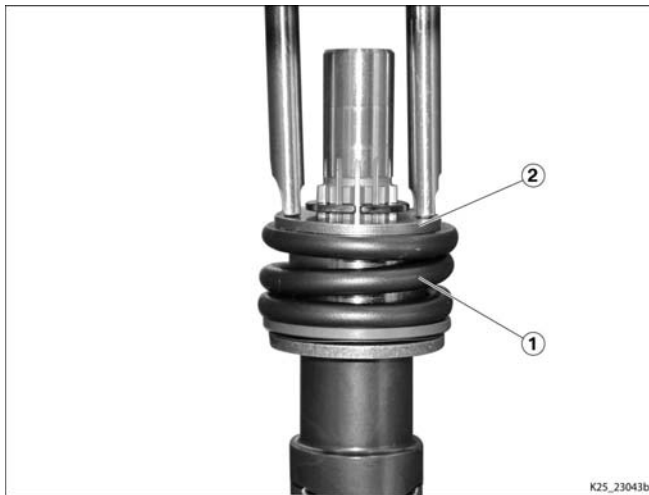
- Clamp the input shaft into the vice with soft jaws and with the output end facing upwards.
- Remove grooved ball bearing (1) using universal puller (No. 00 7 501), (No. 00 7 502), (No. 00 7 503), (No. 00 7 504), (No. 00 7 505), (No. 00 7 506) acting on output end.

(-) Disassembling input shaft

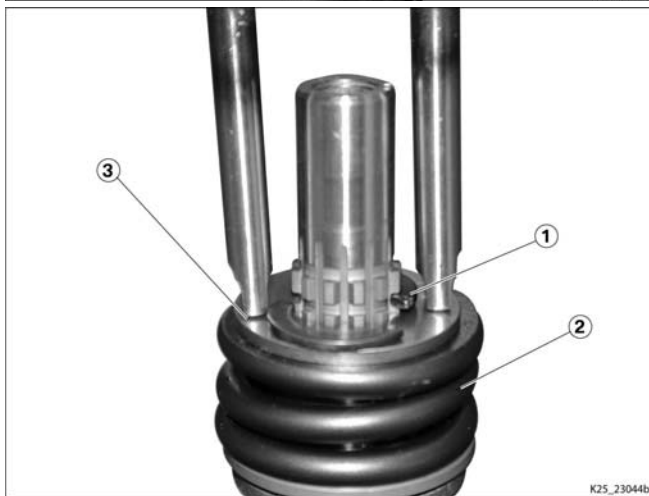
- Remove shim (1) and retaining sleeve (2).



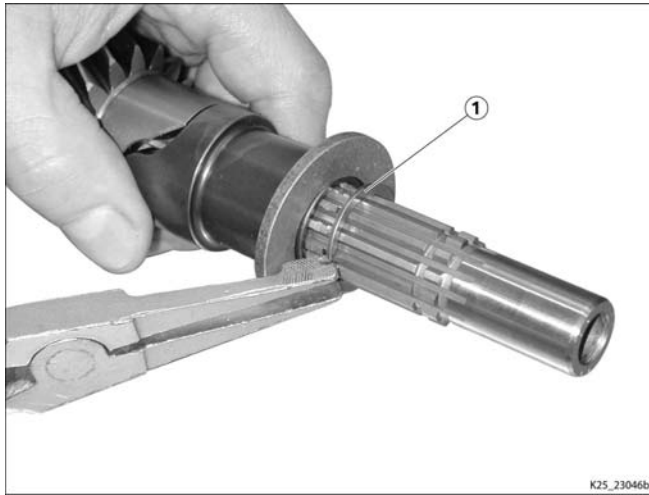
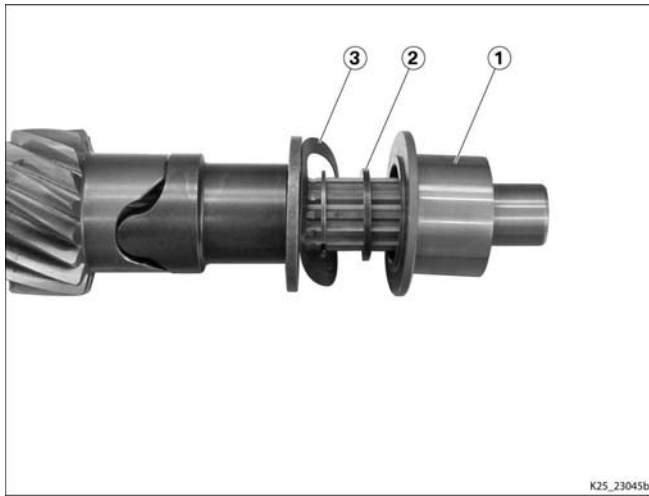
- Use pressure-relief tool (No. 23 2 653) , to preload damper spring (1), applying pressure via thrust washer (2).



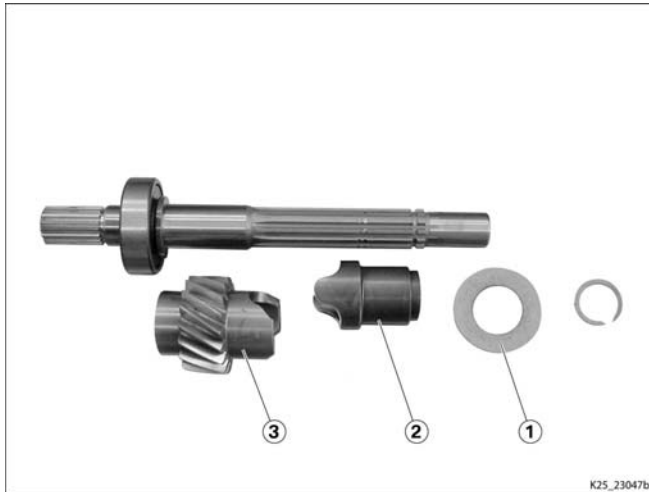
- Remove segment washers (1).
- Relive pressure on damper spring (2) and remove complete with thrust washer (3).



- Remove sleeve (1) with predamper adjusting washer (2) and predamper wavy spring (3).



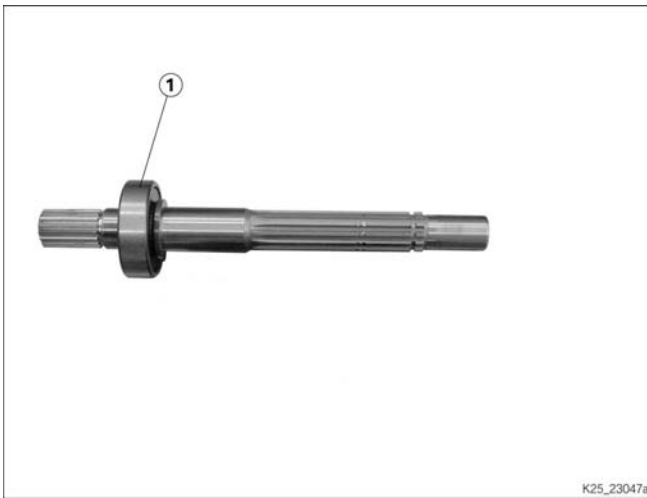
- Remove circlip (1).



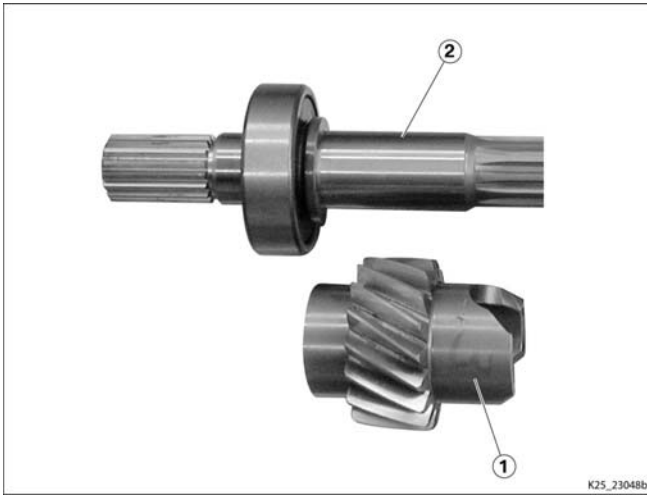
- Remove spring stop washer (1) and thrust piece (2).
- Remove constant-speed gear (3).

(-) Assembling input shaft

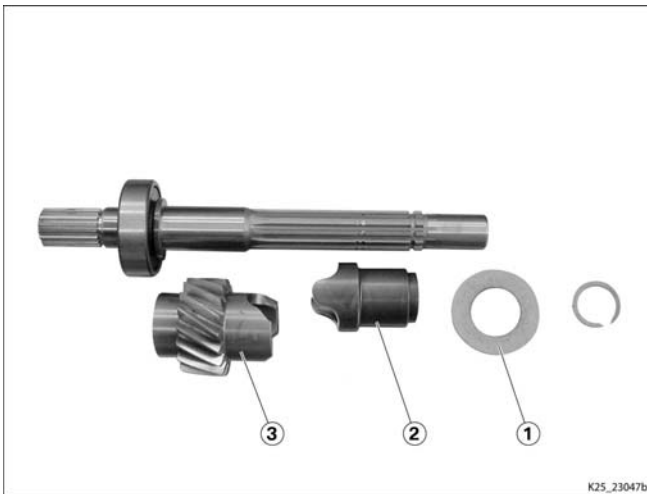
- Press grooved ball bearing (1) onto the input end of the input shaft.



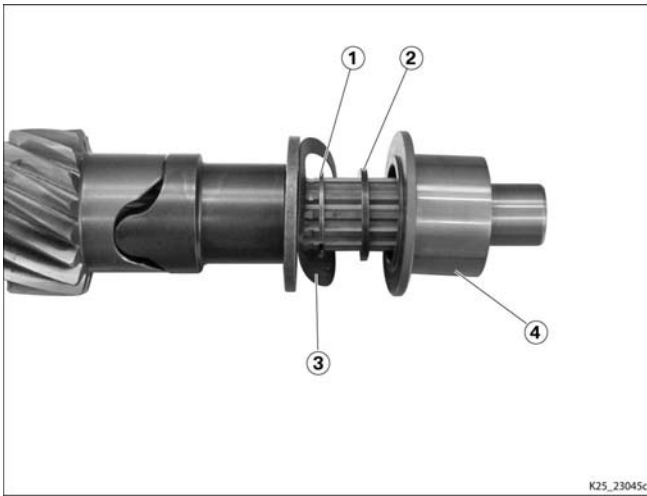
- Push gear (1) onto the bearing seat of input shaft (2).



- Place thrust piece (1) and spring stop washer (2) on the splines of the input shaft.



- Install new circlip (1).
- Push predamper adjusting washer (2) onto the input shaft.
- Place spring washer (3) and sleeve (4) in position, making sure that the spring washer is correctly seated.

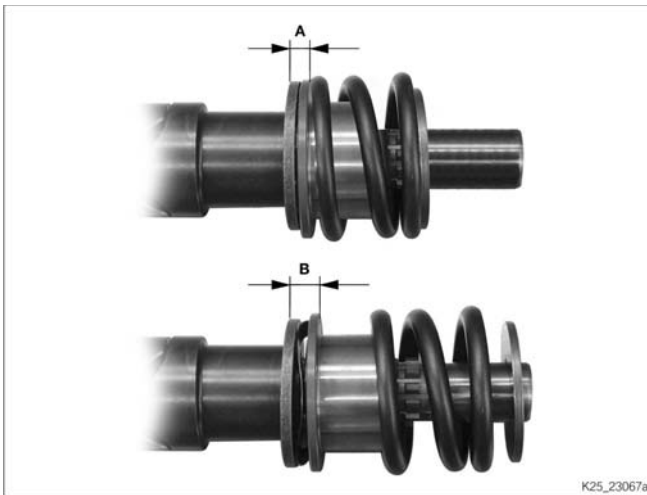


K25_23045c


► **Checking axial play of spring segment**

Test

- Press the sleeve against the spring stop washer and use the dial gauge to measure distance (A).
- Carefully relieve the pressure on the sleeve and use the dial gauge to measure distance (B).
- The difference between A and B equals the axial play of the spring segment.



K25_23067a

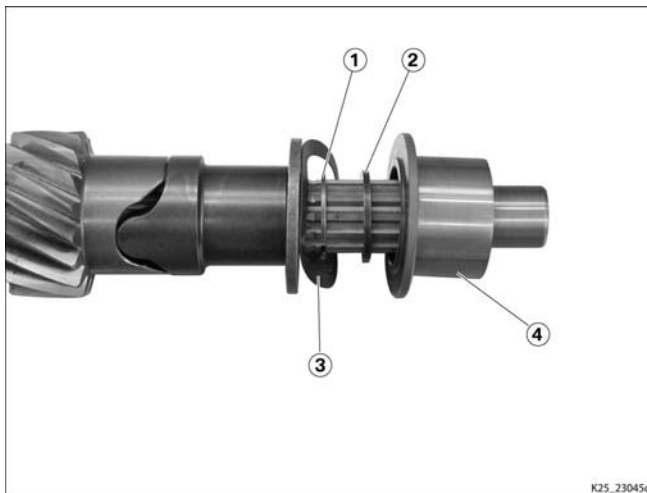
 Technical data			
Endplay of spring segment at gearbox input shaft	Pre-damper stroke	0.4 - 0.6 mm	
	Damper stroke, total (not measurable)	2.8 - 3.4 mm	

Result: Result is out of tolerance.

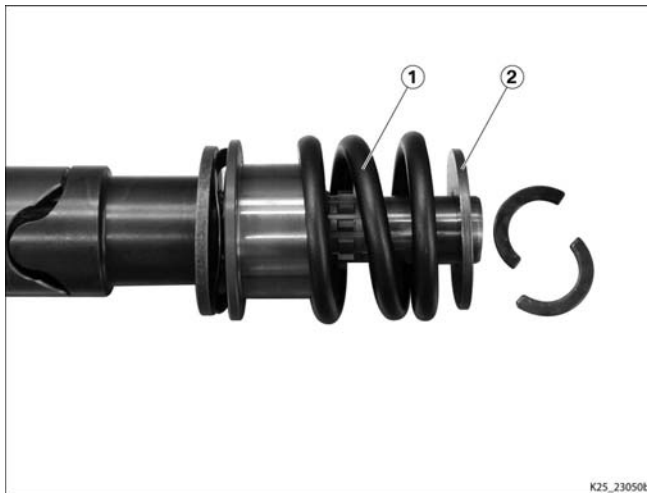
Measure:

- Check spring stop washer, spring washer, sleeve and predamper spacer for wear and replace worn parts as necessary.

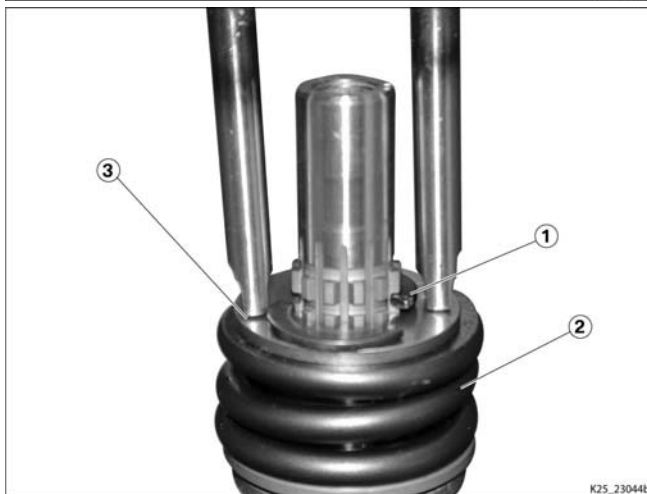




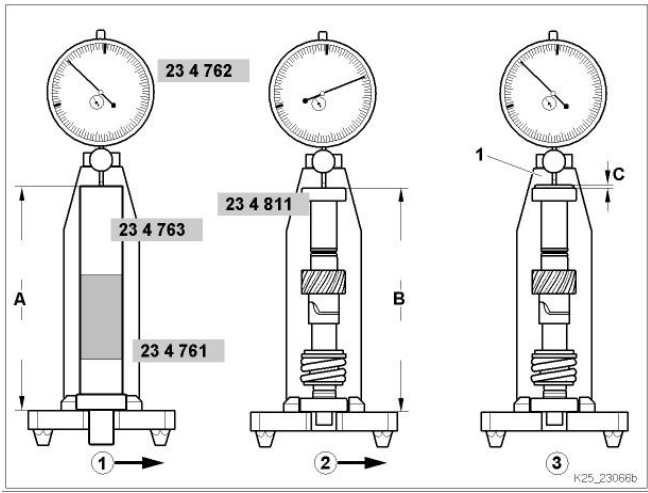
- Install damper spring (1) and thrust washer (2).
- Use pressure-relief tool (No. 23 2 653) to preload the damper spring, applying force via the thrust washer.



- Install split segment washer (1).
- Relieve damper spring (2).



- Install retaining sleeve (2) and shim (1).




► **Measuring fully assembled length of input shaft**

- Place zero gauge (No. 23 4 763) in the measuring stand.
- Install dial gauge (No. 23 4 762) in the rear locating bore in measuring stand (No. 23 4 761) and set to preload.
- Using the dial gauge, zero to distance (A) of zero gauge (No. 23 4 763) .
- Remove zero gauge (No. 23 4 763) from the measuring stand.
- Mount measuring disc (No. 23 4 811) on the input shaft.
- Lay the grooved ball bearing on measuring disc (No. 23 4 811) .
- Place the input shaft in measuring stand (No. 23 4 761) .
- Use dial gauge (No. 23 4 762) to measure deviation from zero of distance (B) at the bearing race.
- The deviation from zero equals the thickness (C) of shim (1).
- Place shim (1) of correct thickness on the bearing race.

Test

- Check deviation from zero.

 Technical data			
Deviation from zero of the gearbox shafts Value definition: Only if the appropriate zero gauge is used		0 - -0.05 mm	
Fully assembled		163.1 - 163.15 mm	

length of gearbox input shaft			
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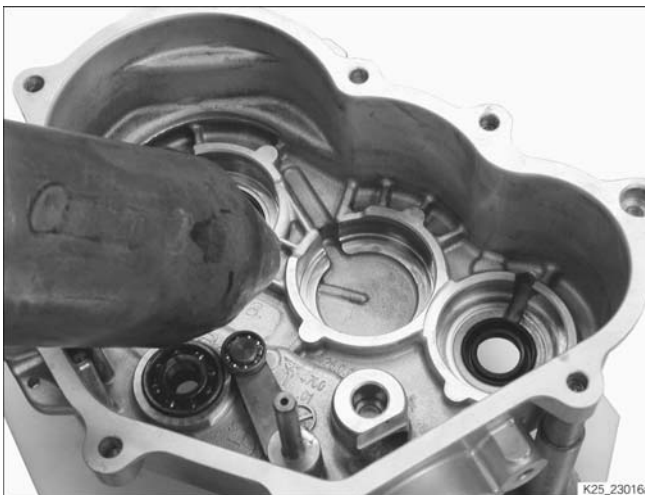
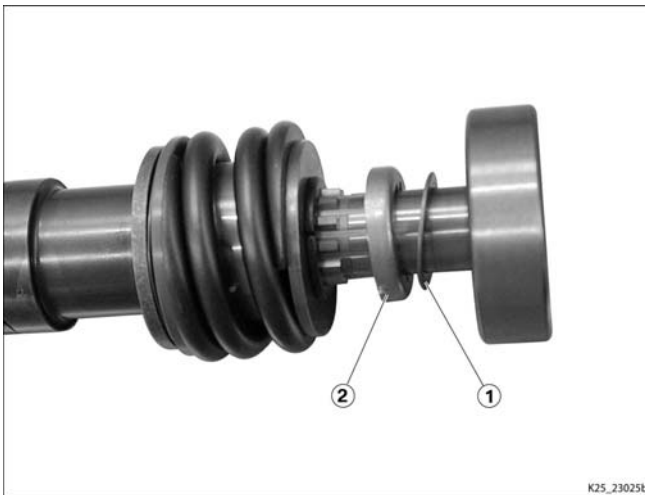
Result: Deviation from zero is greater than maximum permissible value.

Measure:

- Check needle roller bearings, backup washers, shims and gear shift wheel for wear and replace parts as necessary.
- Remove the input shaft from measuring stand (No. 23 4 761) .
- Remove measuring disc (No. 23 4 811) with shim (1) and grooved ball bearing.



- Install a shim of the correct thickness.
- Press grooved ball bearing (1) onto the bearing end of the input shaft.



(-) Installing gearbox shafts

- Install the housing cover in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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Attention

Nature: Shafts not correctly seated in their guides are subject to accelerated wear.

Avoidance: Check that the gearbox shafts are



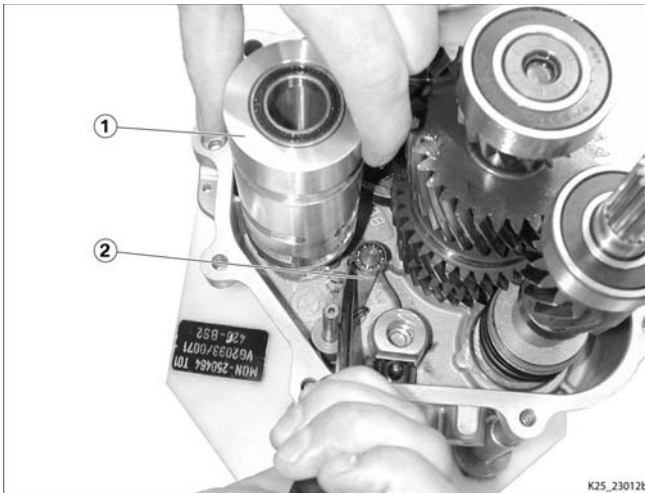
correctly seated.

- Install output shaft (3) with sliding sleeve (No. 23 4 732), intermediate shaft (2) and input shaft (1) together in the housing cover.

(-) Installing selector drum



- Affix shim (1) to the selector drum with a blob of grease.



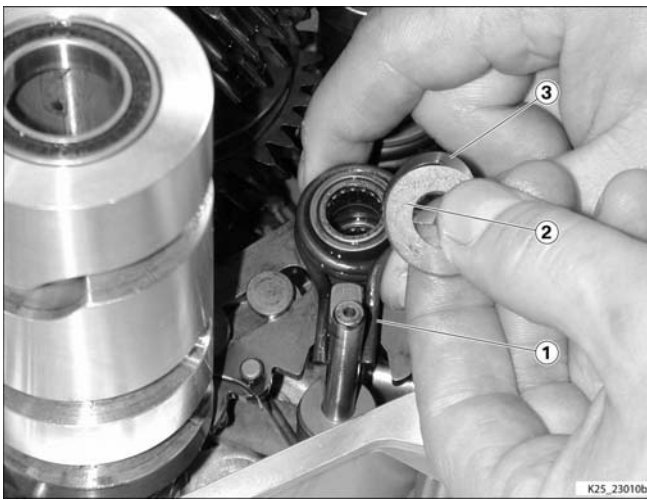
- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.

- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.



(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).

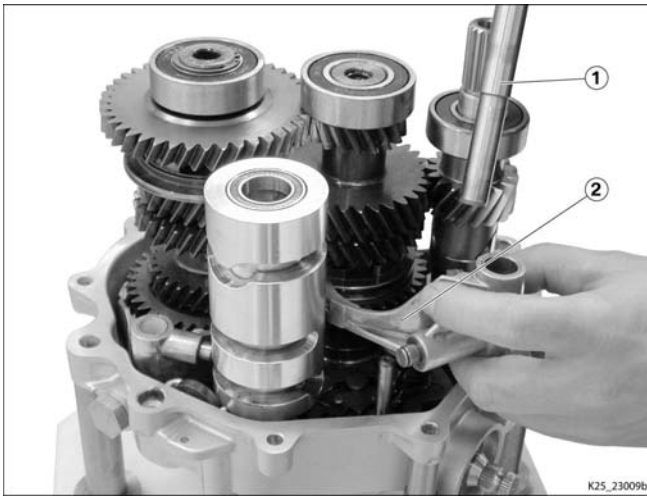


- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



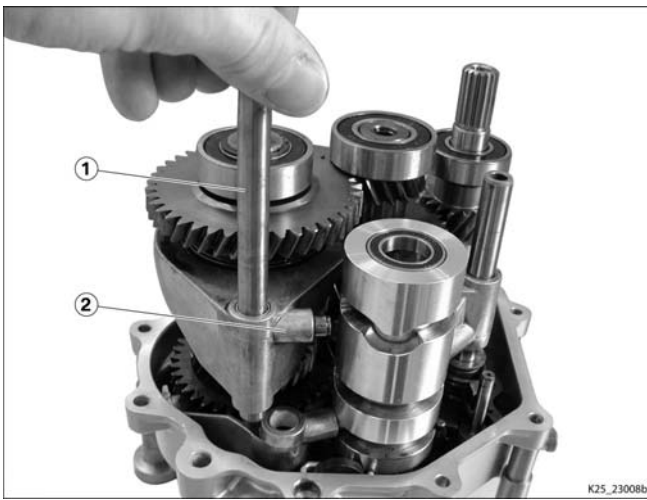
(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



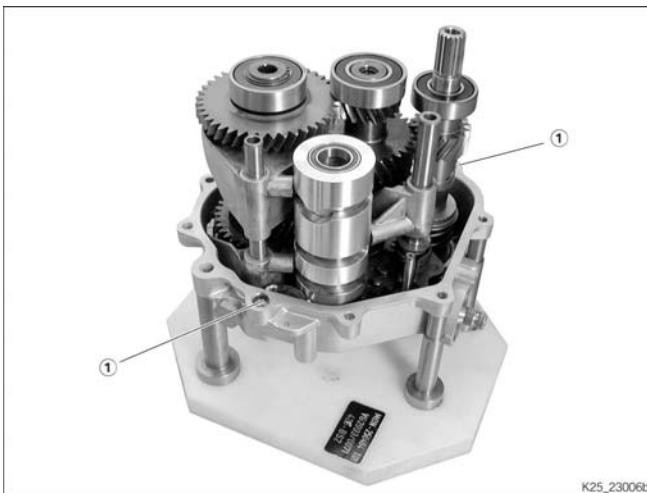
(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

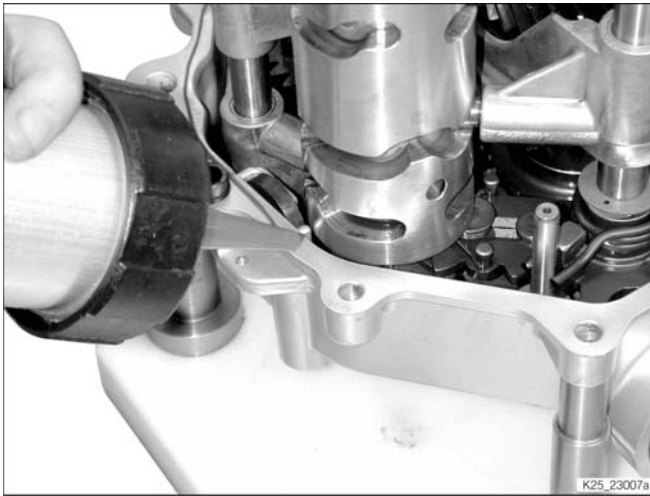
- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.


Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.



Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.

 Consumables/lubricants		
Loctite 5203	Sealing compound	




Warning


Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.

 Technical data			
Mating temperature, gearbox housing		100 - 120 °C	

- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.

 Tightening torques		
Gearbox cover to gearbox housing	9 Nm	



📁 23 21 756 Removing and installing, disassembling and assembling output shaft (gearbox removed)



K25_23002b


(-) Removing gearbox housing

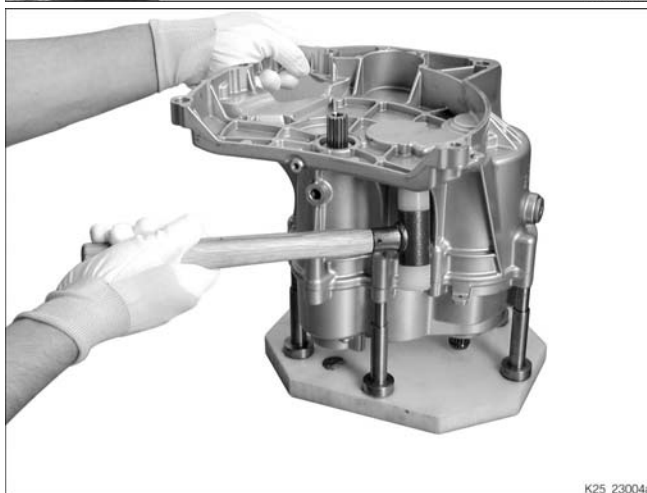
- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



K25_23003a

- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



K25_23004a



Warning

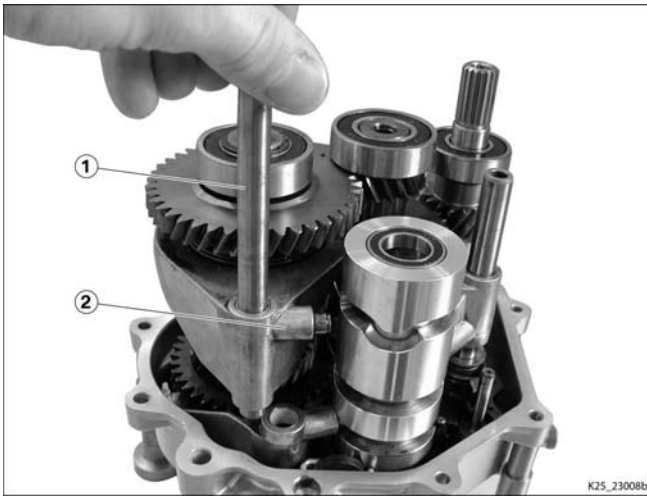
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



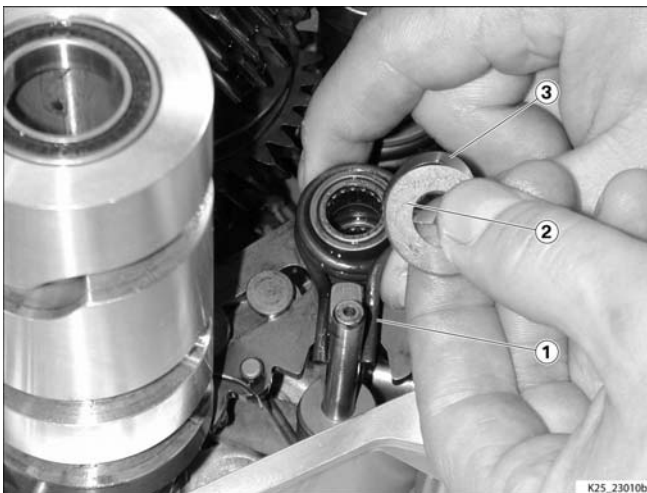
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).

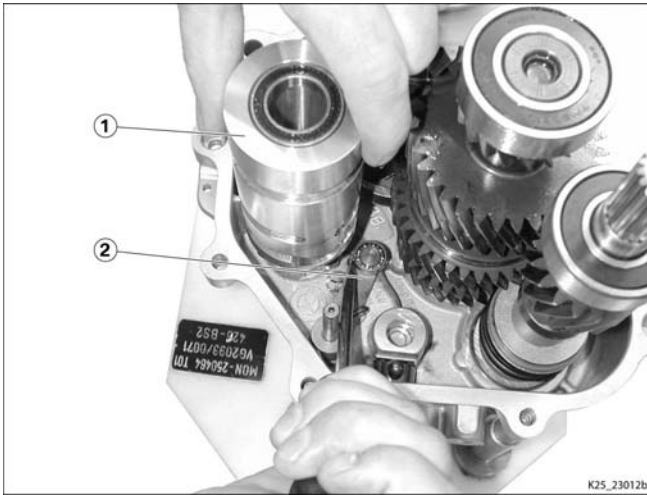


(-) Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.

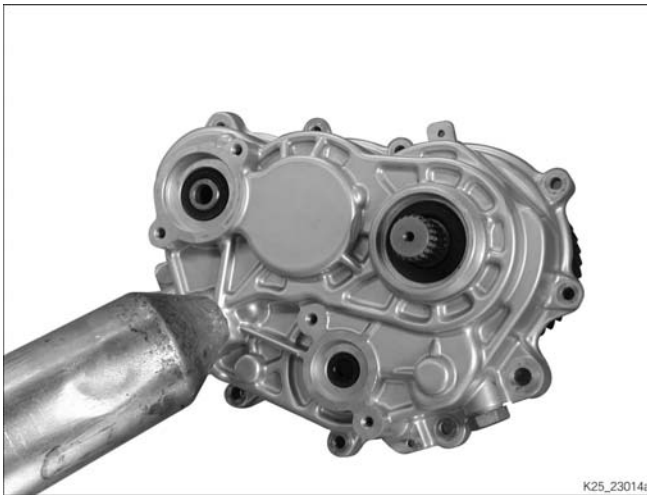


K25_23011b



K25_23012b

- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



K25_23014a

(-) Removing gearbox shafts

- Remove the housing cover with gear set from gearbox adapter (No. 23 1 661) (No. 23 1 662) and carefully lay it on its side.



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

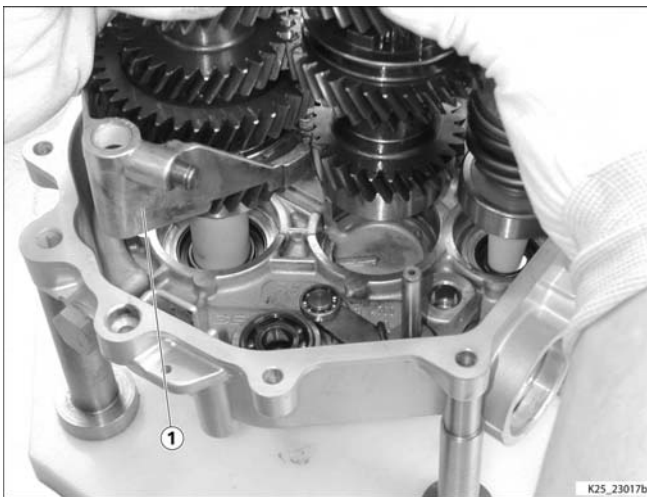
Release temperature, gearbox housing		100 - 120 °C	
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- Remove input shaft (1) with intermediate shaft (2) and output shaft (3) together from the housing cover.



(-) Removing selector fork, 2nd/3rd gears

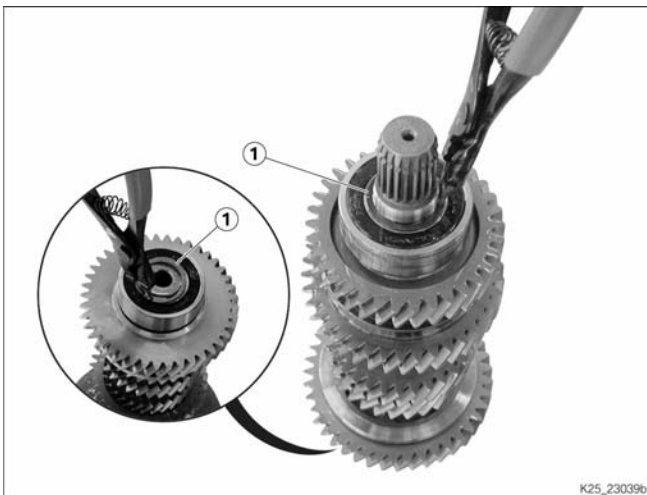
- Remove selector fork (1) for 2nd/3rd gears.



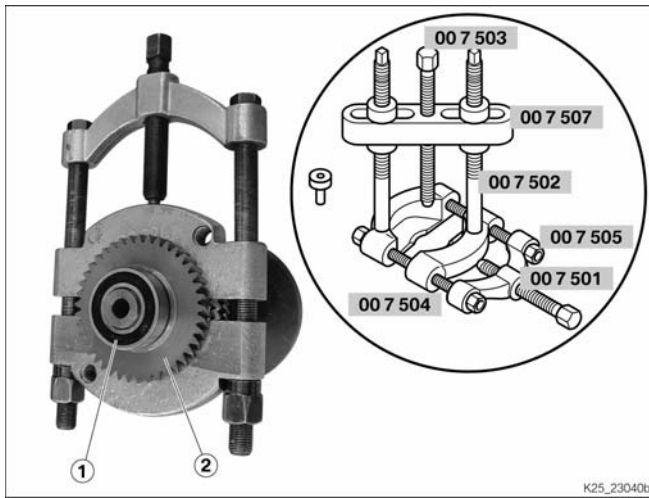
(-) Disassembling output shaft

► Removing grooved ball bearing of output shaft (bearing end)

- Remove circlip (1) in front of shaft bearing.



- Pull off grooved ball bearing (1) with universal puller (No. 00 7 501), (No. 00 7 502), (No. 00 7 503), (No. 00 7 504), (No. 00 7 505), (No. 00 7 506) together with gear shift wheel for 1st gear (2).

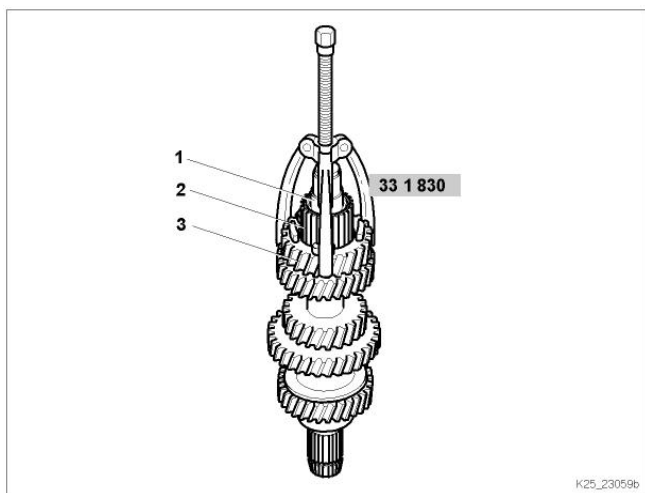


- Remove gear shift wheel for 1st gear (1) with thrust washer (2).



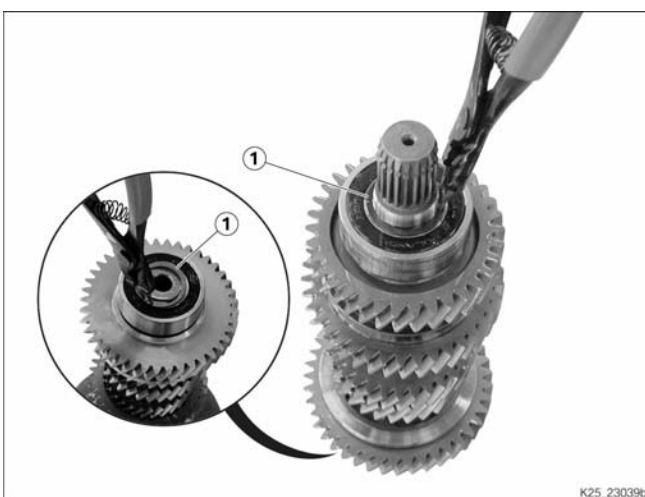
- Remove green needle roller bearing (1) and shift sleeve for 1st/5th gears (2).

- Remove bearing bushing (1) with guide sleeve for 1st/5th gear (2) and gear shift wheel for 5th gear (3) with puller (No. 33 1 830) .
- Remove black needle roller bearing for 5th gear.
- Using suitable protective jaws, clamp the shaft in the vice, making sure that the output splines are pointing up.

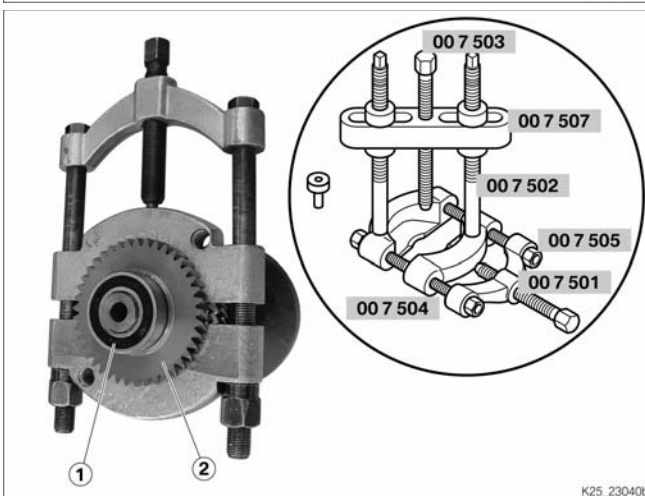


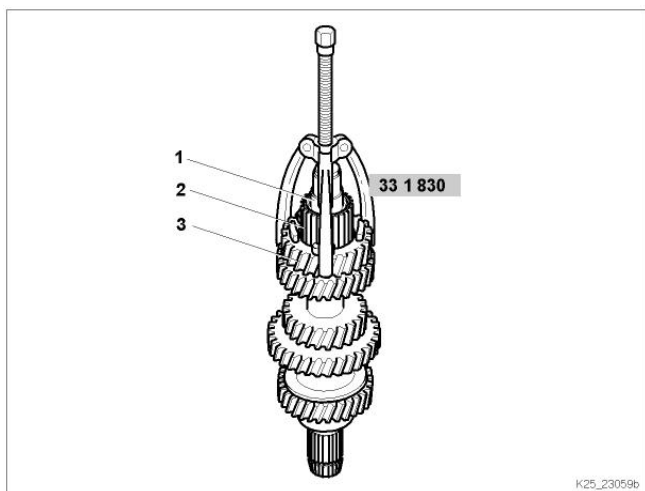
► **Removing grooved ball bearing of output shaft (output splines)**

- Remove circlip (1) in front of shaft bearing.

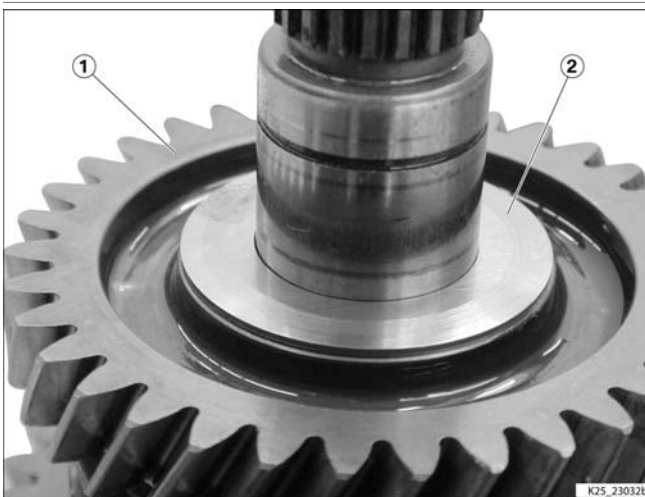


- Pull off grooved ball bearing (1) with universal puller (No. 00 7 501), (No. 00 7 502), (No. 00 7 503), (No. 00 7 504), (No. 00 7 505), (No. 00 7 506) together with gear shift wheel for 3rd gear (2).

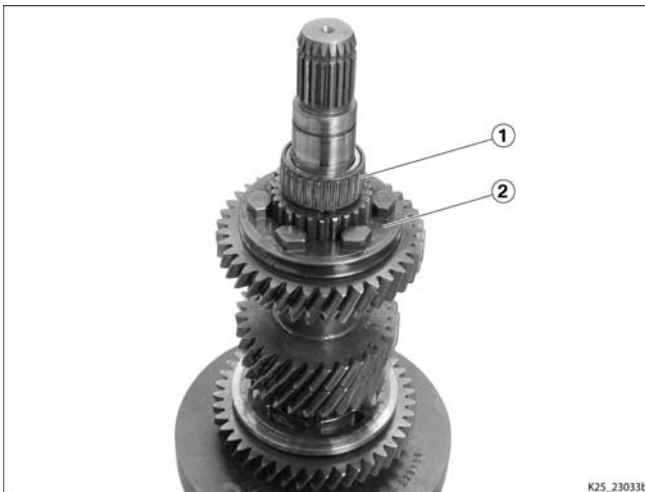




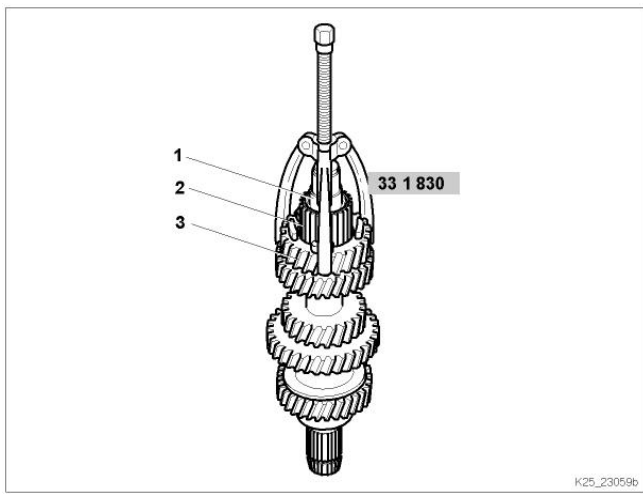
- Remove gear shift wheel for 3rd gear (1) with thrust washer (2).



- Remove green needle roller bearing (1) and shift sleeve for 2nd/3rd gear (2).



- Remove bearing bushing (1) with guide sleeve for 2nd/3rd gear (2) and gear shift wheel for 2nd gear (3) with puller (No. 33 1 830) .
- Remove black needle roller bearing for 2nd gear.



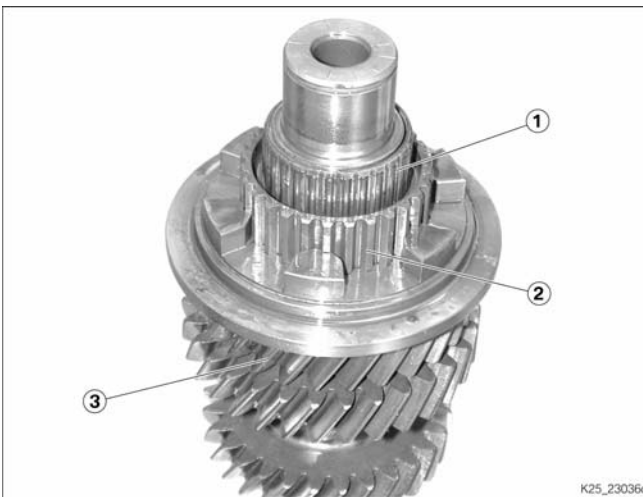
(-) Assembling output shaft

- Using suitable protective jaws, clamp the shaft in the vice, making sure that the end of the shaft that does not have splines is pointing up.

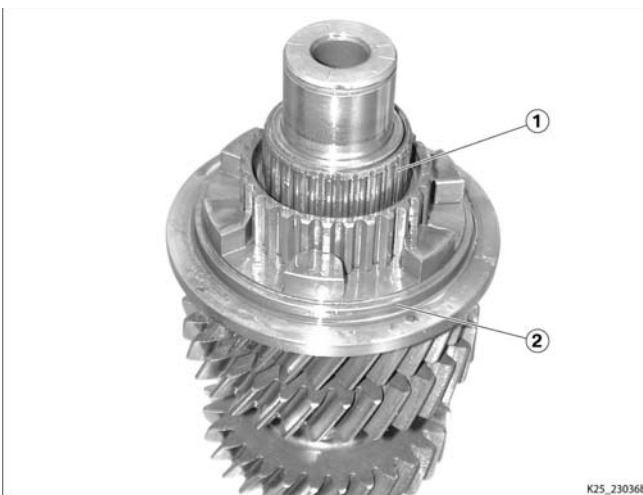


Note


Lightly oil all friction faces with gear oil prior to assembly.



- Install black needle roller bearing for gear shift wheel, 5th gear.
- Install the gear shift wheel for 5th gear (3) with the dogs toward the end of the shaft.
- Install guide sleeve for 1st/5th gear (2), with the taper toward the end of the shaft.
- Press on the bearing bushing for gear shift wheel, 1st gear (1).
- Place shift sleeve for 1st/5th gears (2) on guide sleeve for 1st/5th gears, making sure that the side with the dogs is toward the end of the shaft.
- Install green needle roller bearing (1) for gear shift wheel, 1st gear.



- Install gear shift wheel for 1st gear (1).
- Measure the partial fully assembled length.

 Technical data			
Fully assembled		115.55 - 115.6 mm	



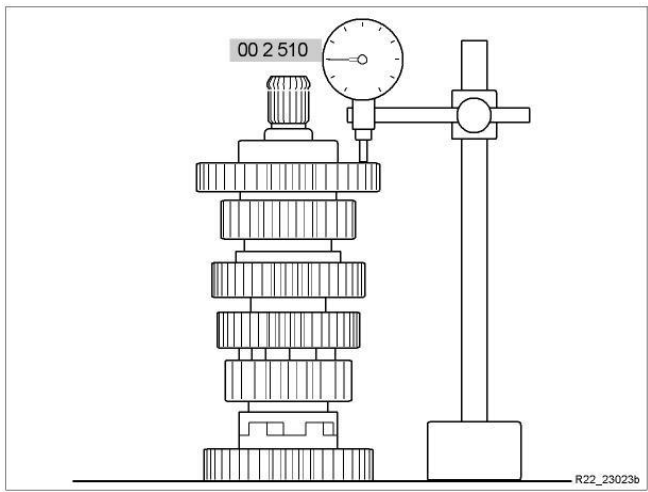
length of gearbox output shaft			
Value definition:			
Partial length (needle roller bearing, gear shift wheel 5th gear - gear shift wheel 1st gear)			

Attention

Nature: Damage to components can occur if the tapered thrust washer is not installed right way round.


Avoidance: The tapered thrust washer must be installed with the smaller diameter toward the shaft bearing.

- Install thrust washer (2) of correct thickness as calculated.
 - Press the grooved ball bearing onto the output shaft.
- **Checking endplay, output shaft, 5th/1st gear**



Test

- Secure dial gauge (No. 00 2 510) to the stand.
- Set the dial gauge on the edge of the gear shift wheel for 5th gear and check endplay.

 Technical data			
Endplay gearbox output shaft, free gearwheel 5th gear		0.1 - 0.3 mm	


Result: Result is out of tolerance.

Measure:

- Check needle roller bearings, backup washers, shims and gear shift wheel for wear and replace parts as necessary.

Test

- Set the dial gauge on the edge of the gear shift wheel for 1st gear and check endplay.

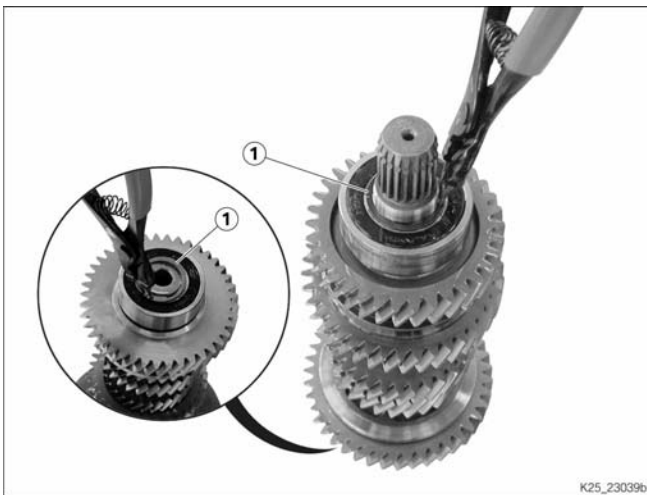
 Technical data			
Endplay		0.1 - 0.25 mm	

gearbox output shaft, free gearwheel 1st gear			
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Result: Result is out of tolerance.

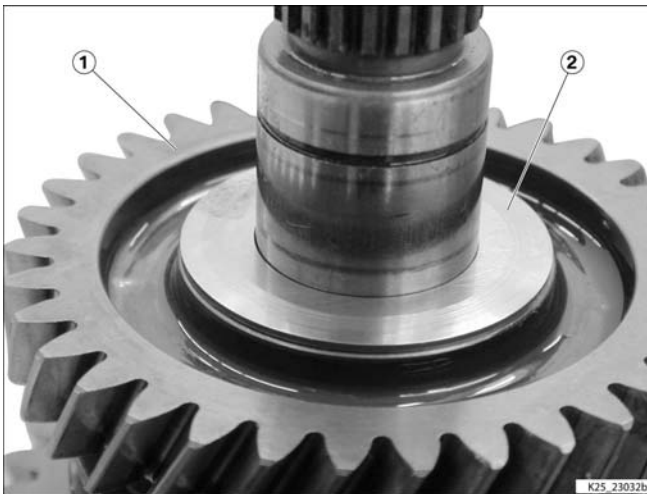
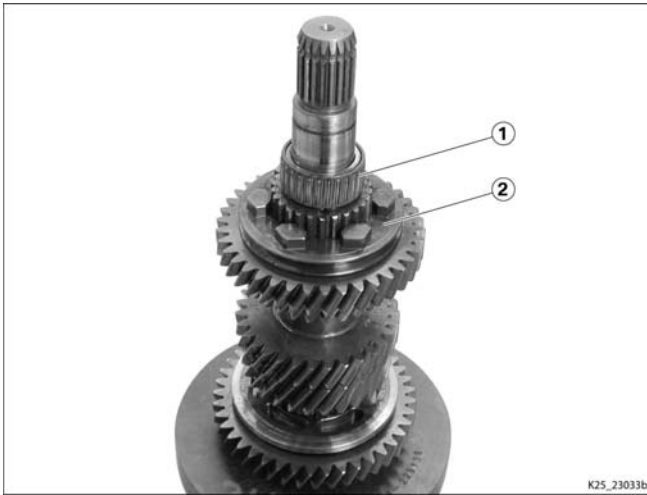
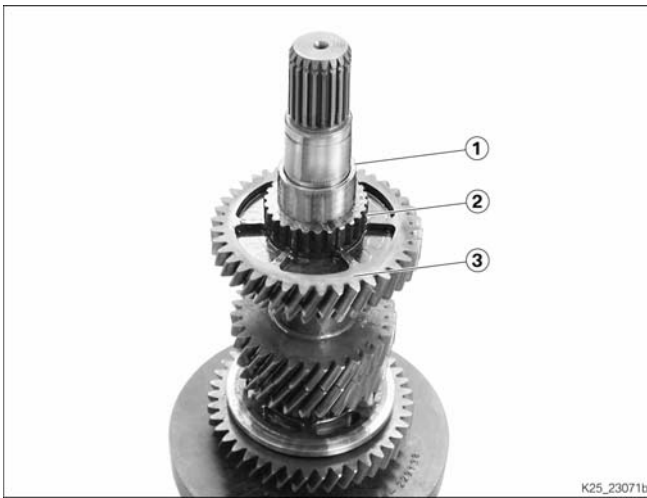
Measure:

- Check needle roller bearings, backup washers, thrust washer and gear shift wheel for wear and replace parts as necessary.



- Calculate the thickness of circlip (1); the circlip must fit snugly in the groove.
- Install new circlip (1) in front of the shaft bearing, making sure that it is seated correctly.
- Using suitable protective jaws, clamp the shaft in the vice, making sure that the output splines are pointing up.

- Install black needle roller bearing for gear shift wheel, 2nd gear.
- Install gear shift wheel for 2nd gear (3) making sure that the side with the pockets is toward the output splines.
- Press on guide sleeve for 2nd/3rd gears (2).
- Press on bearing bushing (1) for gear shift wheel, 3rd gear.

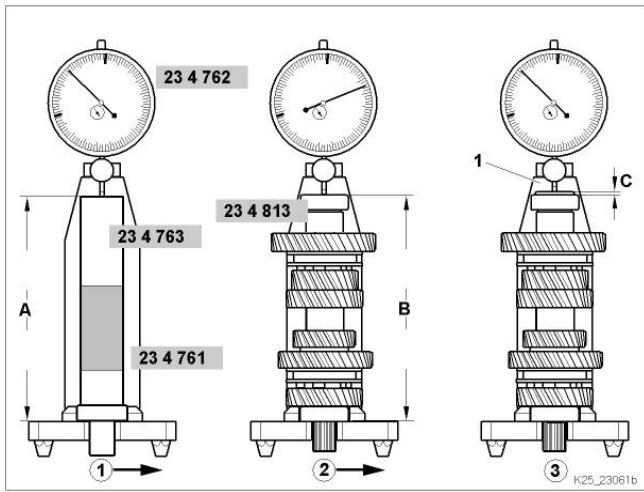


- Place gear shift wheel for 2nd/3rd gears (2) on guide sleeve for 2nd/3rd gears.
- Install green needle roller bearing (1) for gear shift wheel, 3rd gear, making sure that the dogs are toward the output splines.

- Install gear shift wheel, 3rd gear (1).

► **Measuring fully assembled length of output shaft**


- Place zero gauge (No. 23 4 763) in the measuring stand.
- Install dial gauge (No. 23 4 762) in the rear locating bore in measuring stand (No. 23 4 761) and set to preload.
- Using the dial gauge, zero to distance (A) of zero gauge (No. 23 4 763) .
- Remove zero gauge (No. 23 4 763) from the measuring stand.



- Mount measuring disc (No. 23 4 813) on the output shaft.
- Lay the grooved ball bearing on measuring disc (No. 23 4 813) .
- Place the output shaft in measuring stand (No. 23 4 761) .
- Use dial gauge (No. 23 4 762) to measure deviation from zero of distance (B) at the bearing race.
- The deviation from zero equals the thickness (C) of shim (1).
- Place shim (1) of correct thickness on the bearing race.

Test

- Check deviation from zero.

 Technical data			
Deviation from zero of the gearbox shafts Value definition: Only if the appropriate zero gauge is used		0 - -0.05 mm	
Fully assembled length of gearbox output shaft Value definition: Overall length		182.64 - 182.69 mm	

Result: Deviation from zero is greater than maximum permissible value.

Measure:

- Check needle roller bearings, backup washers, shims and gear shift wheel for wear and replace parts as necessary.
- Remove the output shaft from measuring stand (No. 23 4 761) .
- Remove measuring disc (No. 23 4 813) with shim (1) and grooved ball bearing.

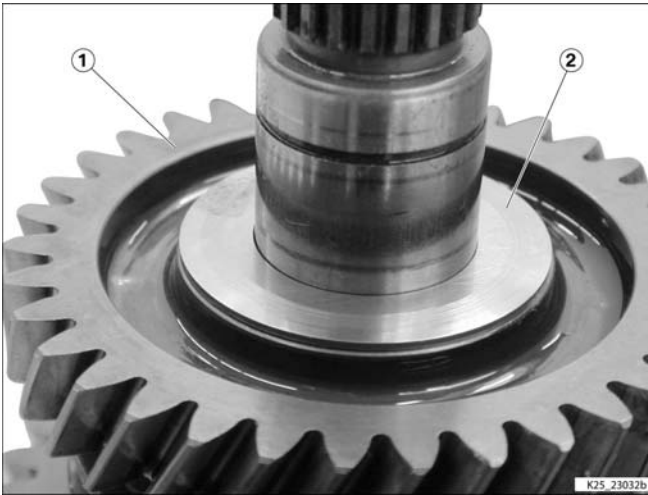


Attention

Nature: Damage to components can occur if the tapered thrust washer is not installed right way round.

Avoidance:

The tapered thrust washer must be installed with the smaller diameter toward



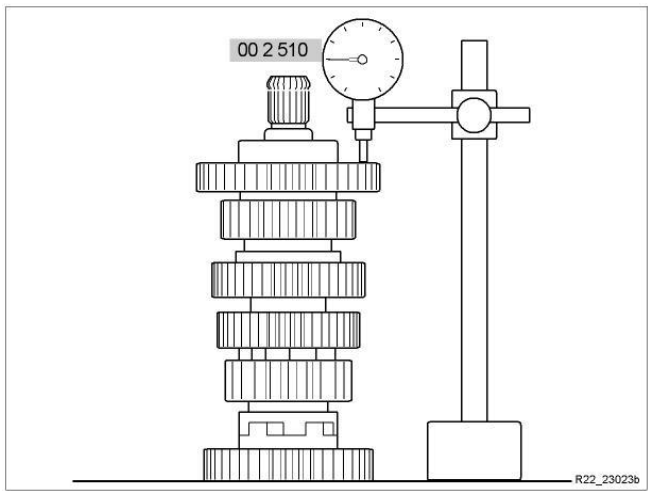
the shaft bearing.


- Install thrust washer (2) of correct thickness as calculated, making sure that the washer is correctly seated.
- Press the grooved ball bearing onto the output shaft.

► **Checking endplay, output shaft, 2nd/3rd gear**

Test

- Secure dial gauge (No. 00 2 510) to the stand.
- Set the dial gauge on the edge of the gear shift wheel for 2nd gear and check endplay.



 Technical data			
Endplay gearbox output shaft, free gearwheel 2nd gear		0.15 - 0.45 mm	


Result: Result is out of tolerance.

Measure:

- Check needle roller bearings, backup washers, shims and gear shift wheel for wear and replace parts as necessary.

Test

- Set the dial gauge on the edge of the gear shift wheel for 3rd gear and check endplay.

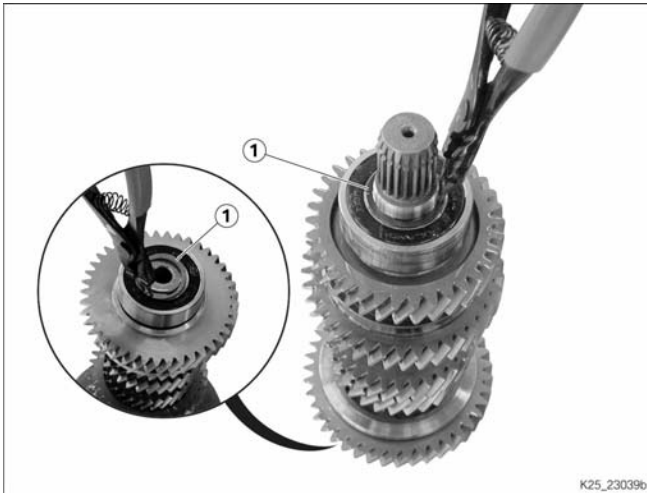
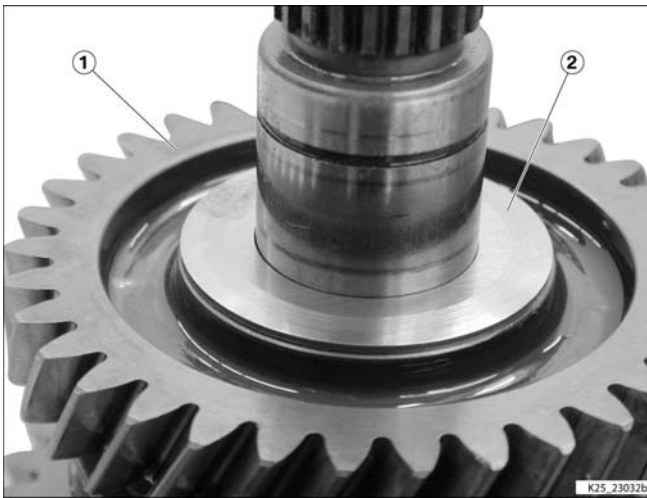
 Technical data			
Endplay gearbox output shaft, free gearwheel 3rd gear		0.1 - 0.25 mm	

Result: Result is out of tolerance.

Measure:

- Check needle roller bearings, backup washers, thrust washer and gear shift wheel for wear and replace parts as necessary.

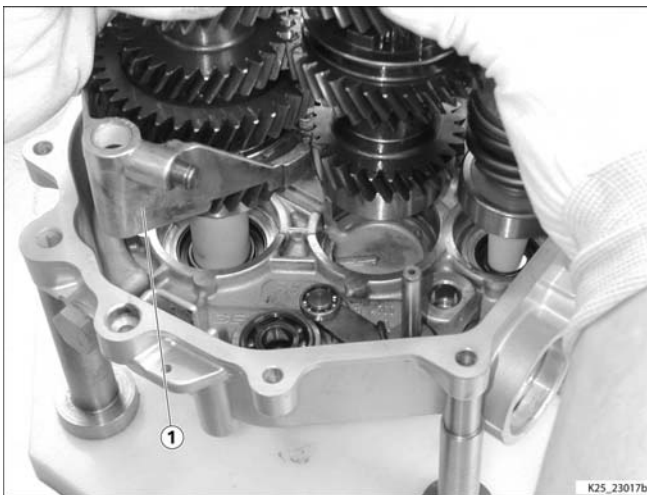




- Calculate the thickness of circlip (1); the circlip must fit snugly in the groove.
- Install new circlip (1) in front of the shaft bearing, making sure that it is seated correctly.

(-) Installing shift fork, 2nd/3rd gears

- Mount selector fork (1) for 2nd/3rd gears on the output shaft.



(-) Installing gearbox shafts

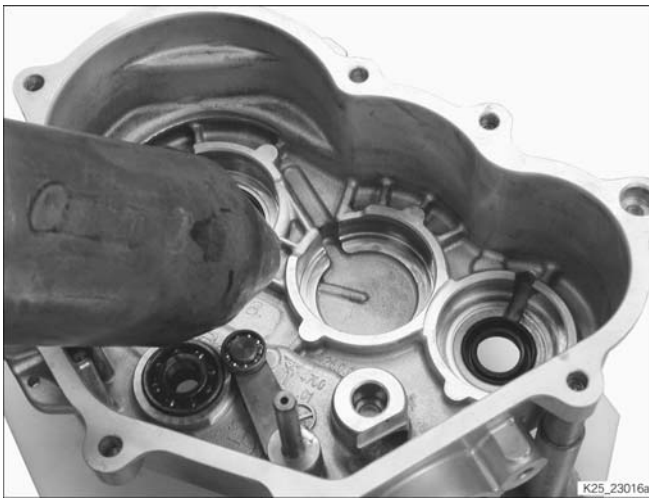
- Install the housing cover in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



Warning


Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling



heated parts.

- Heat the bearing seats in the housing cover.

 Technical data			
Mating temperature, gearbox housing		100 - 120 °C	



⚠ Attention

Nature: Shafts not correctly seated in their guides are subject to accelerated wear.

Avoidance: Check that the gearbox shafts are correctly seated.

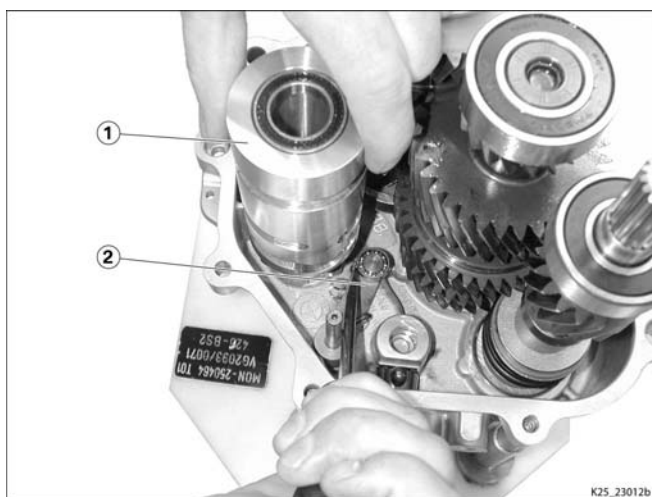
- Install output shaft (3) with sliding sleeve (No. 23 4 732), intermediate shaft (2) and input shaft (1) together in the housing cover.



(-) Installing selector drum

- Affix shim (1) to the selector drum with a blob of grease.

- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.

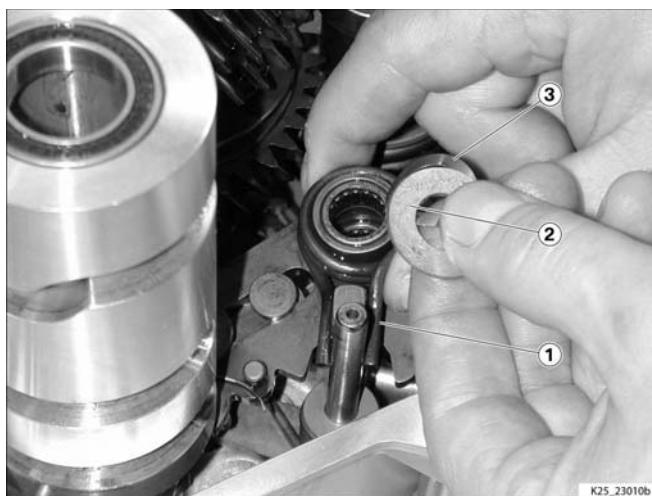


- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.



(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).



- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



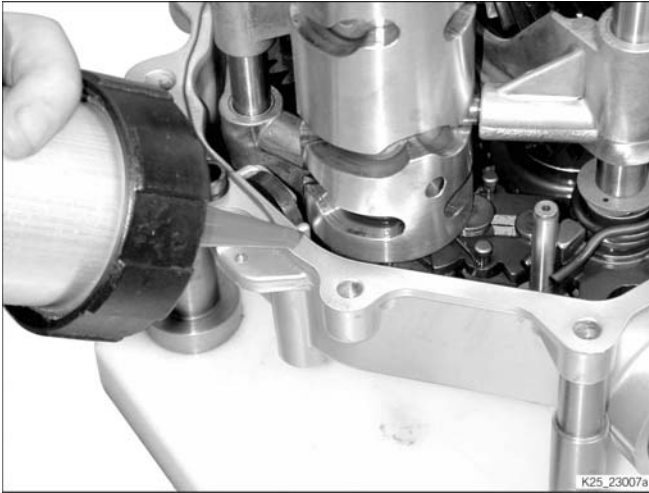
(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.

⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203	Sealing compound	
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⚠ Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.




Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.



 Tightening torques		
Gearbox cover to gearbox housing	9 Nm	

📁 23 31 501 Replacing selector forks (gearbox removed)


(-) Removing gearbox housing

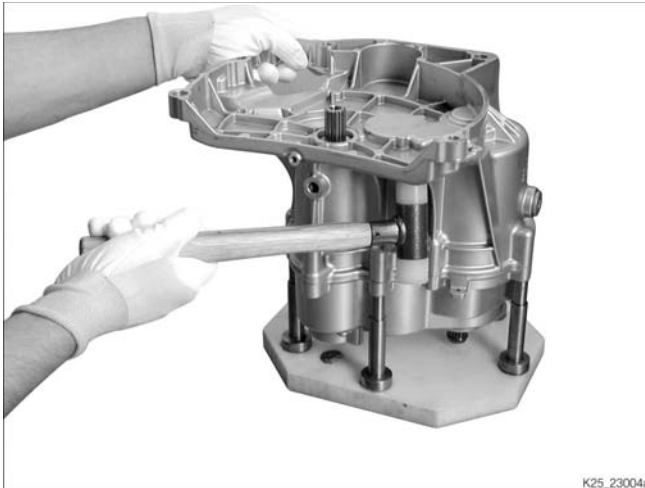


- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

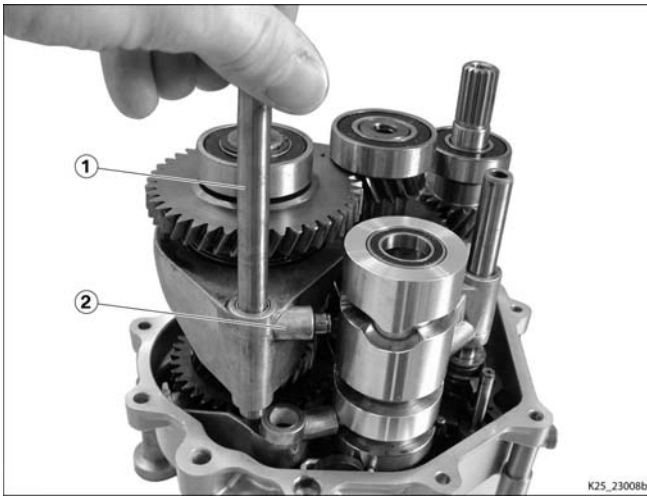
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



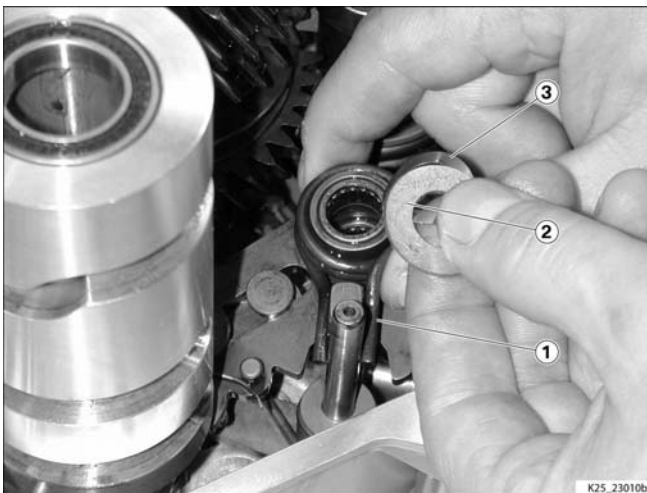
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).

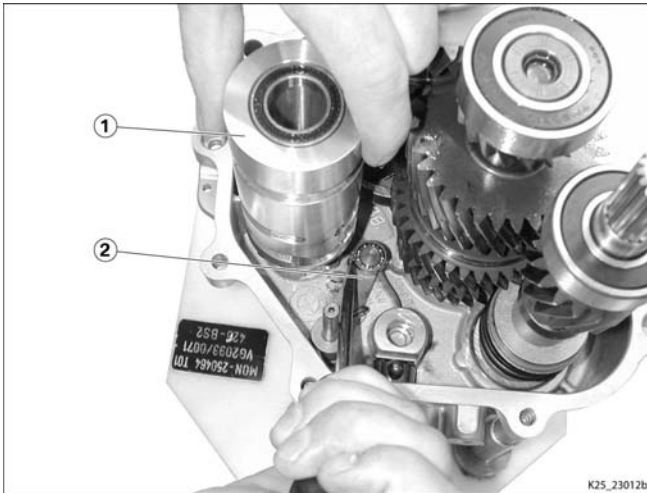


(-) Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.

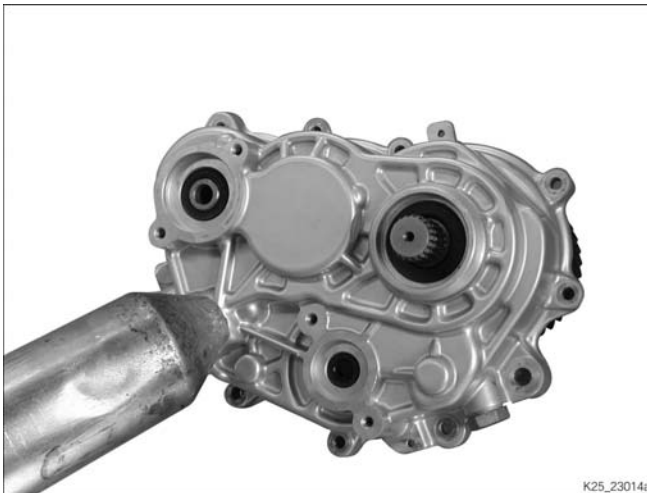


K25_23011b



K25_23012b

- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



K25_23014a

(-) Removing gearbox shafts

- Remove the housing cover with gear set from gearbox adapter (No. 23 1 661) (No. 23 1 662) and carefully lay it on its side.



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

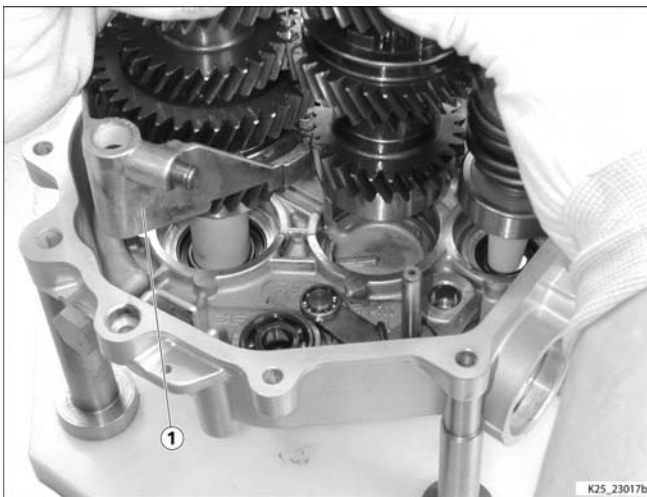
Release temperature, gearbox housing		100 - 120 °C	
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- Remove input shaft (1) with intermediate shaft (2) and output shaft (3) together from the housing cover.



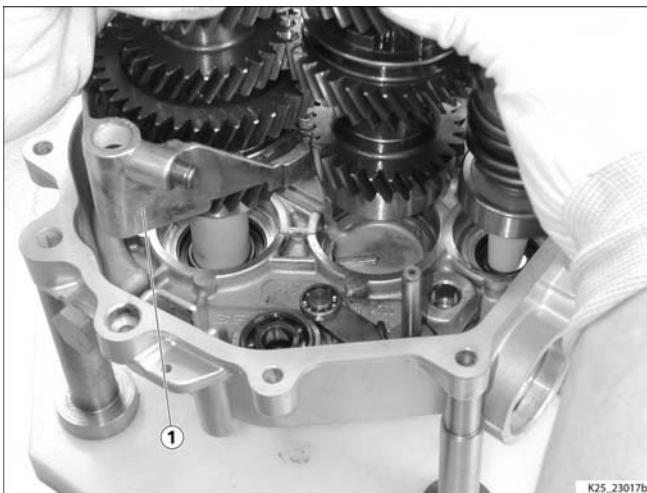
(-) Removing selector fork, 2nd/3rd gears

- Remove selector fork (1) for 2nd/3rd gears.



(-) Installing shift fork, 2nd/3rd gears

- Mount selector fork (1) for 2nd/3rd gears on the output shaft.



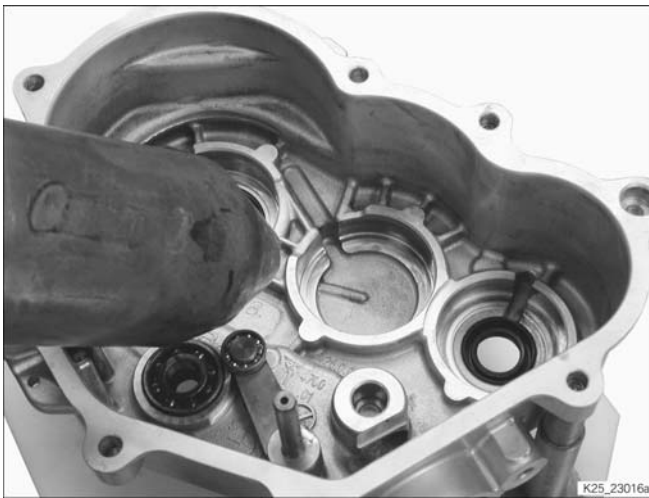
(-) Installing gearbox shafts

- Install the housing cover in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



Warning

Nature: Heated/hot parts can cause burns.



Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
-------------------------------------	--	--------------	--



Attention

Nature: Shafts not correctly seated in their guides are subject to accelerated wear.

Avoidance: Check that the gearbox shafts are correctly seated.

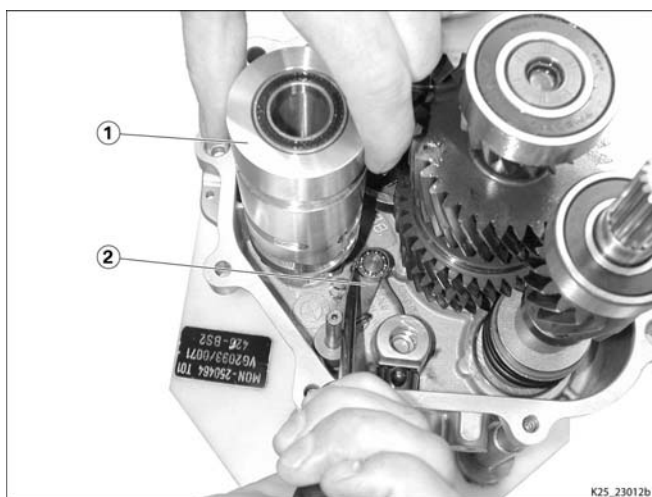
- Install output shaft (3) with sliding sleeve (No. 23 4 732), intermediate shaft (2) and input shaft (1) together in the housing cover.



(-) Installing selector drum

- Affix shim (1) to the selector drum with a blob of grease.

- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.

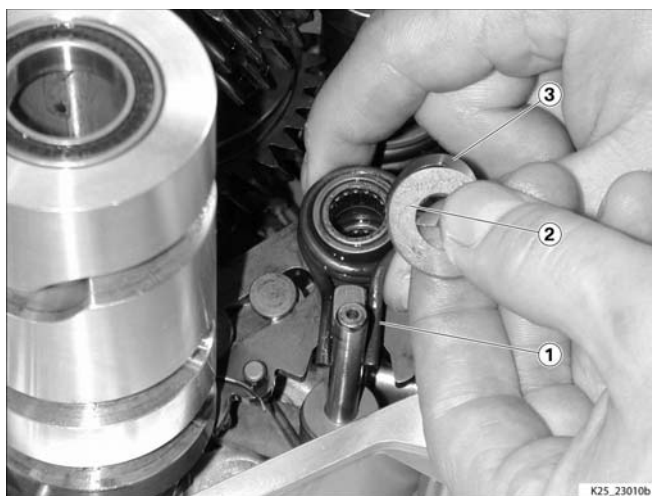


- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.



(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).



- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



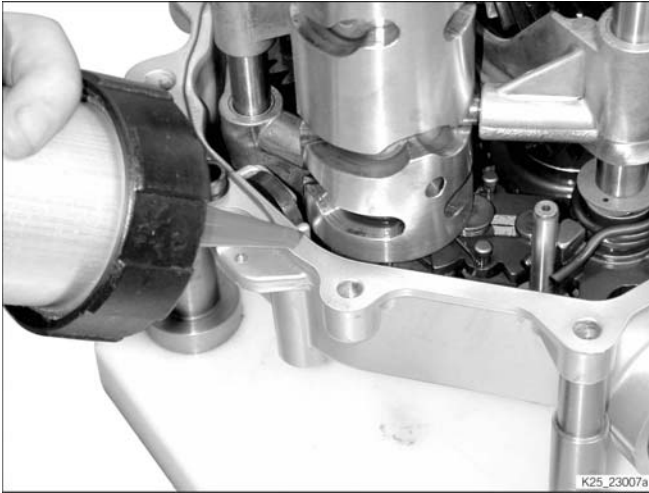
(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.

⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203	Sealing compound	
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⚠ Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
-------------------------------------	--	--------------	--

- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.



Tightening torques

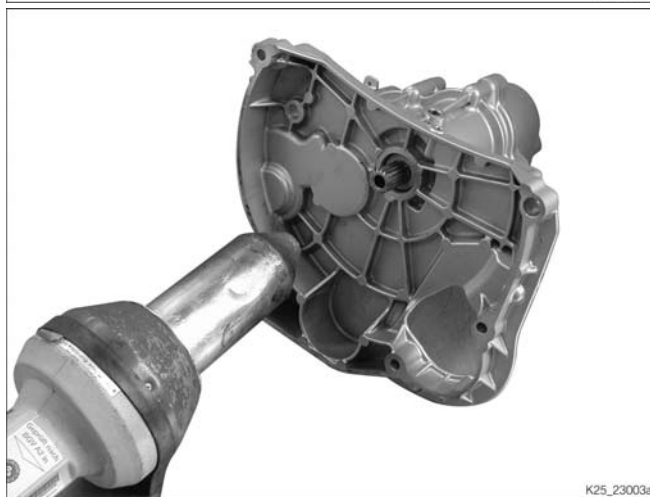
Gearbox cover to gearbox housing	9 Nm	
----------------------------------	------	--

📁 23 31 510 Replacing selector fork, 2nd/3rd gear (gearbox removed)


(-) Removing gearbox housing

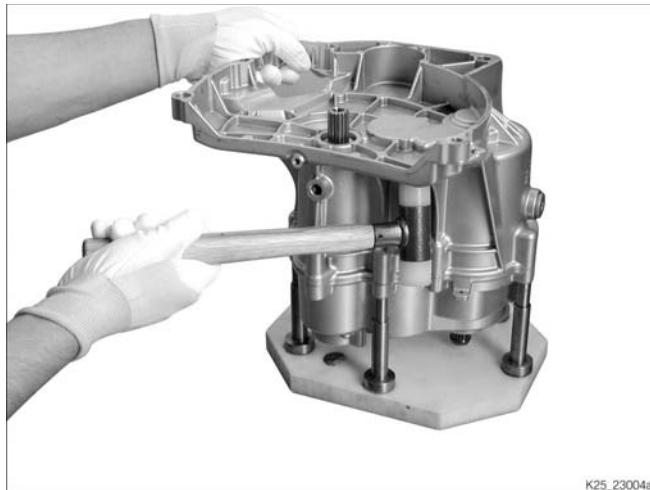


- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

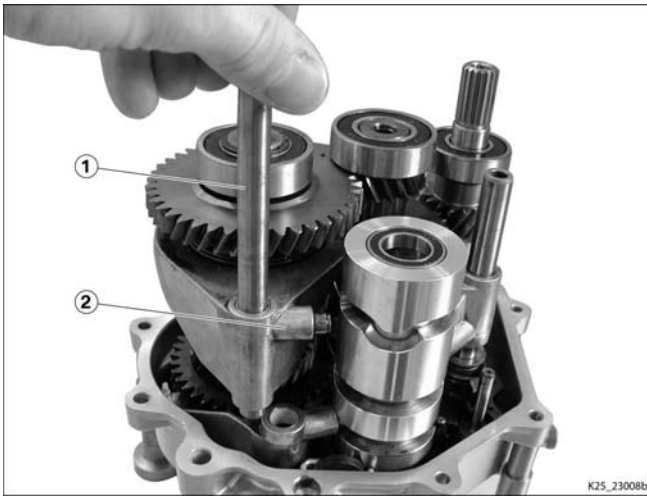
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



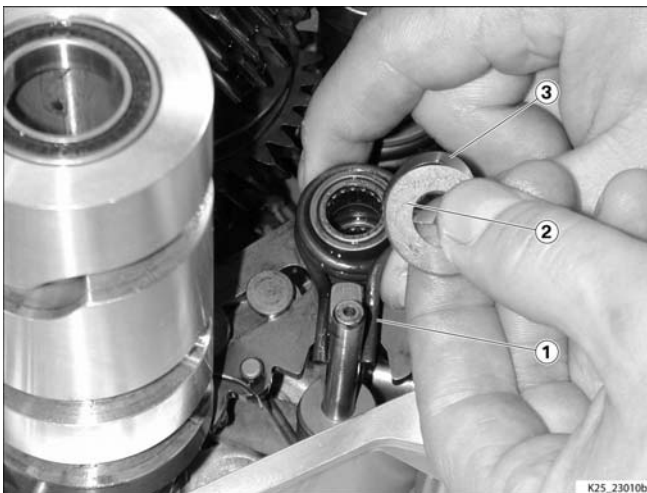
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).

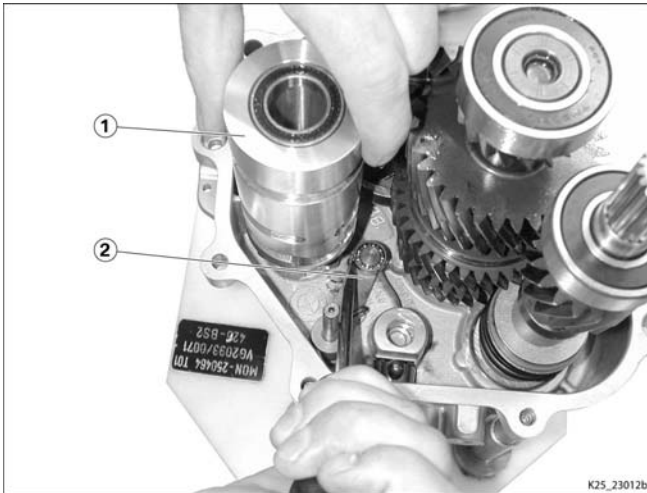


(-) Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.

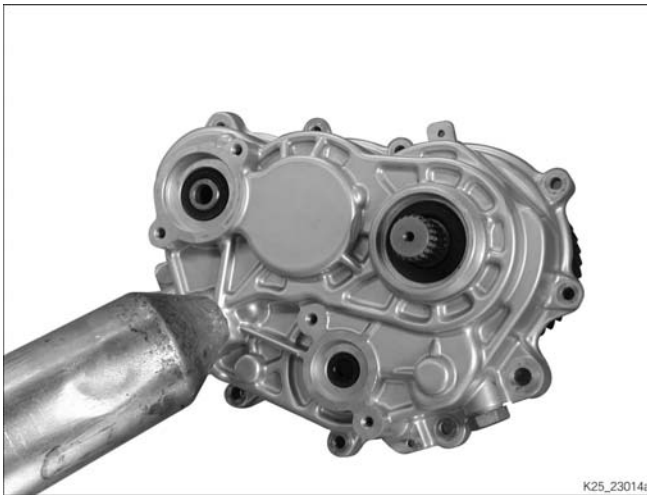


K25_23011b



K25_23012b

- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



K25_23014a

(-) Removing gearbox shafts

- Remove the housing cover with gear set from gearbox adapter (No. 23 1 661) (No. 23 1 662) and carefully lay it on its side.



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

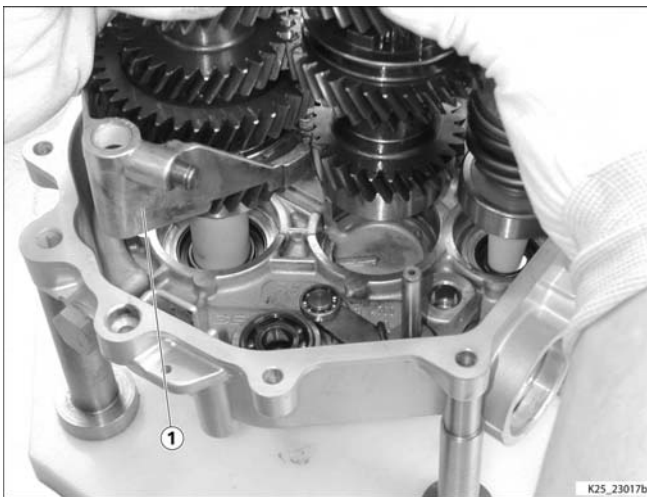
Release temperature, gearbox housing		100 - 120 °C	
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- Remove input shaft (1) with intermediate shaft (2) and output shaft (3) together from the housing cover.



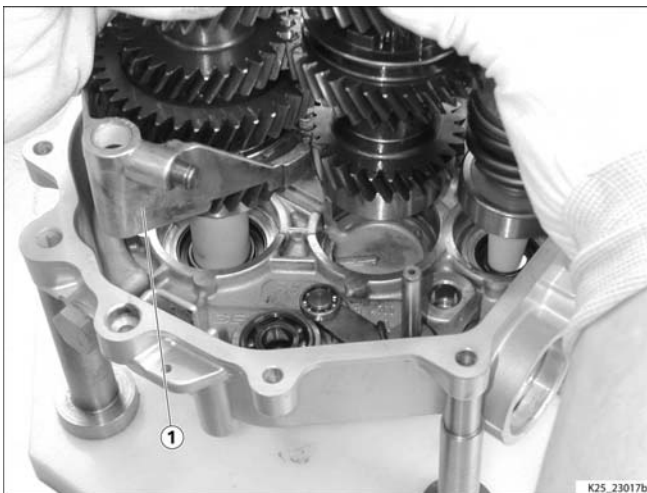
(-) Removing selector fork, 2nd/3rd gears

- Remove selector fork (1) for 2nd/3rd gears.



(-) Installing shift fork, 2nd/3rd gears

- Mount selector fork (1) for 2nd/3rd gears on the output shaft.



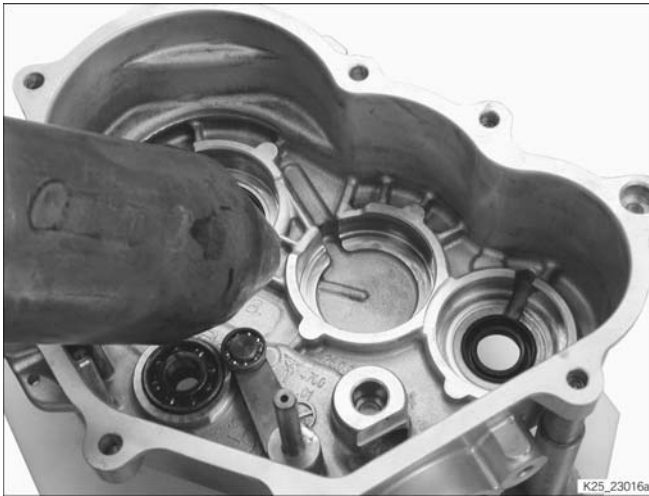
(-) Installing gearbox shafts

- Install the housing cover in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



Warning

Nature: Heated/hot parts can cause burns.



Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the housing cover.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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Attention

Nature: Shafts not correctly seated in their guides are subject to accelerated wear.

Avoidance: Check that the gearbox shafts are correctly seated.

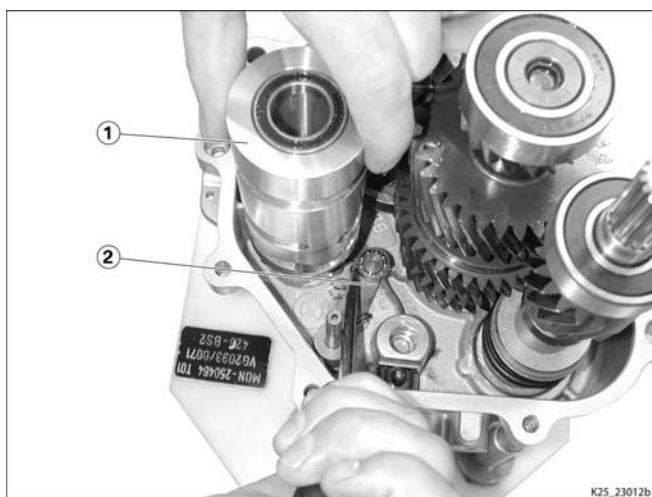
- Install output shaft (3) with sliding sleeve (No. 23 4 732), intermediate shaft (2) and input shaft (1) together in the housing cover.



(-) Installing selector drum

- Affix shim (1) to the selector drum with a blob of grease.

- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.

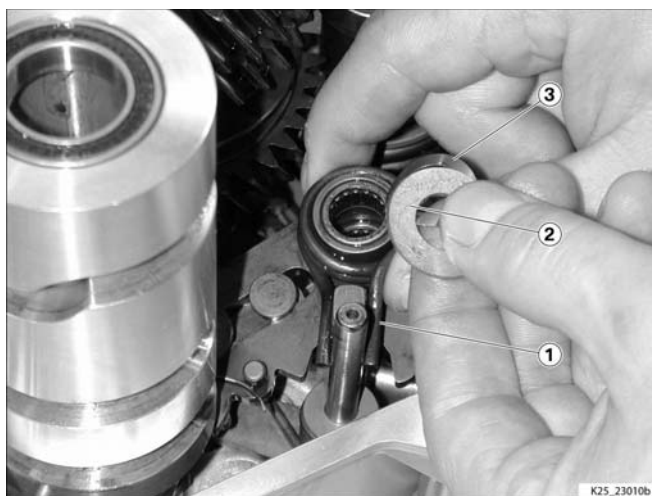


- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.



(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).



- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



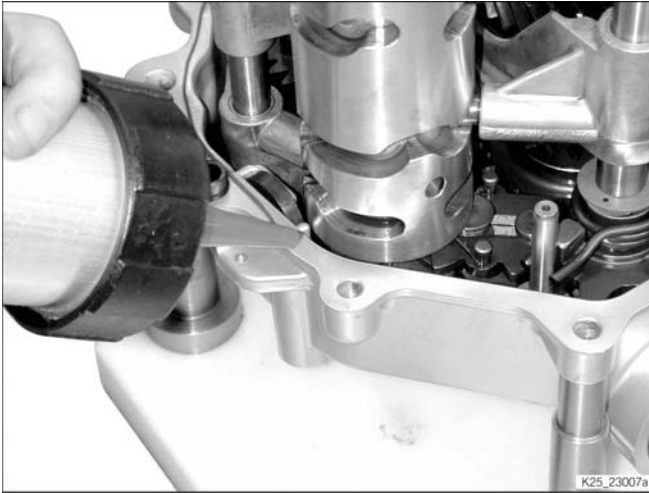
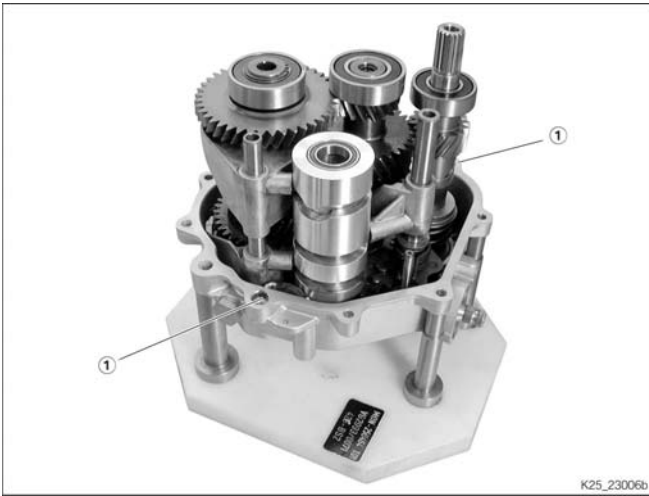
(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.

⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203	Sealing compound	
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⚠ Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.



Tightening torques

Gearbox cover to gearbox housing	9 Nm	
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📁 23 31 515 Replacing shift fork, 1st/5th gear (gearbox removed)


(-) Removing gearbox housing

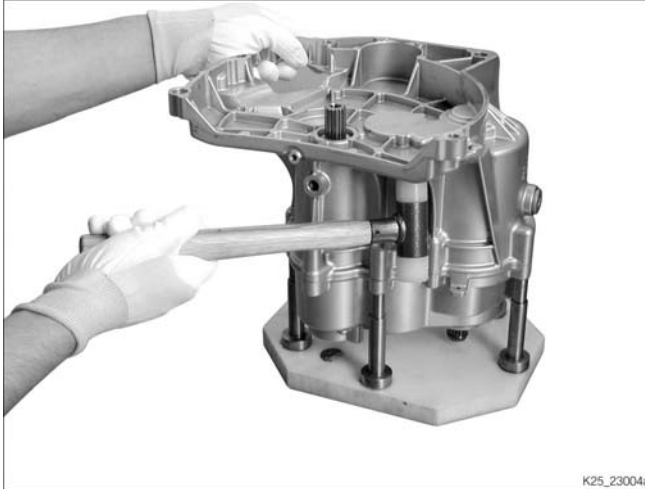
- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



- Heat the bearing seats in the gearbox housing.



 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

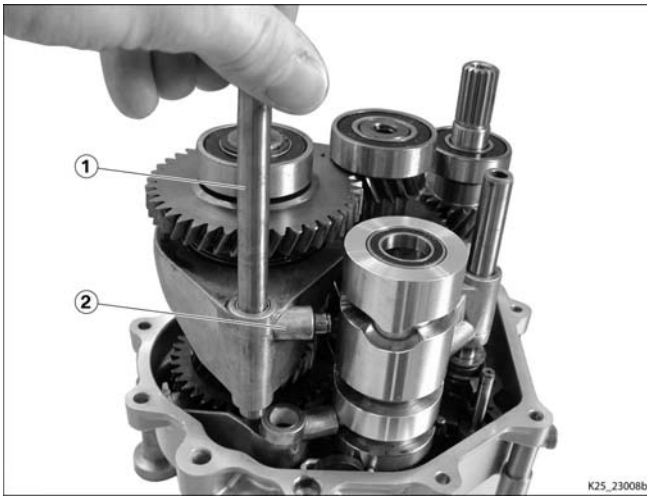
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



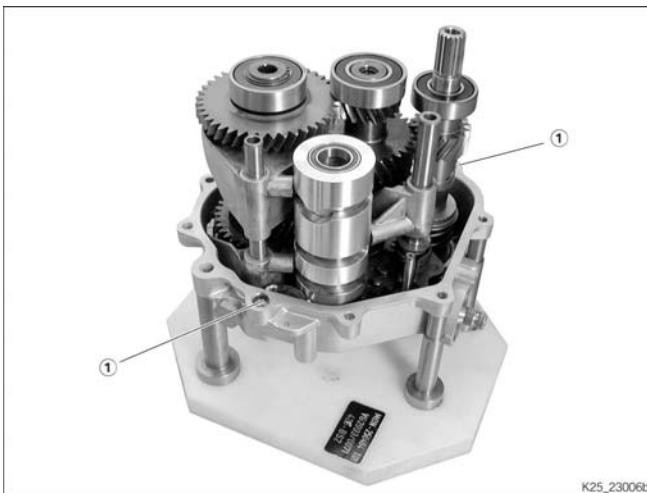
(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

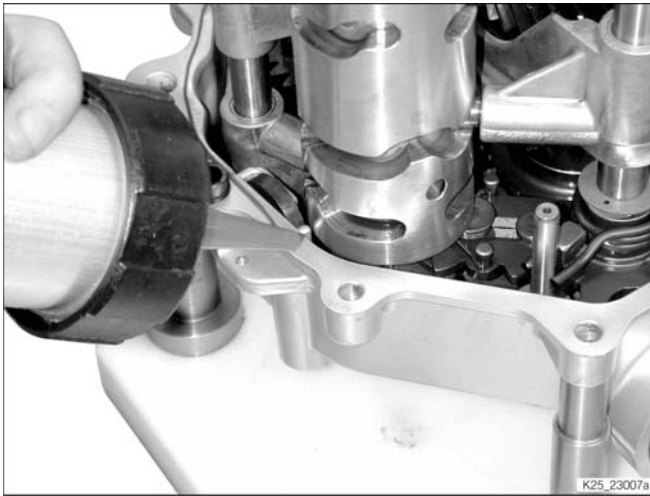
- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.


Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.



Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.

 Consumables/lubricants		
Loctite 5203	Sealing compound	




Warning


Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.

 Technical data			
Mating temperature, gearbox housing		100 - 120 °C	

- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.

 Tightening torques		
Gearbox cover to gearbox housing	9 Nm	

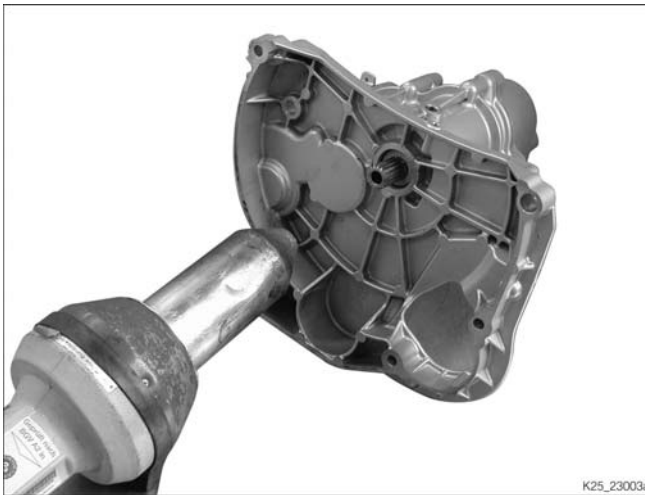


📁 23 31 520 Replacing shift fork, 4th/6th gear (gearbox removed)


(-) Removing gearbox housing

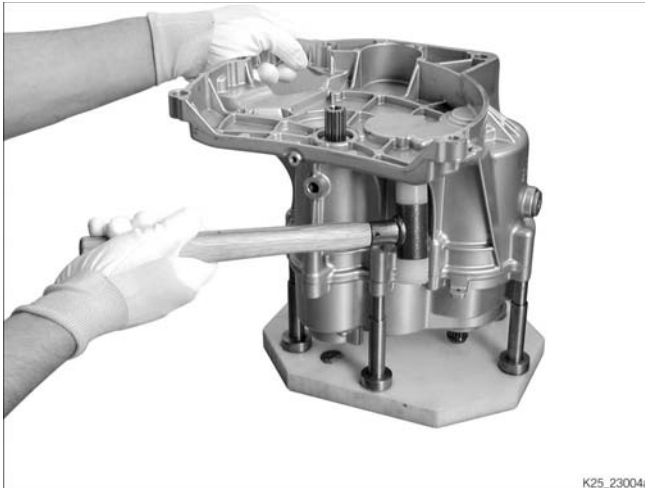


- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

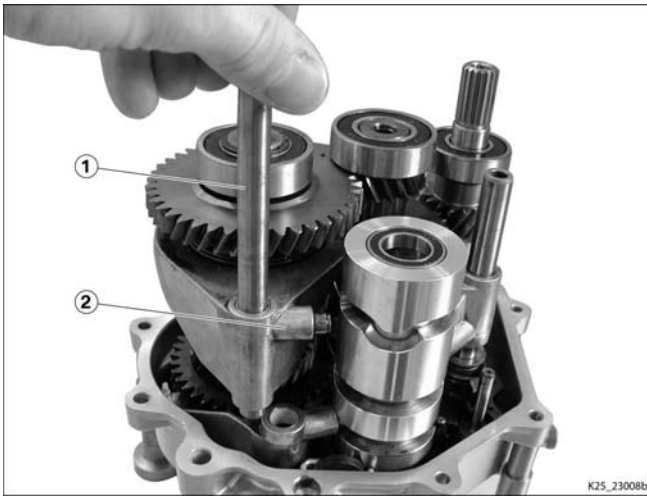
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



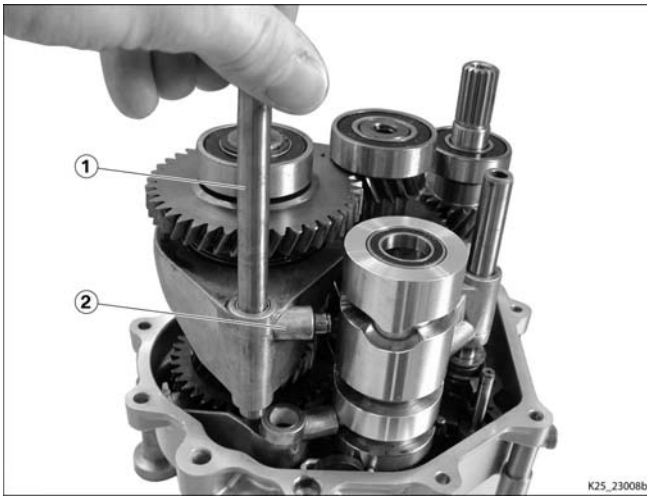
(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.

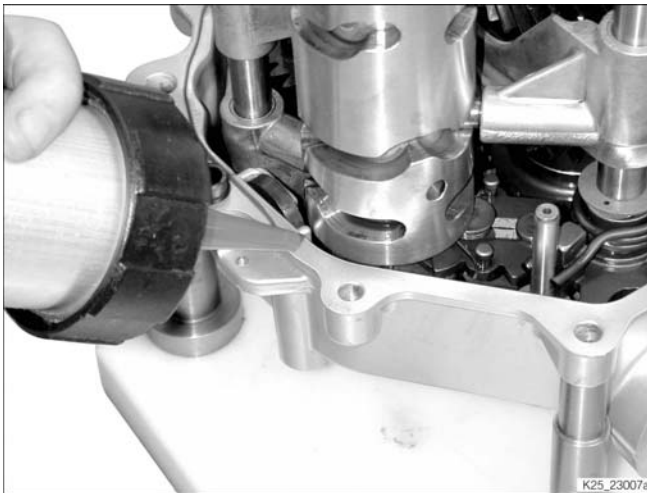


- Clean the sealing face of the gearbox housing.

⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.



- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203

Sealing compound

⚠ Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.



Tightening torques

Gearbox cover to gearbox housing	9 Nm	
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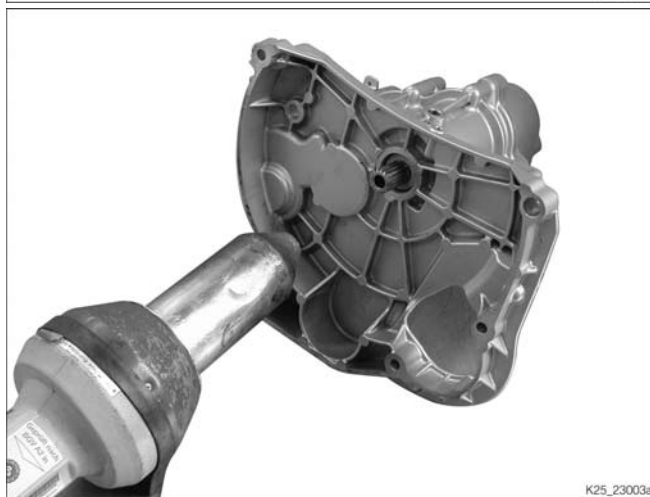
📁 23 31 533 Replacing pawl (gearbox removed)

(-) Removing gearbox housing




K25_23002b

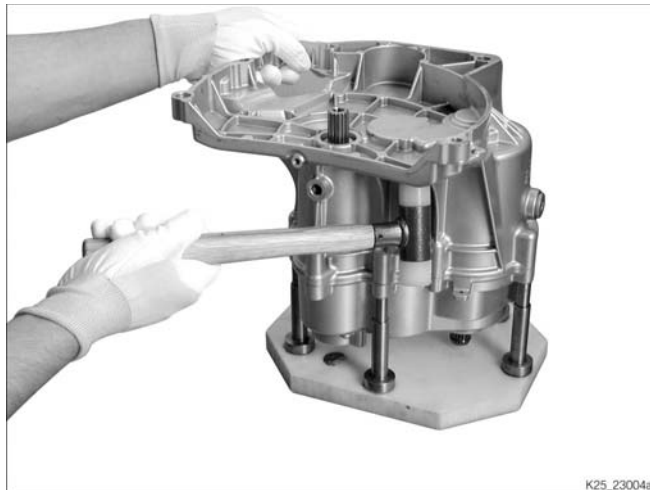
- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



K25_23003a

- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



K25_23004a

Warning

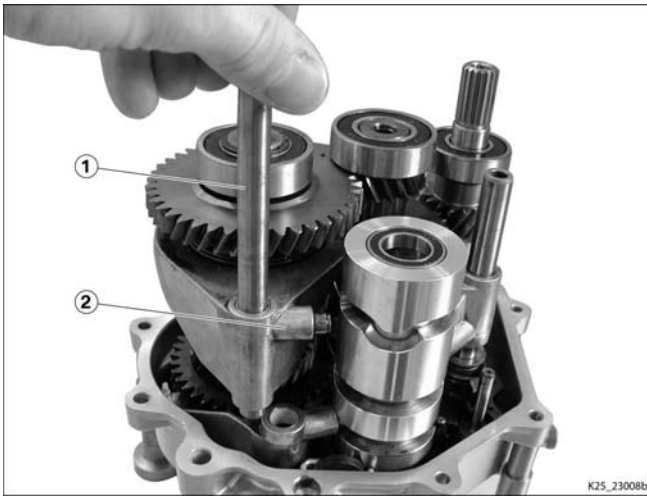
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



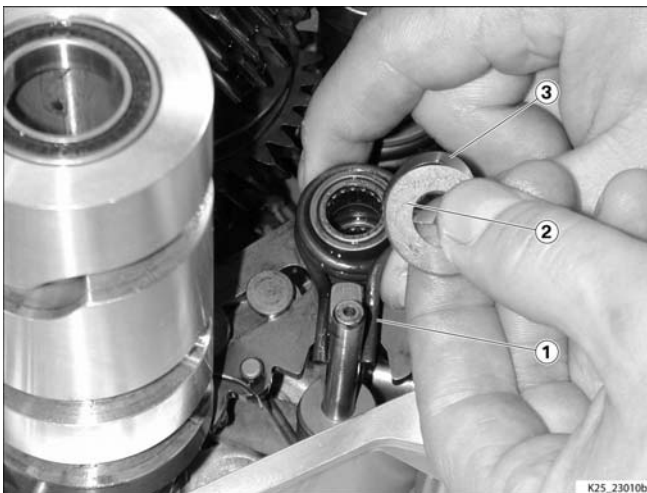
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



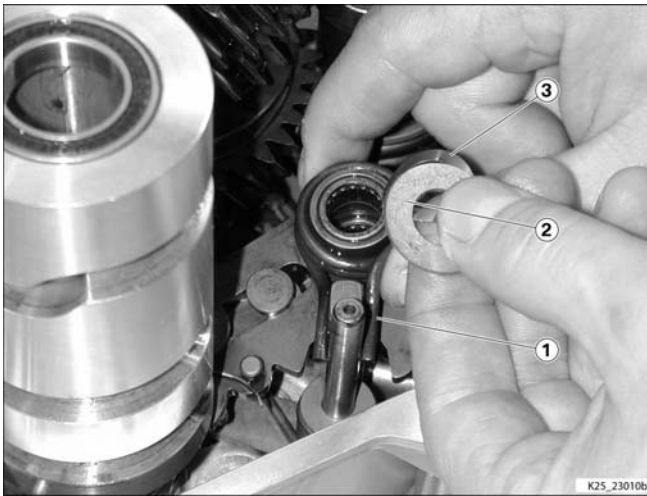
(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).



(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).



- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



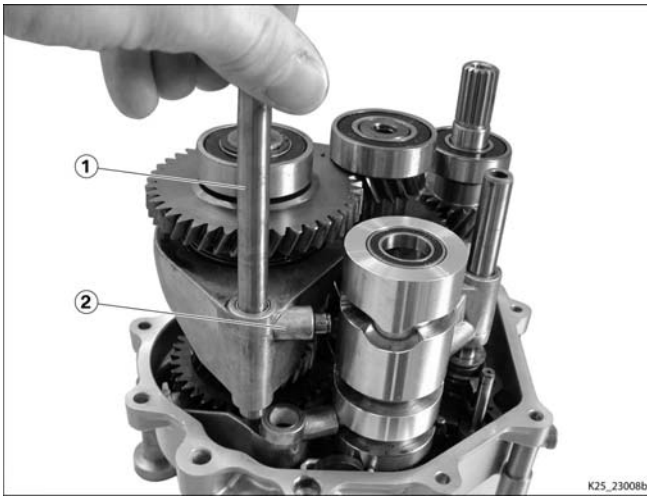
(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).

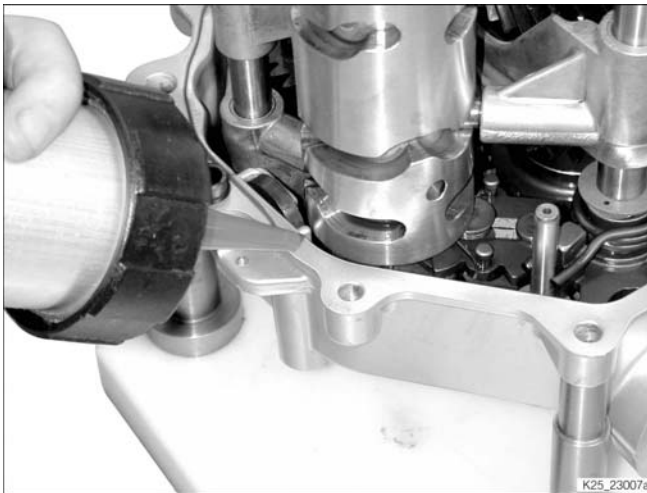


(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.



⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203

Sealing compound



Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.



Tightening torques

Gearbox cover to gearbox housing	9 Nm	
----------------------------------	------	--



📁 23 31 559 Replacing locking lever (gearbox removed)




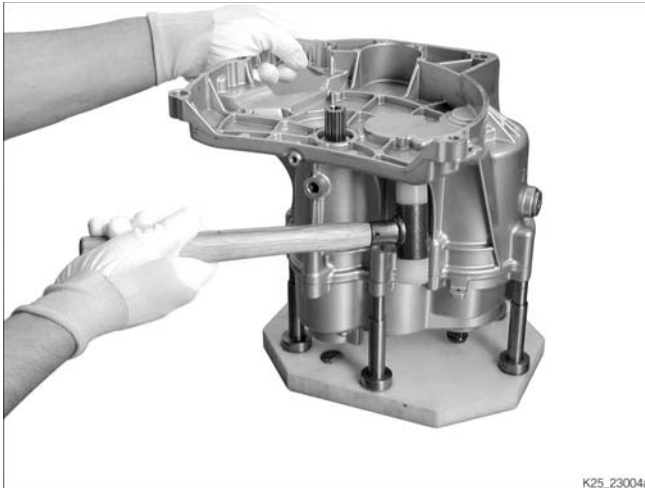
(-) Removing gearbox housing

- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662).



- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

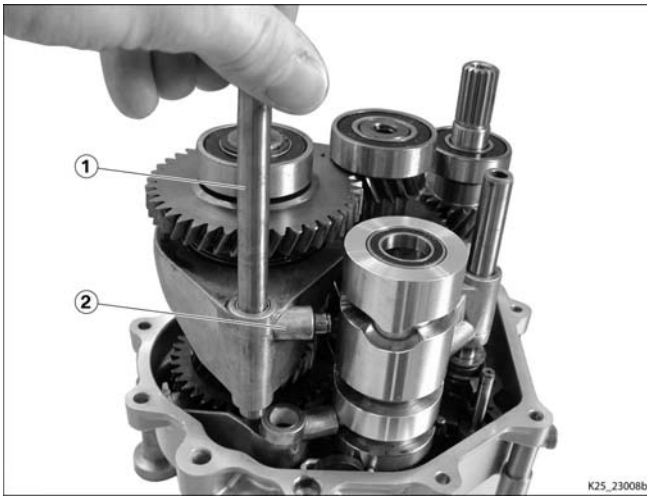
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



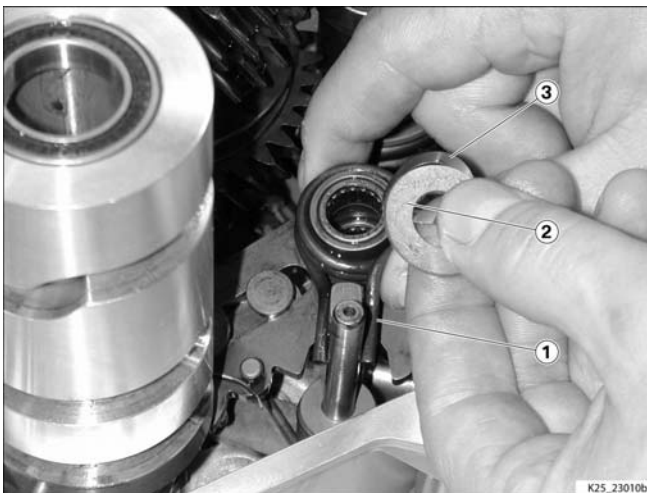
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



(-) Removing shift mechanism

- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).

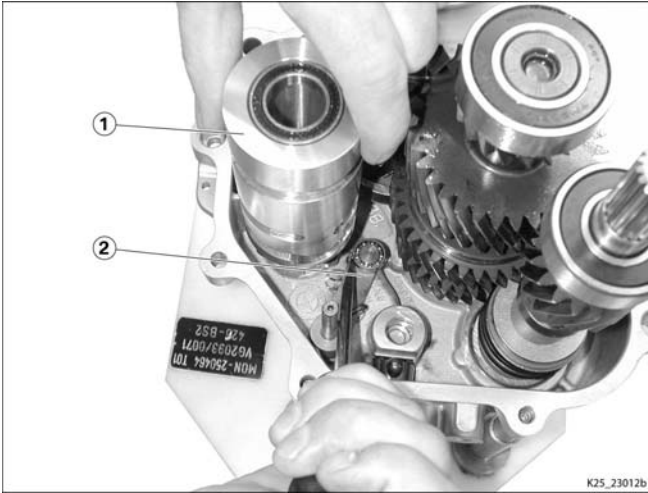


(-) Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.



- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



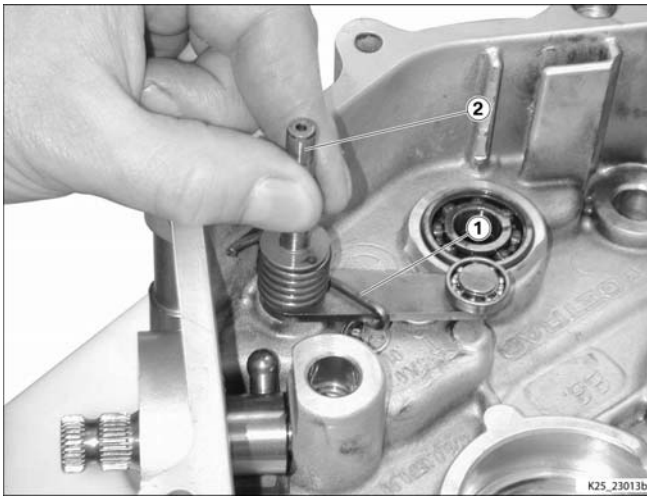
(-) Removing locking lever

- Remove locking lever (1) and pivot pin (2) from the housing cover.



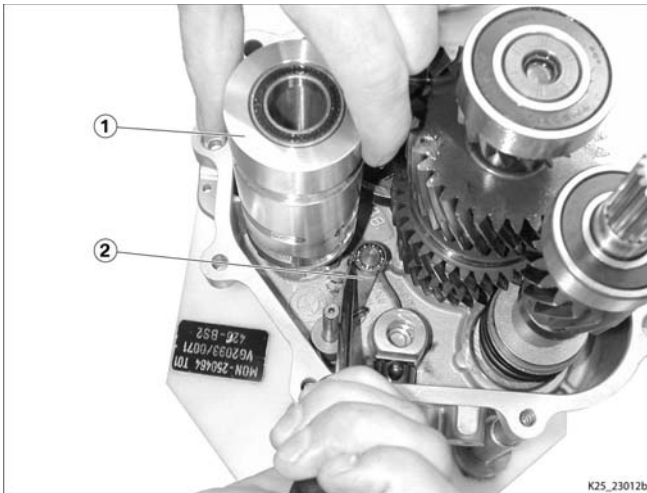
(-) Installing locking lever

- Install locking lever (1) and pivot pin (2).



(-) Installing selector drum

- Affix shim (1) to the selector drum with a blob of grease.



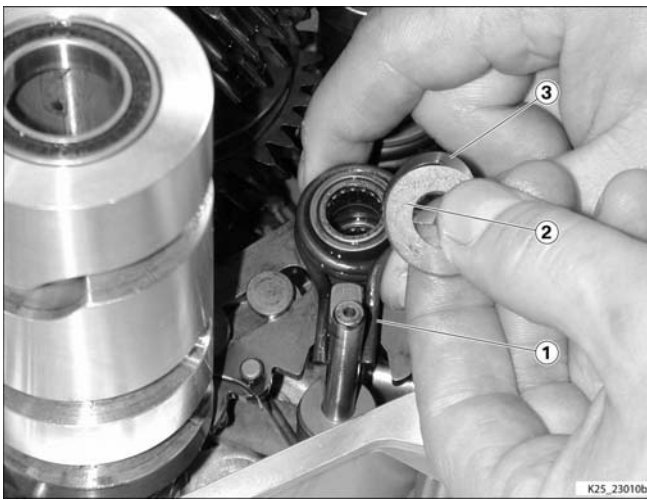
- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.

- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.



(-) Installing shift mechanism

- Install shift mechanism (1) with washer (2) and spring (3).

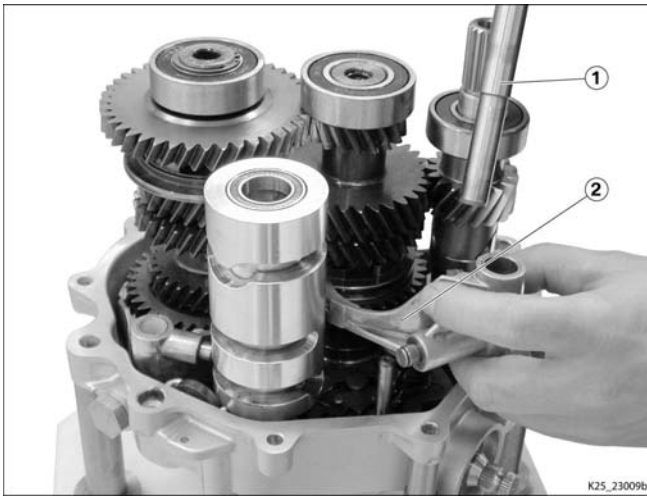


- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



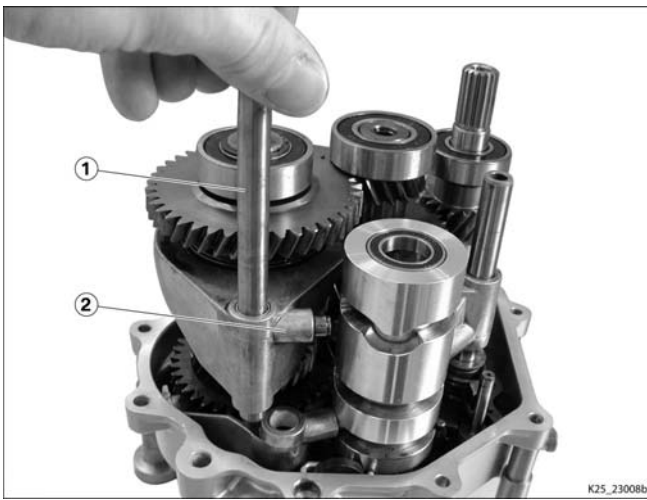
(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



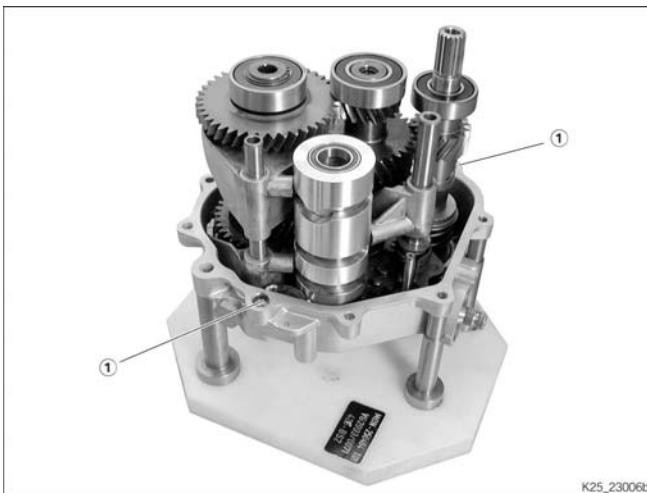
(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

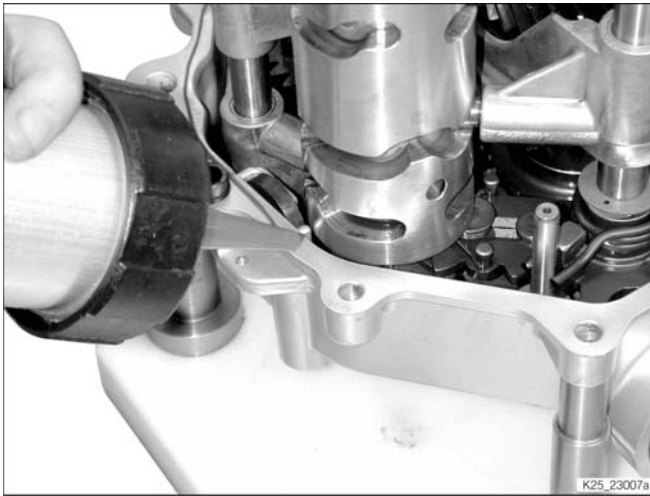
- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.


Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.



Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.

 Consumables/lubricants		
Loctite 5203	Sealing compound	




Warning


Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.

 Technical data			
Mating temperature, gearbox housing		100 - 120 °C	

- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.

 Tightening torques		
Gearbox cover to gearbox housing	9 Nm	

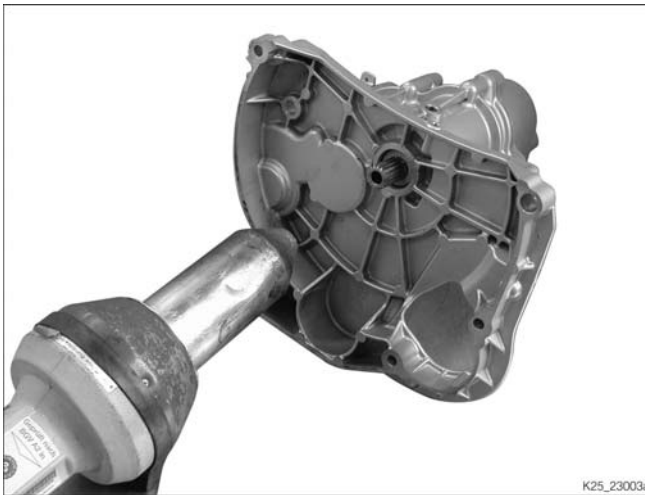


 **23 31 625 Replacing selector drum (gearbox removed)**


(-) Removing gearbox housing

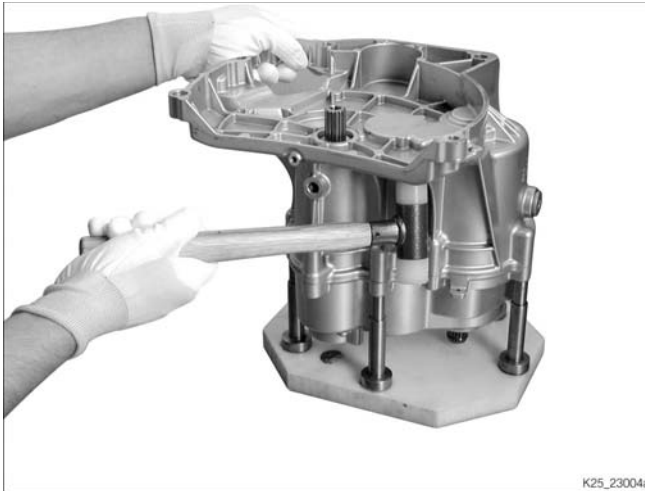


- Remove 9 screws (1) securing cover to housing.
- Remove exhaust-system bracket (2).
- Secure the gearbox in gearbox adapter (No. 23 1 661) (No. 23 1 662) .



- Heat the bearing seats in the gearbox housing.

 Technical data			
Release temperature, gearbox housing		100 - 120 °C	



Warning

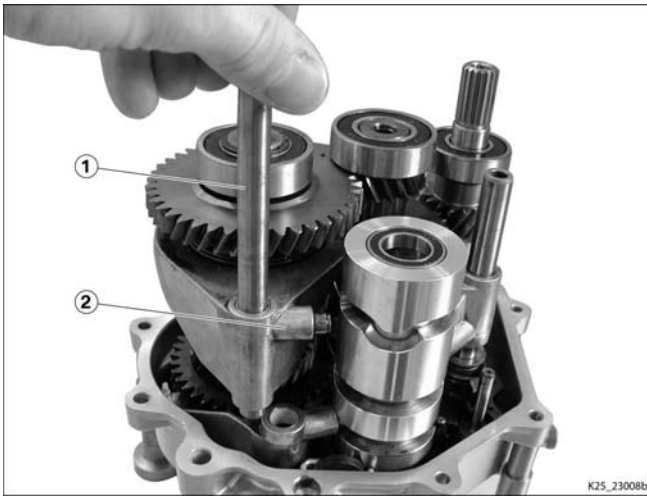
Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Tap lightly with a plastic-faced hammer to release gearbox housing (1) and remove it.

(-) Removing selector fork, 1st/5th gears

- Pull out selector rail I (1).
- Remove selector fork (2) for 1st/5th gears.



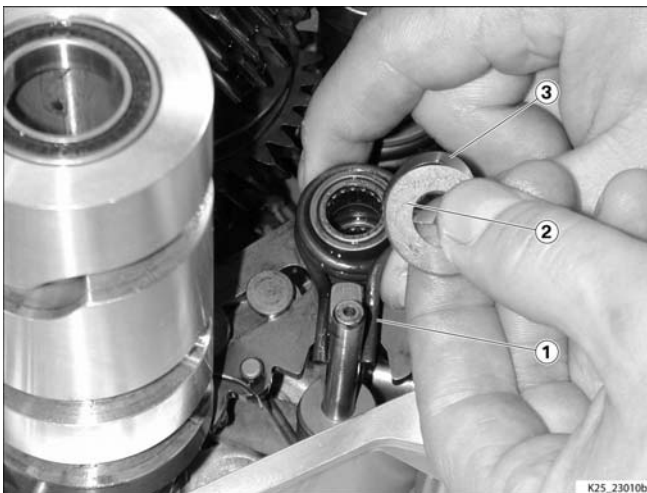
(-) Removing selector fork, 4th/6th gears

- Pull out selector rail II (1).
- Remove shift fork (2) for 4th/6th gears.



(-) Removing shift mechanism

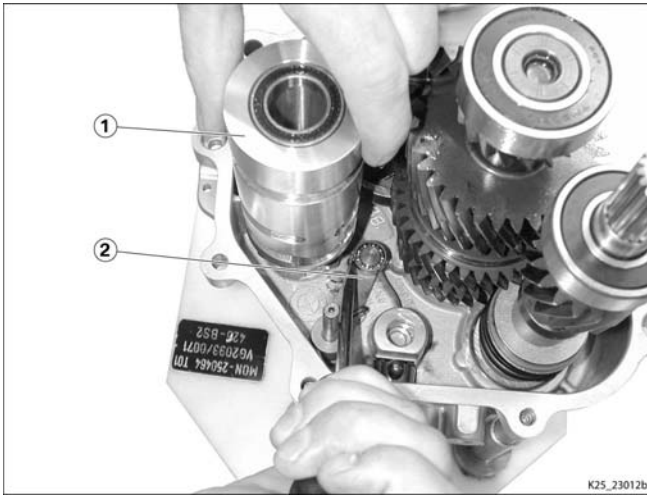
- Remove shift mechanism (1) with thrust washer (2) and preload spring (3).



(-) Replacing selector drum

► Removing selector drum

- Lift selector fork (1) for 2nd/3rd gears clear of track and pivot it to the side.

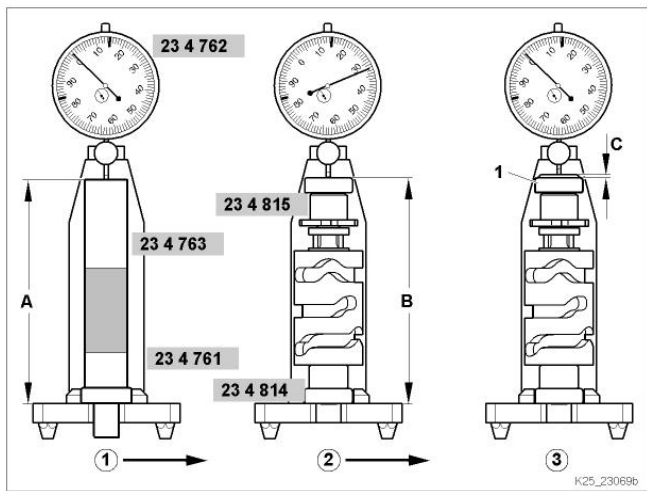


- Turn selector drum (1) gently back and forth to remove it from the housing cover. If necessary, push locking lever (2) aside and hold it in this position to keep it clear.



- Install a new selector drum.

► **Measuring fully assembled length of selector drum**




- Place zero gauge (No. 23 4 763) in the measuring stand.
- Install dial gauge (No. 23 4 762) in the rear locating bore in measuring stand (No. 23 4 761) and set to preload.
- Using the dial gauge, zero to distance (A) of zero gauge (No. 23 4 763) .
- Remove zero gauge (No. 23 4 763) from the measuring stand.
- Place measuring disc (No. 23 4 815) on the selector drum.
- Lay the grooved ball bearing on measuring disc (No. 23 4 815) .
- Place the selector drum with adapter disc (No. 23 4 814) in the measuring stand.
- Use dial gauge (No. 23 4 762) to measure deviation from zero of distance (B) at the bearing race.
- The deviation from zero equals the thickness (C) of shim (1).
- Place shim (1) of correct thickness on the bearing

race.

Test

- Check deviation from zero.

 Technical data			
Deviation from zero of the gearbox shafts Value definition: Only if the appropriate zero gauge is used		0 - -0.05 mm	
Selector drum - fully assembled length		141.4 - 141.5 mm	

Result: Deviation from zero is greater than maximum permissible value.

Measure:

- Check shims for wear and replace as necessary.
- Remove the selector drum from the measuring stand (No. 23 4 761) .
- Remove measuring disc (No. 23 4 815) with shim (1) and grooved ball bearing.

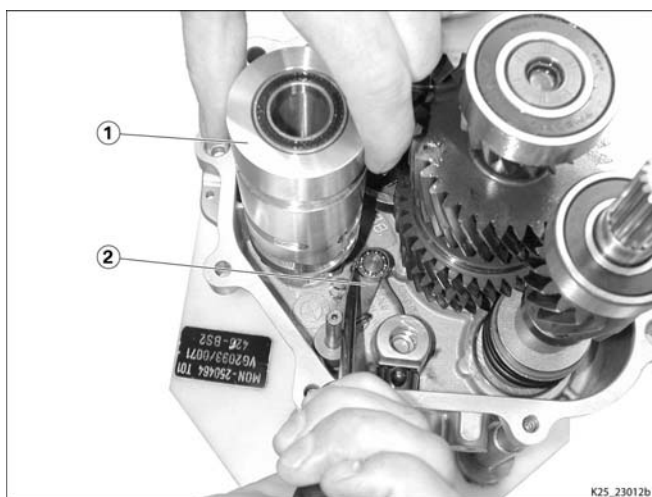


▶ Installing selector drum

- Affix shim (1) to the selector drum with a blob of grease.



- Push locking lever (2) to one side and install selector drum (1) in the gearbox cover.
- Make sure that the locking lever is seated correctly on the selector star.
- Turn the selector drum to the neutral position.

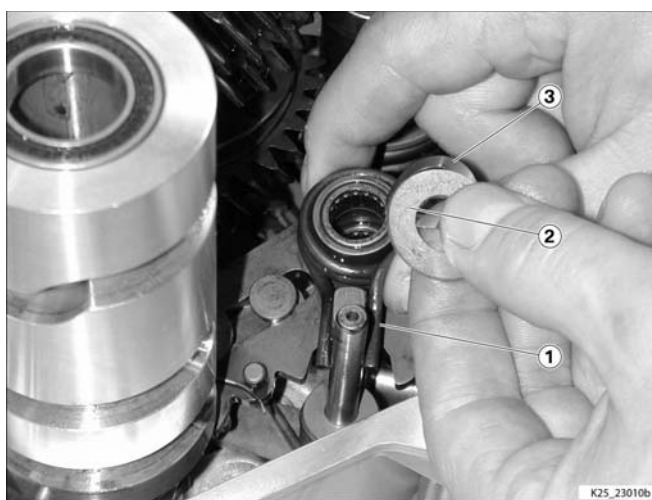


- Insert selector fork (1) for 2nd/3rd gears in the appropriate track.



◀ (-) **Installing shift mechanism**

- Install shift mechanism (1) with washer (2) and spring (3).



- Make sure that it is seated correctly relative to the ball head of selector shaft (1).



(-) Installing shift fork, 4th/6th gears

- Mount the selector fork for 4th/6th gears on the intermediate shaft.
- Insert selector fork (2) for 4th/6th gears in the appropriate track.
- Install selector rail II (1).



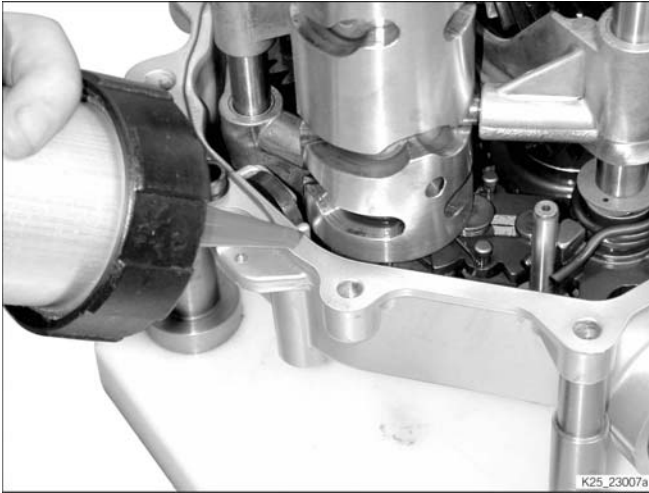
(-) Installing selector fork, 1st/5th gears

- Insert selector fork (2) for 1st/5th gears in the appropriate track.
- Install selector rail I (1).



(-) Installing gearbox housing

- Insert reamed sleeves (1) into both bores.



- Clean the sealing face of the gearbox housing.

⚠ Attention

Nature: Sealant allowed to bond before the parts are assembled and sealant applied to oily surfaces will not form a correct seal.

Avoidance: Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; within this time, place the housing in position and tighten the securing screws.

- Run a bead of sealant around the sealing face.



Consumables/lubricants

Loctite 5203	Sealing compound	
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⚠ Warning

Nature: Heated/hot parts can cause burns.

Avoidance: Wear protective gloves when handling heated parts.

- Heat the bearing seats in the gearbox housing and place the housing in position.



Technical data

Mating temperature, gearbox housing		100 - 120 °C	
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- Install 9 screws (1) to secure the cover to the housing, taking care to install exhaust-system bracket (2) at the same time.

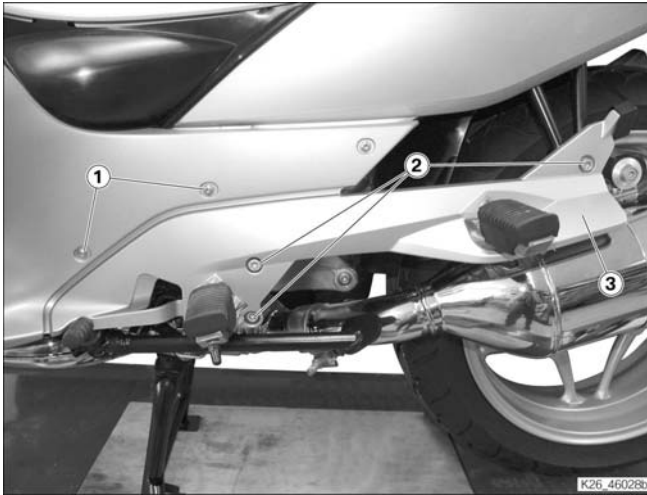


Tightening torques

Gearbox cover to gearbox housing	9 Nm	
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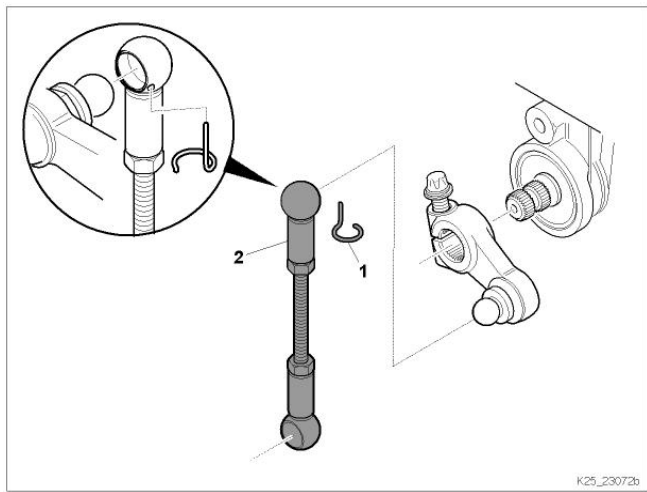
23 31 650 Replacing foot-operated selector shaft

(-) Removing left footrest plate



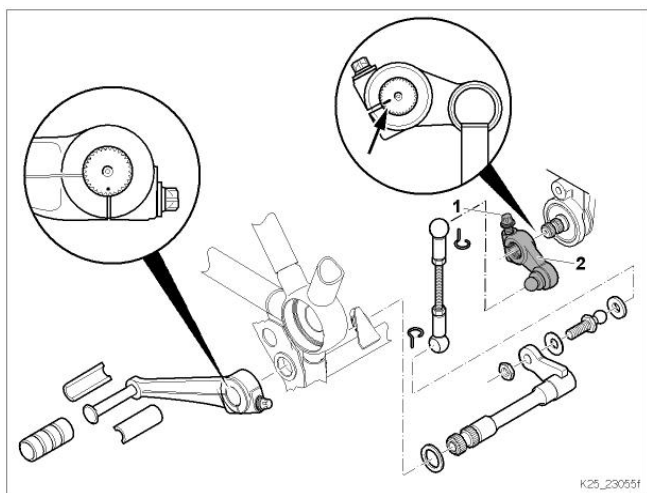
- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.

(-) Disengaging selector rod from shift lever



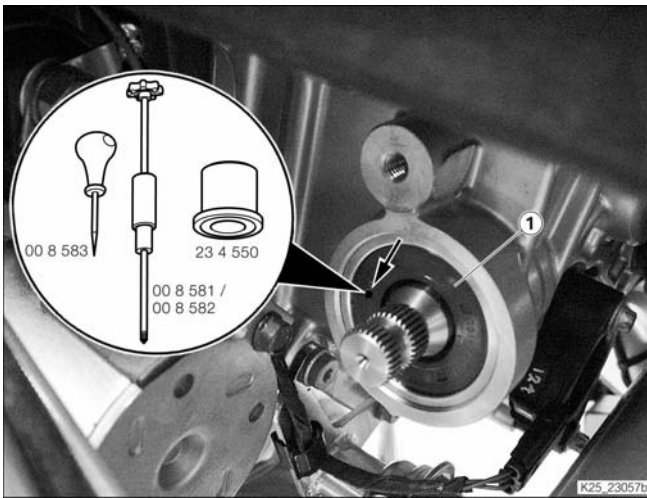
- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.

(-) Removing shift lever from selector shaft



- Remove screw (1) from the shift lever.
- Pull shift lever (2) off the selector shaft.

(-) Removing shaft sealing ring of selector shaft from housing cover



- Shaft sealing ring (1) has to be pierced with mandrel (No. 00 8 583) at the position as indicated (arrow), in order to avoid damaging the housing.
- Remove shaft sealing ring (1) with puller (No. 00 8 581) , (No. 00 8 582) .

(-) Removing foot-operated selector shaft



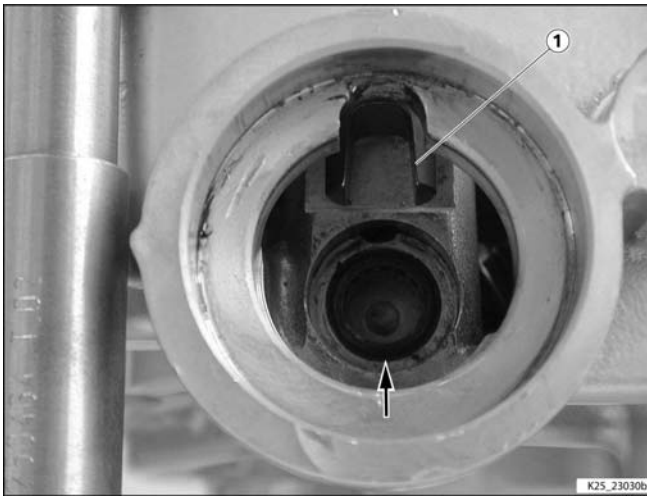
- Remove circlip (1) in front of the selector shaft bearing.



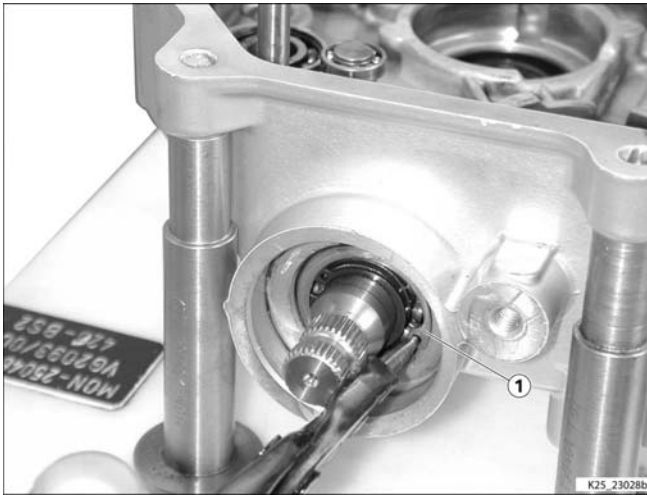
- Remove selector shaft (1), making sure that the ball head is in line with the recess in the housing.

(-) Installing foot-operated selector shaft

- Install the selector shaft in the housing cover.
- Make sure that the ball head of the selector shaft engages the V-groove of shift actuator (1), while at the same time making sure that the end of the shaft is correctly seated in the needle bearing in the housing cover (arrow).



- Install a new circlip (1) in front of the selector shaft bearing.



(-) Installing shaft sealing ring of selector shaft in housing cover

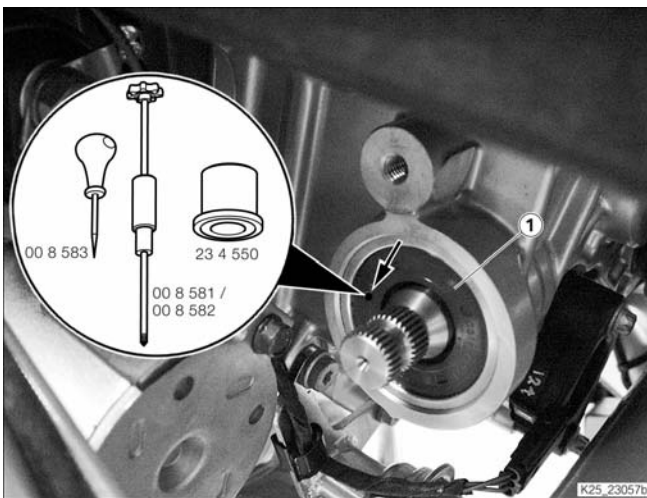
- Clean the bearing bore in the housing.



Note

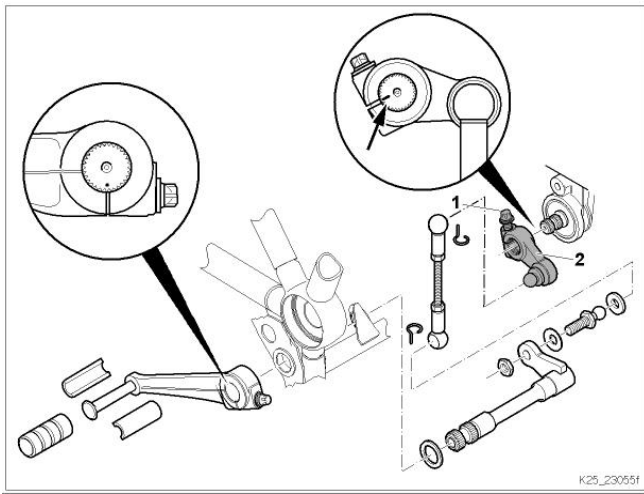
Lightly oil the sealing lips before installing the shaft sealing rings.

- Install a new shaft sealing ring, using drift (No. 23 4 550) .



(-) Connecting shift lever to selector shaft

- Position shift lever (2) on the selector shaft.
- Make sure that the mark (arrow) is aligned with the gap on the shift lever.
- Install screw (1) in the selector shaft.

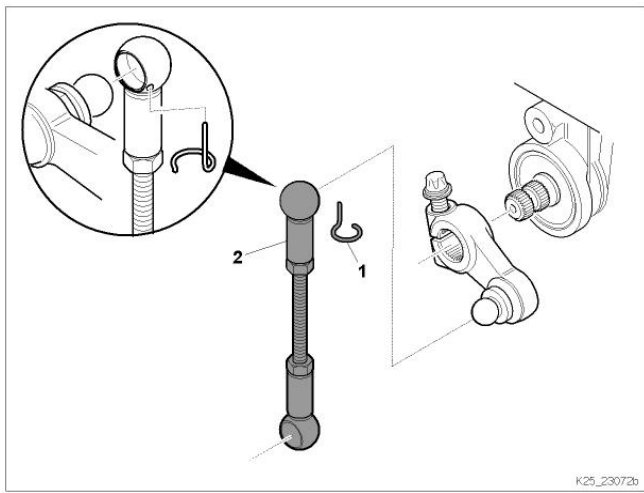


Tightening torques

Selector lever to selector shaft, M6 x 25	8 Nm	
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(-) Securing selector rod to shift lever

- Grease the ball head of the shift lever and the ball socket of selector rod (2).



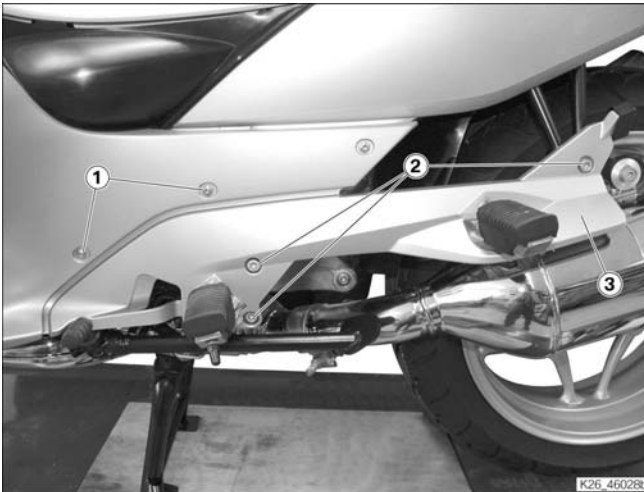
Consumables/lubricants

Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992
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- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

(-) Installing left footrest plate

- Install footrest plate (3).
- Install screws (2).

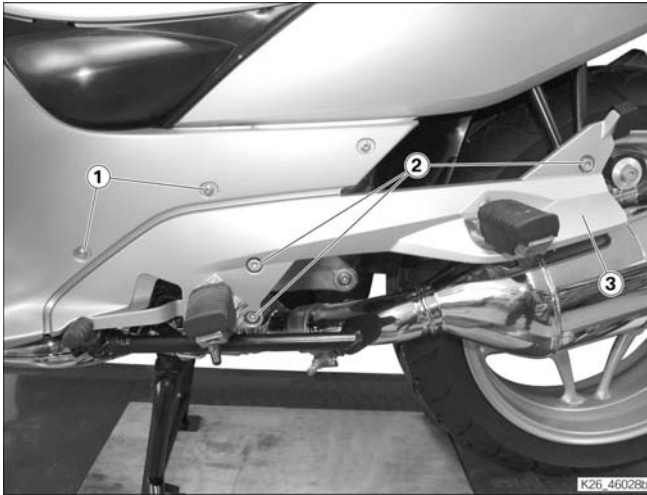


Tightening torques

Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

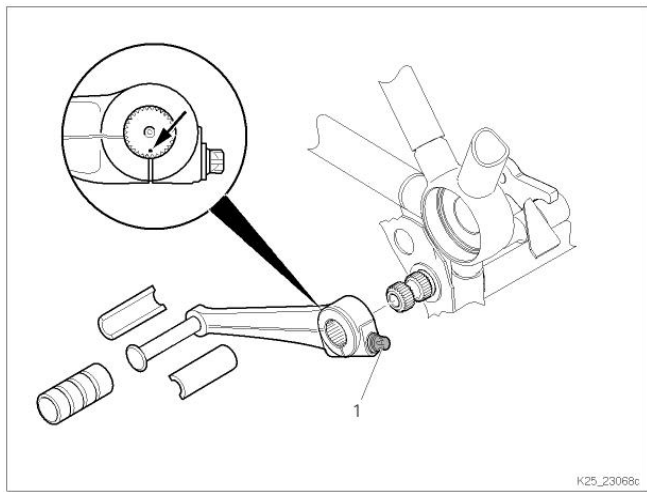
- Install screws (1).

 **23 41 300 Replacing gearshift lever**



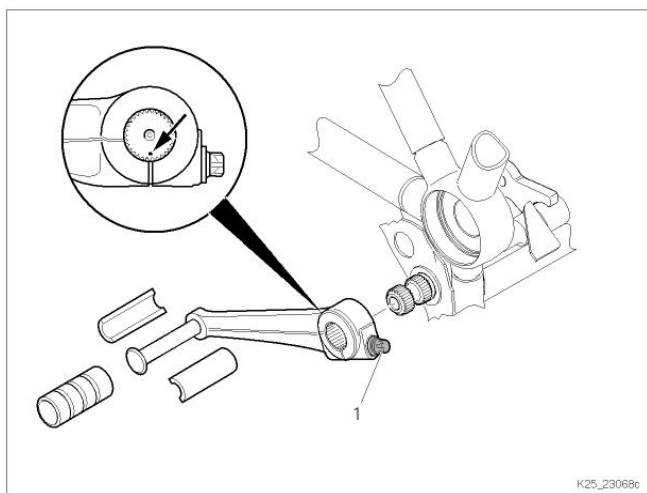
(-) Removing left footrest plate

- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.



(-) Removing gearshift lever

- Remove screw (1) securing the gearshift lever.
- Remove the gearshift lever.



(-) Installing gearshift lever

 **Attention**

Nature: If the shift lever is not positioned correctly it can obstruct the side stand.

Avoidance: Use the marks to install the shift lever in the correct position.

When all work on the shift linkage has been completed, check that the side stand is not obstructed.

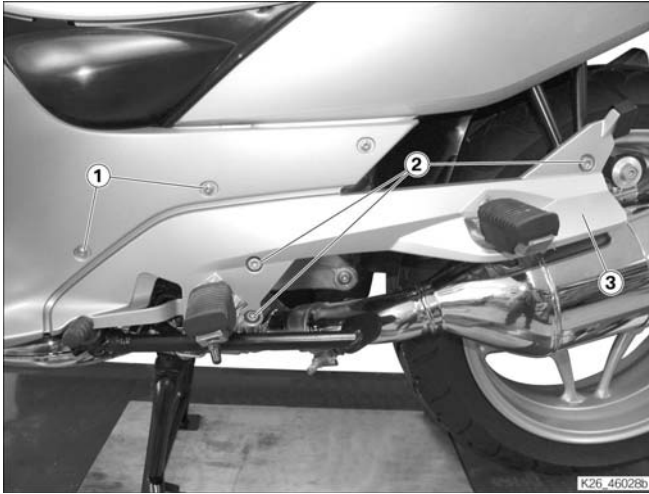
- Position the gearshift lever on the selector rod.
- The punch mark (arrow) must be aligned with the gap in the gearshift lever.
- Tighten screw (1) to secure the gearshift lever.




Foot-operated shift lever to selector shaft, M6 x 25	8 Nm	
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(-) Installing left footrest plate

- Install footrest plate (3).
- Install screws (2).

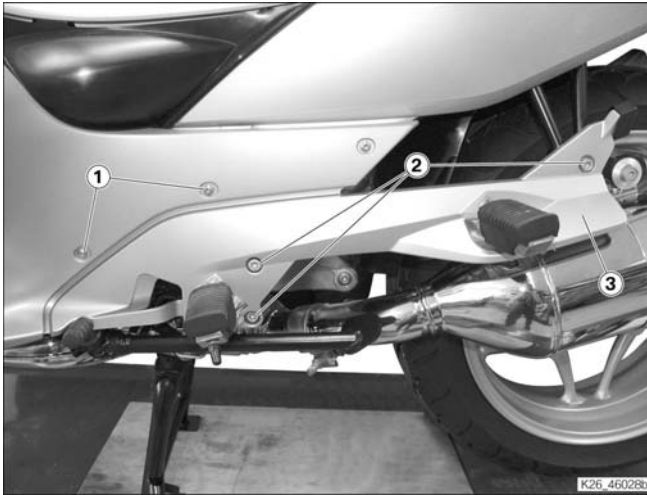


 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

- Install screws (1).

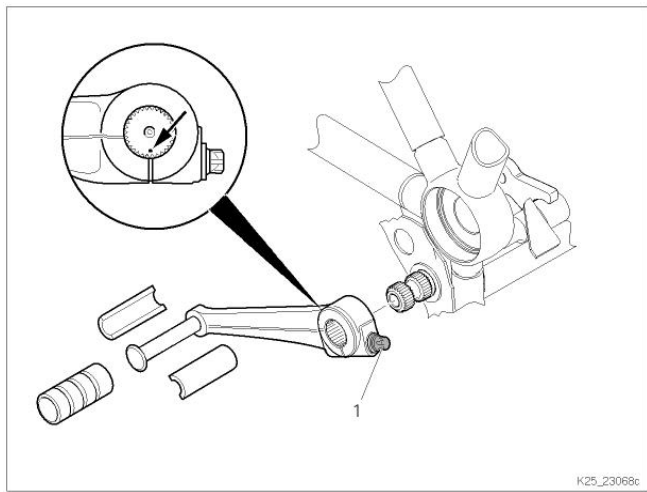
 **23 41 304 Replacing intermediate shaft, gearshift pedal**

(-) Removing left footrest plate



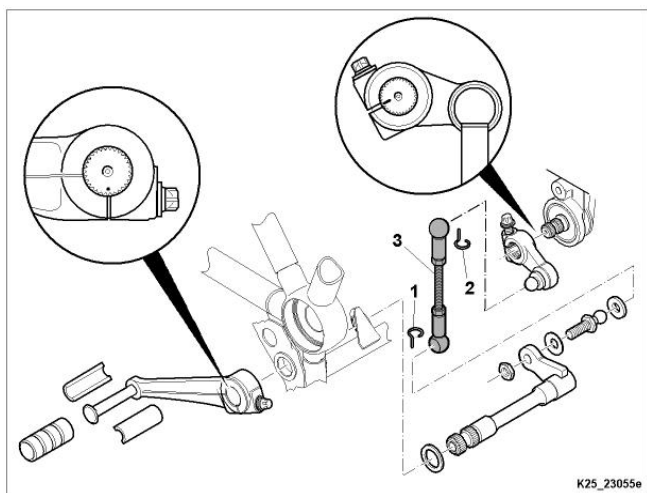
- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.

(-) Removing gearshift lever



- Remove screw (1) securing the gearshift lever.
- Remove the gearshift lever.

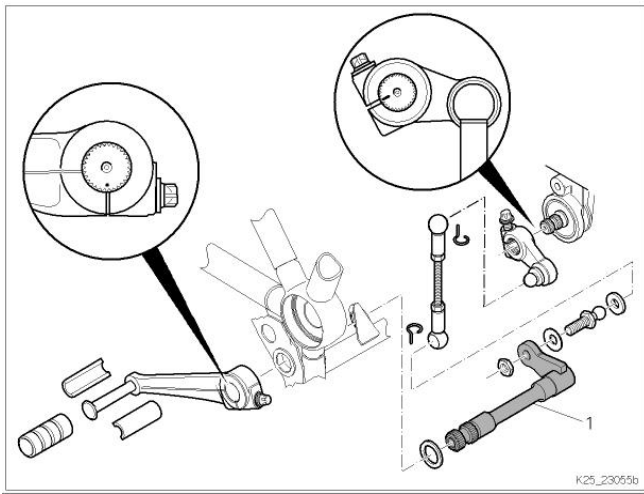
(-) Removing selector rod for gearshift lever



- Remove retainers (1) and (2).
- Disconnect selector rod (3) from gearshift lever and selector shaft.

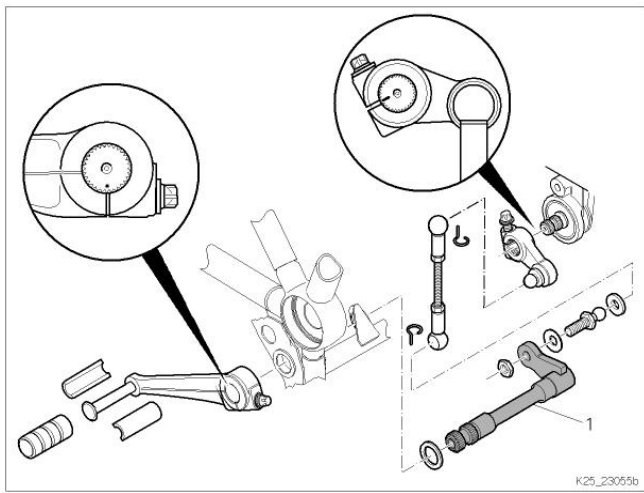
(-) Removing foot-operated selector shaft

- Remove foot-operated selector shaft (1).



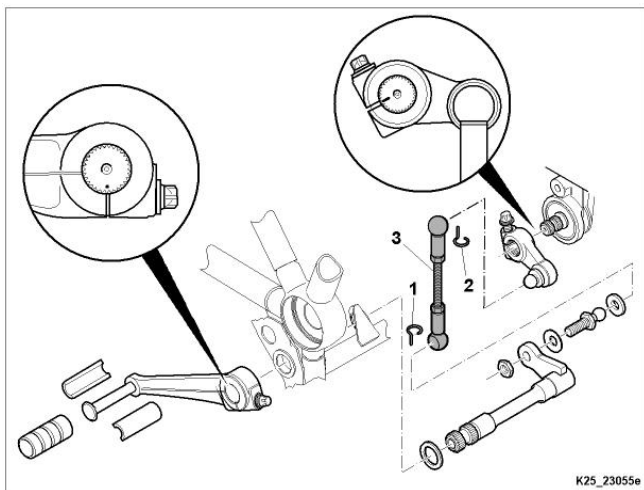
(-) Installing foot-operated selector shaft


- Install foot-operated selector shaft (1).




(-) Installing selector rod for gearshift lever

- Grease the ball head of the gearshift lever and the ball socket of the selector rod.

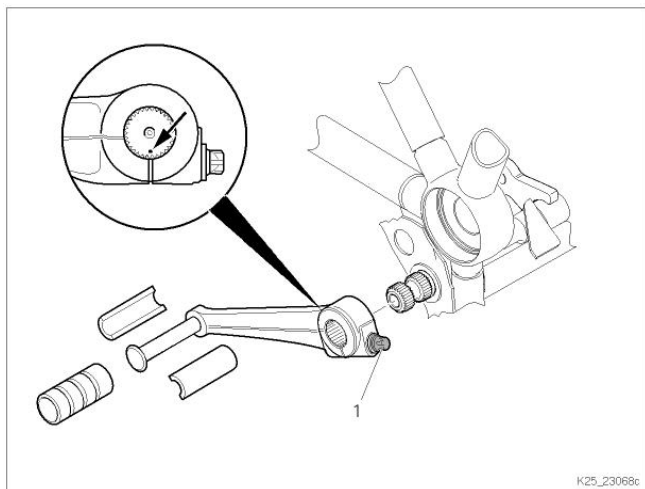


 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Grease the ball head of the shift lever and the ball socket of the selector rod.

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Press selector rod (3) onto the ball head of the shift



- lever and the gearshift lever.
- Install retaining clips (2) and (1).

(-) Installing gearshift lever

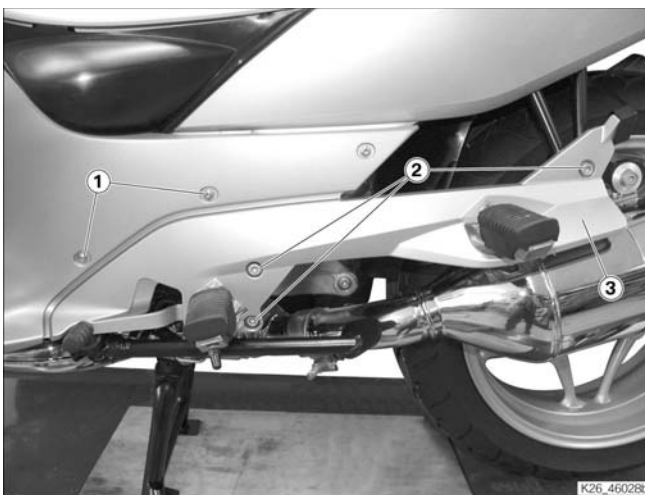
⚠ Attention

- Nature:** If the shift lever is not positioned correctly it can obstruct the side stand.
 - Avoidance:** Use the marks to install the shift lever in the correct position.
- When all work on the shift linkage has been completed, check that the side stand is not obstructed.

- Position the gearshift lever on the selector rod.
- The punch mark (arrow) must be aligned with the gap in the gearshift lever.
- Tighten screw (1) to secure the gearshift lever.

⚠ Tightening torques		
Foot-operated shift lever to selector shaft, M6 x 25	8 Nm	

(-) Installing left footrest plate

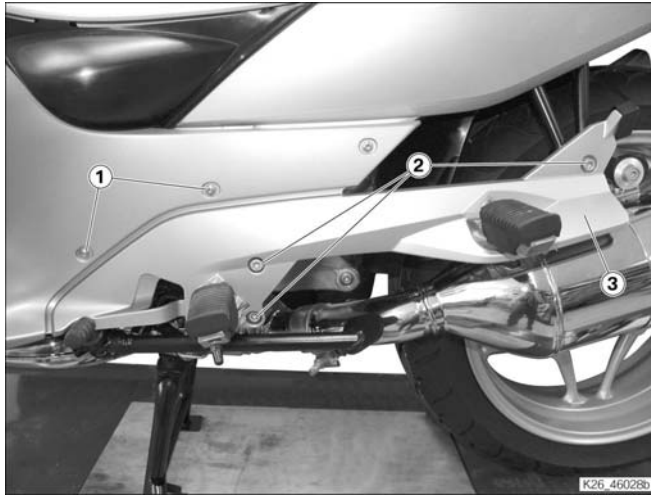


- Install footrest plate (3).
- Install screws (2).

⚠ Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

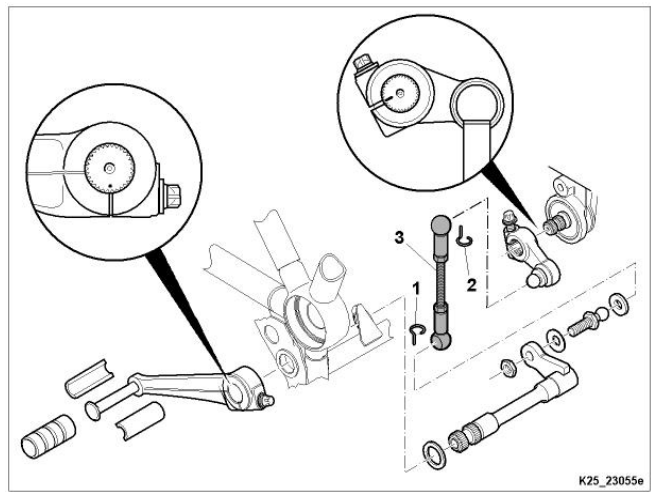
- Install screws (1).

 **23 41 325 Replacing selector rod on gearshift lever**



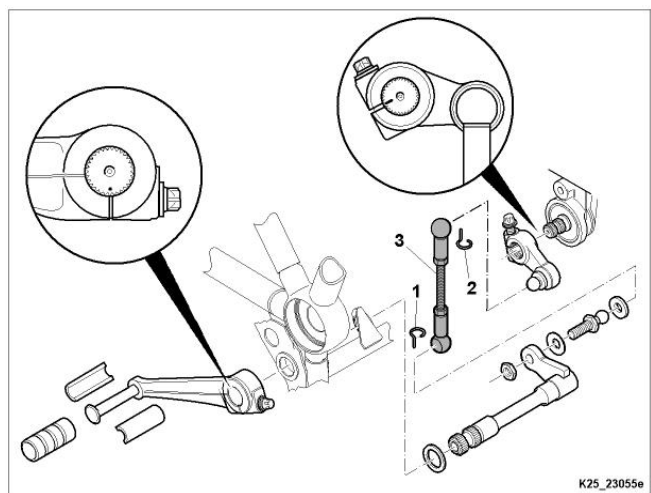
(-) Removing left footrest plate

- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.




(-) Removing selector rod for gearshift lever

- Remove retainers (1) and (2).
- Disconnect selector rod (3) from gearshift lever and selector shaft.




(-) Installing selector rod for gearshift lever

- Grease the ball head of the gearshift lever and the ball socket of the selector rod.

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Grease the ball head of the shift lever and the ball socket of the selector rod.

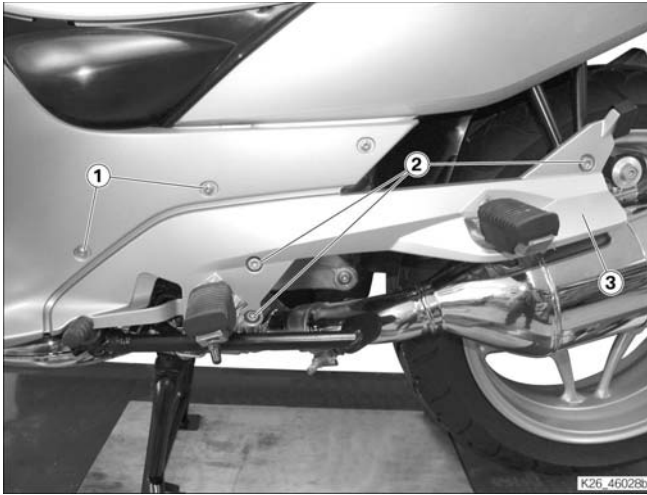
 Consumables/lubricants		
Staburags NBU 30 PTM	High-	07 55 9


	performance lubricating grease	056 992
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- Press selector rod (3) onto the ball head of the shift lever and the gearshift lever.
- Install retaining clips (2) and (1).

(-) Installing left footrest plate

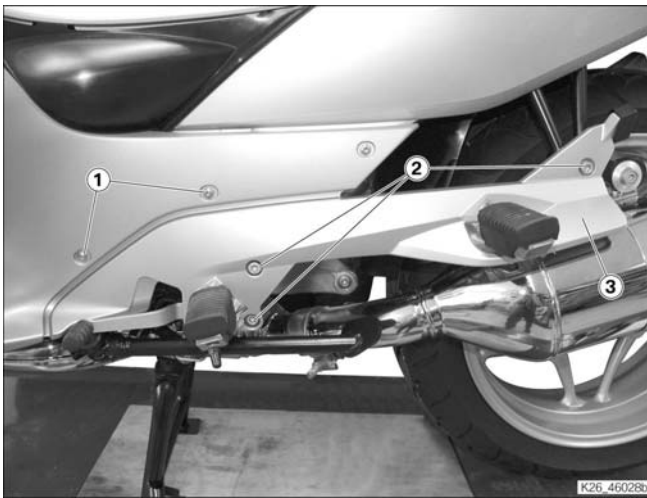
- Install footrest plate (3).
- Install screws (2).



 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

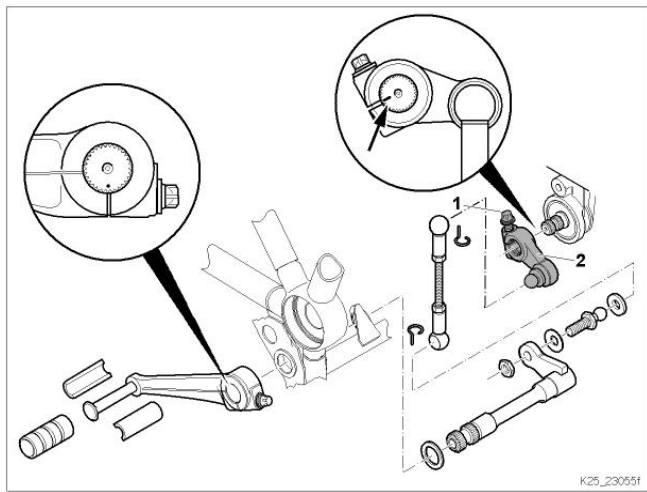
- Install screws (1).

23 41 329 Replacing shift lever on selector shaft



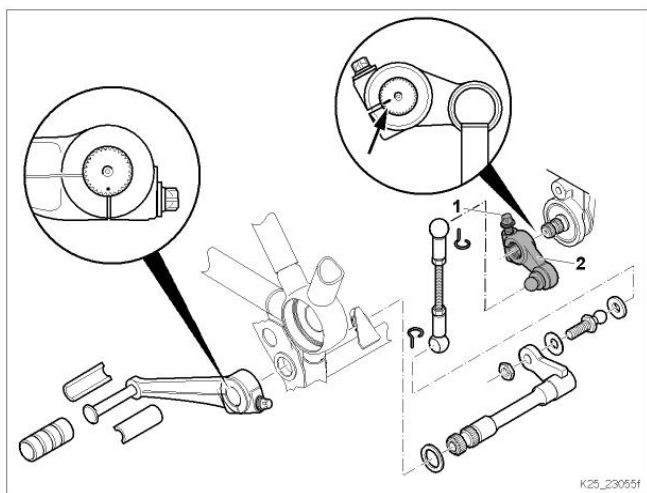
(-) Removing left footrest plate

- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.




(-) Removing shift lever from selector shaft

- Remove screw (1) from the shift lever.
- Pull shift lever (2) off the selector shaft.



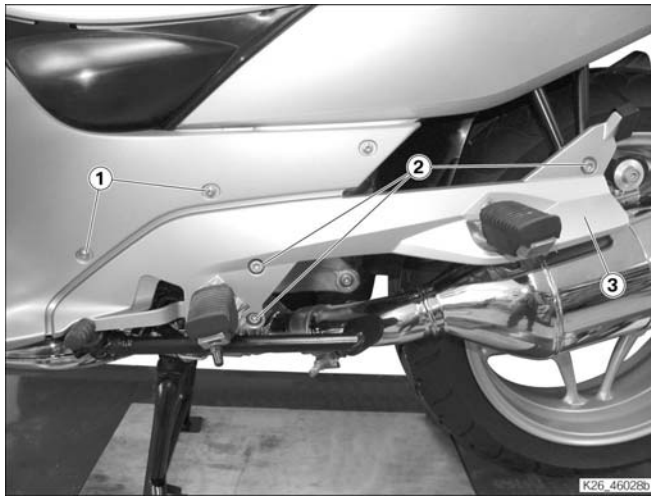
(-) Connecting shift lever to selector shaft

- Position shift lever (2) on the selector shaft.
- Make sure that the mark (arrow) is aligned with the gap on the shift lever.
- Install screw (1) in the selector shaft.


 Tightening torques		
Selector lever to selector shaft, M6 x 25	8 Nm	

(-) Installing left footrest plate

- Install footrest plate (3).

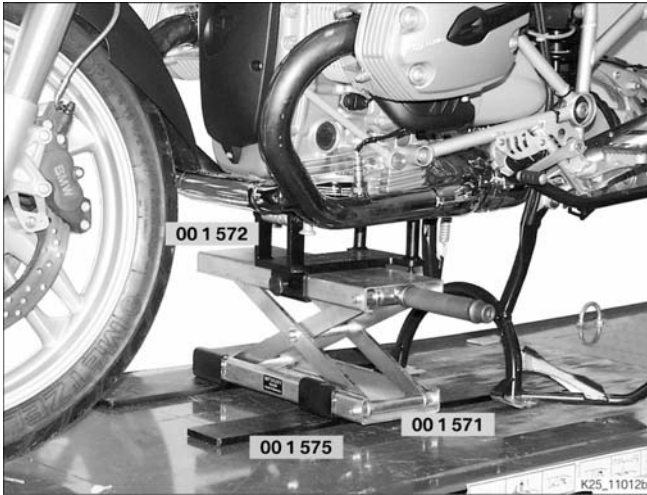


- Install screws (2).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

- Install screws (1).

 **31 31 001 Replacing front spring strut**



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

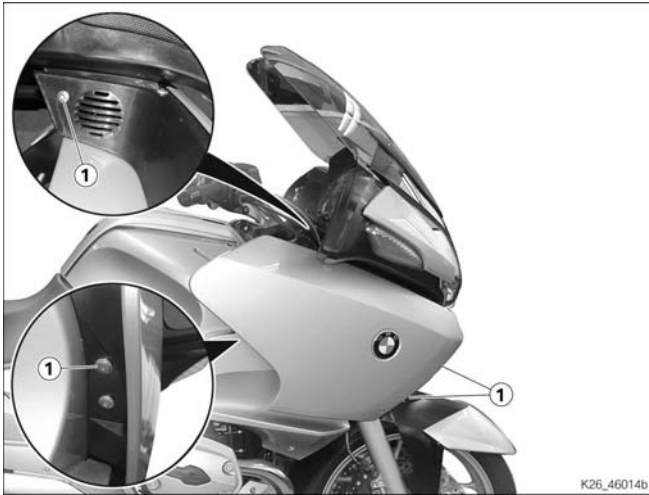
- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



Variant, ESA

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing tank rail

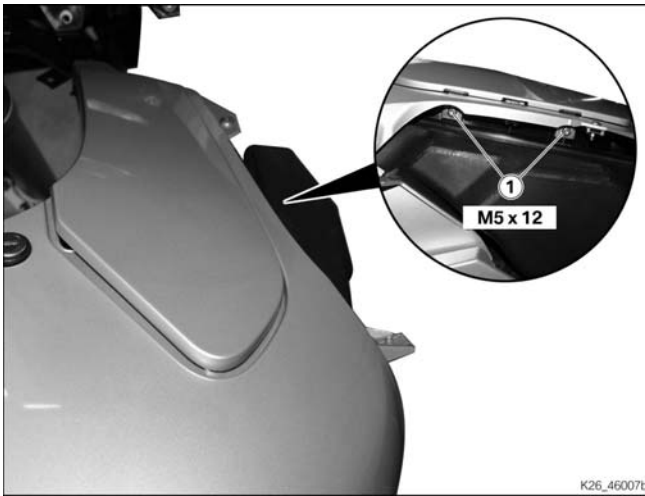
- Remove screws (1).
- Remove tank rail.



Variant, ESA

(-) Removing storage compartment lid

- Remove screws (1).



- Remove storage compartment lid.

Variant, ESA

(-) Removing entire right side tank cover



- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

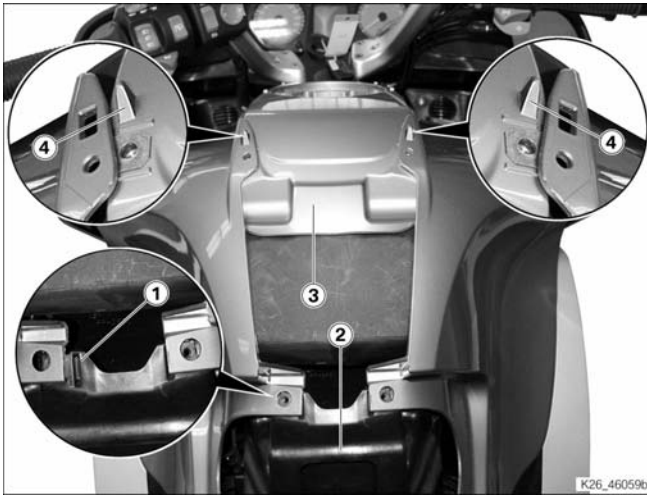
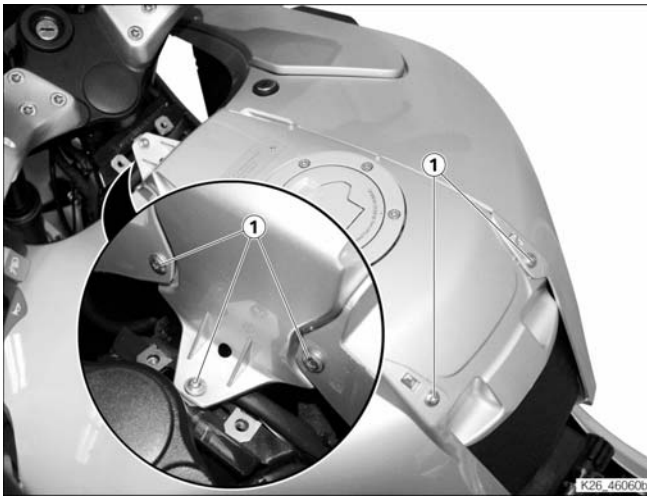
(-) Removing fuel tank cover



- Remove screws (1).
- Close off fuel filler pipe in fuel tank.
- Remove fuel tank cover.

(-) Removing centre fuel-tank cover

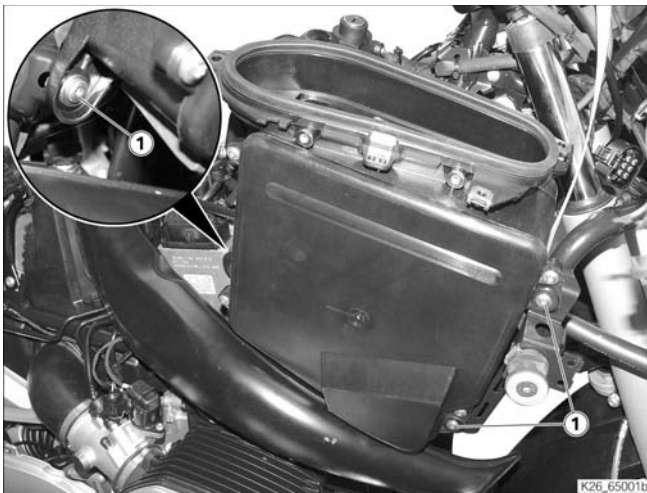
- Remove screws (1).



- Disengage locating lug of left-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Disengage locating lug of right-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Pull middle tank cover (3) in forward direction and remove.

Variant, ESA

(-) Removing stowage compartment



- Remove screws (1).
- Remove the stowage compartment.

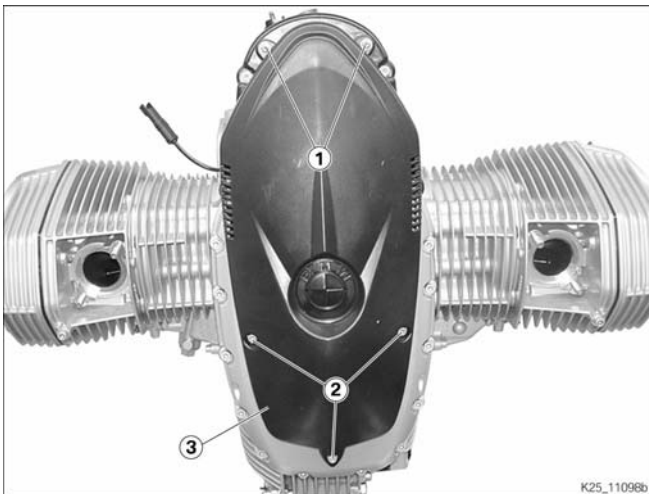
Variant, Radio with CD player

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



(-) Removing belt guard

- Remove screws (1) and (2).
- Remove belt guard (3).



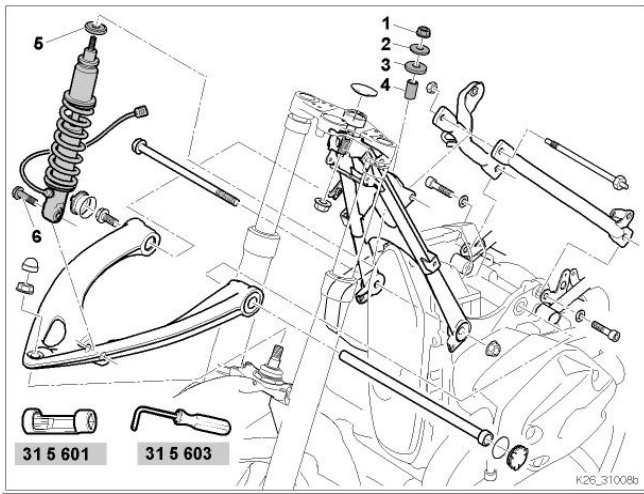
(-) Removing spring strut

Variant, ESA

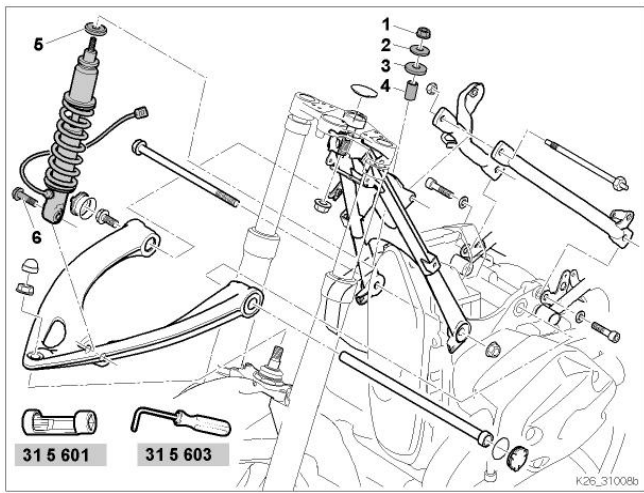
- Disconnect plug (7).
- Open the cable tie (arrow).




- Remove nut (1) at top.
- Remove washer (2) and rubber buffer (3).
- Remove screw (6) at bottom.
- Lower the spring strut and manoeuvre it forward to remove.
- Remove spacing sleeve (4) and rubber buffer (5).




(-) Installing spring strut




- Clean the threads in the spring strut and the leading link.
- Mount rubber buffer (5) and spacing sleeve (4) on the spring strut.
- Guide the spring strut into position from below.
- Install rubber buffer (3) and washer (2).
- Apply thread-locking compound to nut (1), install at top and tighten until hand-tight.

 Consumables/lubricants		
Loctite 243	Thread-locking compound, medium-strength	07 58 9 056 031

- Lubricate the **head** of screw (6).

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slightly raise the front wheel and insert **new** screw (6) at bottom.

 Tightening torques		
Spring strut, front, to leading link, M10 x 50 10.9 <i>Micro-encapsulated , Optimoly TA</i>	40 Nm	

- Tighten nut (1) at top.



Tightening torques

Spring strut to front frame, Hex nut M10 x 1.25 Loctite 243	35 Nm	
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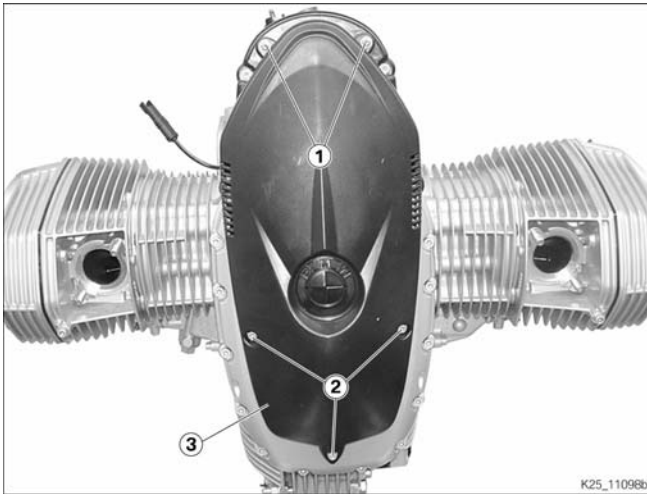


Variant, ESA

- Connect plug (7).
- Secure the cable with cable tie (arrow).

(-) Installing belt guard

- Install belt guard (3) and secure with screws (1) and (2).



Tightening torques

Belt cover to engine, Flat mushroom head screw M5 x 14	5 Nm	
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Variant, ESA

(-) Installing stowage compartment

- Place the stowage compartment in position and align it correctly.
- Install screws (1).



Variant, Radio with CD player

- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).

Variant, ESA

(-) Preparation for initialising/calibrating new parts

Precondition

- Engine switched off.
- Prop the motorcycle in such a way that it cannot move while initialisation/calibration is in progress.
- Motorcycle's battery is fully charged.



Note

Do not attempt to perform work of any other kind on the motorcycle while programming/coding are in progress.

- Switch off all electrical consumers.



Attention

Nature: Programming/coding is aborted if the voltage in the on-board system drops below 12.6 volts.

Avoidance: Connect the charger to the battery.

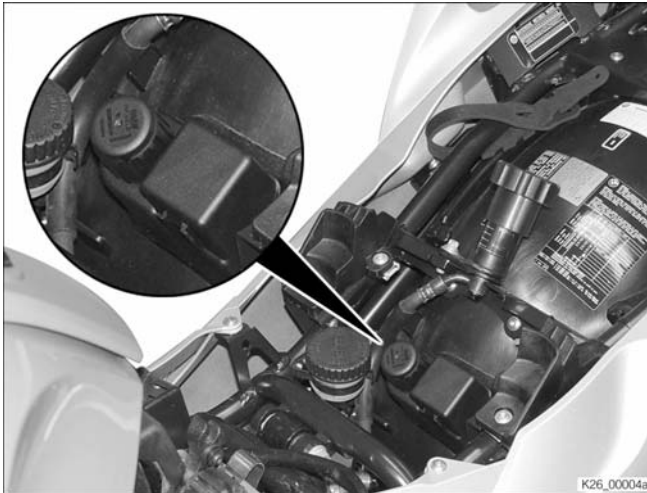
- Connect charger (No. 61 1 581) with cables (No. 61 1 582) to the battery. While initialisation/calibration is in progress, **do not** connect or disconnect the charger.

► Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



- Perform diagnosis. Rectify faults, if found, **before** starting initialisation/calibration.
- Start initialisation/calibration with the CIP program and follow the instructions issued by the BMW Motorrad diagnostic system.

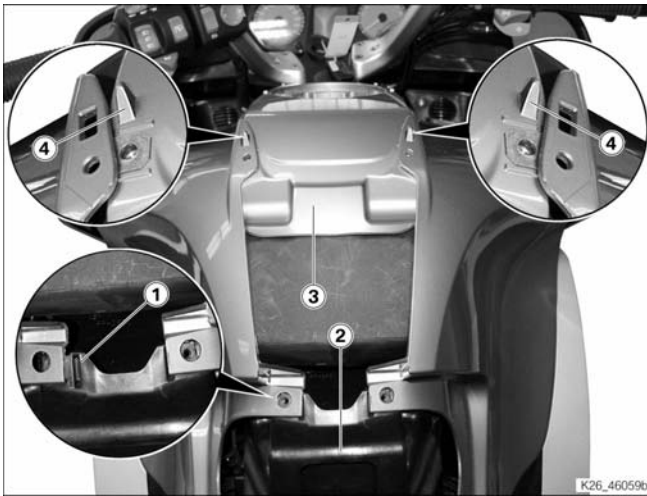
Variant, ESA

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

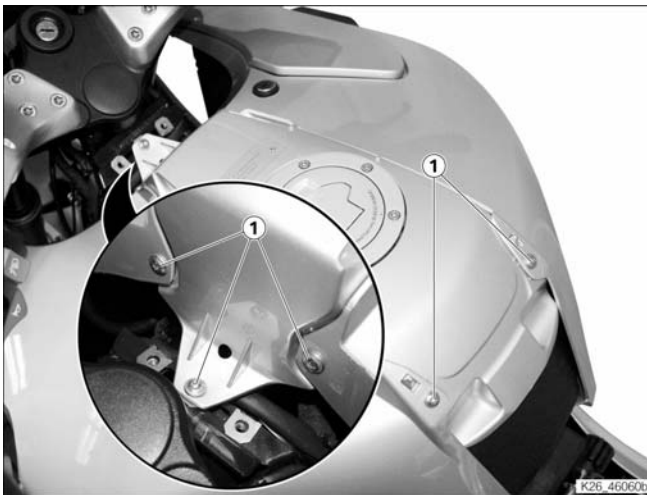
- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing middle tank cover

- Fit middle tank cover (3) aligned in forward direction.
- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the right-hand tank cover in groove (1) of seat bracket (2).
- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the left-hand tank cover in



groove (1) of seat bracket (2).



- Install screws (1).



(-) Installing fuel tank cover

- Remove cap from fuel filler neck.
- Make sure that the seal is seated correctly under the fuel filler neck.
- Place fuel tank cover in position, fit screw (1) and evenly tighten crosswise.

Variant, ESA

(-) Installing entire right side tank cover

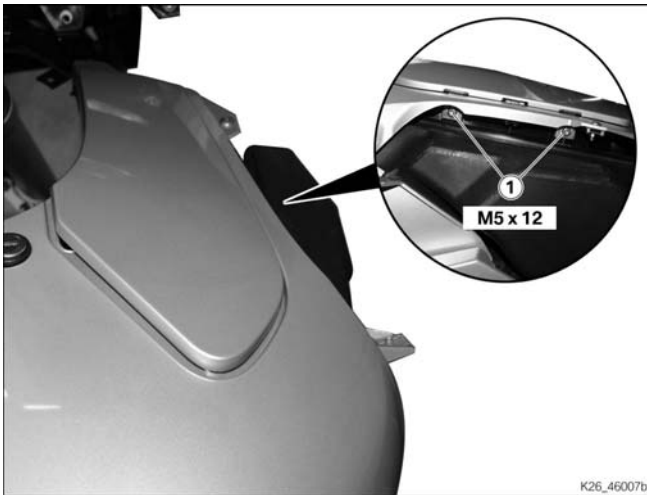
- Fit tank cover.
- Install screws (2).
- Install screws (1).



Variant, ESA

(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



Variant, ESA

(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.



- Install screws (1).

(-) Installing seat



- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

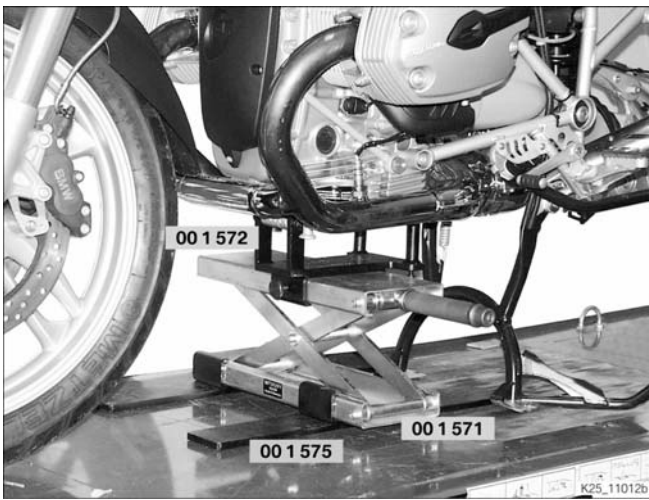
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



31 42 028 Replacing upper fork bridge



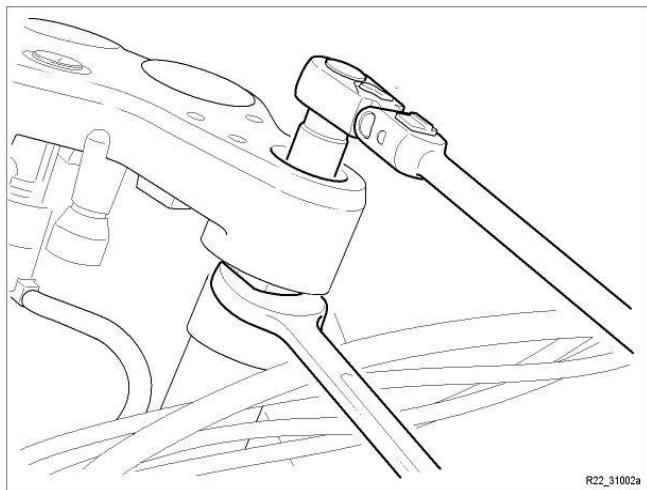
(-) Releasing stub handlebars

- Cover the fuel tank with fuel-tank protective cloth (No. 16 1 611) .
- Remove screws (1) from the stub handlebars.
- Lay the stub handlebars back out of the way.

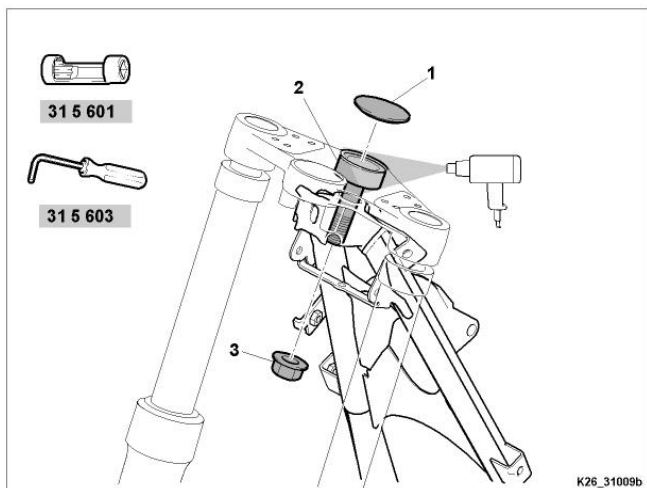
(-) Removing upper fork bridge

► Releasing fixed fork tubes

- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



- Remove cap (1).
- Heat threaded fastener (2) of the fork bridge from above.



Technical data			
Release temperature, top fork bridge		120 °C	

- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, remove nut (3) with socket wrench insert (No. 31 5 601) .

⚠ Attention

Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

- Turn the fork bridge all the way to the left and carefully remove the steering head bearing from the frame front section.
- Carefully lay the fork bridge back out of the way.

► **Disconnecting plug for ignition switch/ring aerial**

- Remove screws (1).
- Remove cover (2).



- Disconnect plugs (3) and (4).



◄ **(-) Disassembling upper fork bridge**

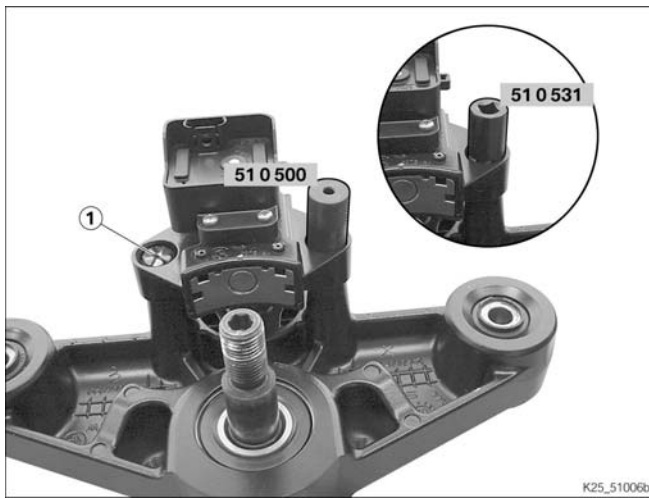
► **Removing ring aerial and ignition/steering lock housing**

- Drill pilot holes into non-removable screws (1) with drill bit (No. 51 0 500) and then continue drilling out the holes until the screw heads come off.



Technical data

Ignition/steering lock - depth for	Bore diameter	min. 5 mm 5 mm	
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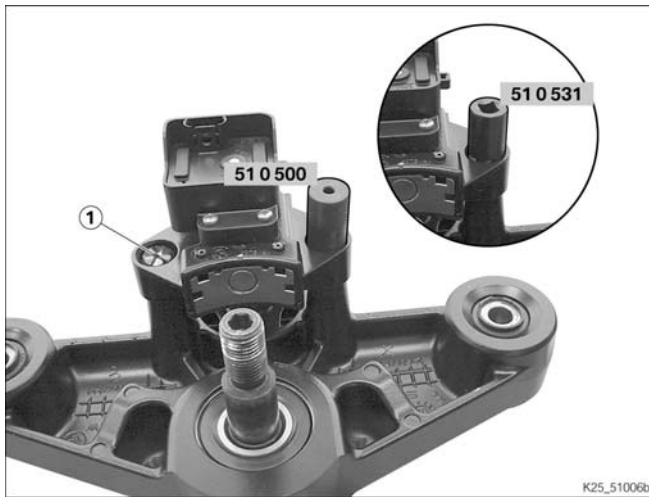
drilling out the non-removable screws	4 mm Bore diameter 8 mm		
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- Removing and disassembling ring aerial with ignition/steering lock housing
- Use a stud remover to remove the shanks of the non-removable screws.

◀ (-) **Assembling top fork bridge**

▶ **Installing ring aerial and ignition/steering lock housing**

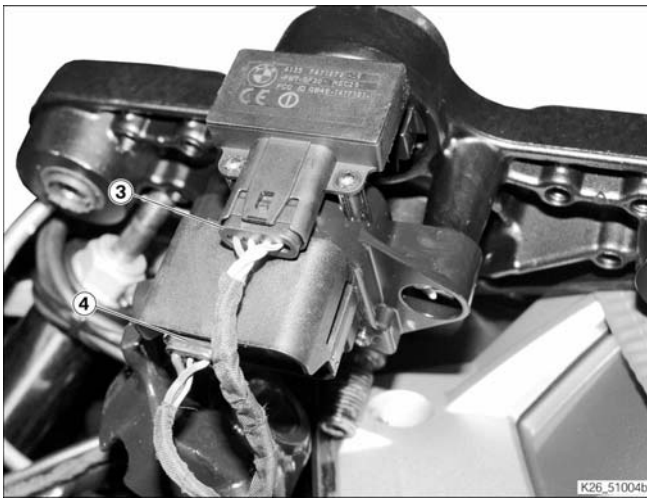
- Clean the threads.
- Assemble the ring aerial with ignition/steering lock housing, using a new O-ring.
- Install the ring aerial with ignition/steering lock housing in the fork bridge.
- Install non-removable screws (1) with socket wrench insert (No. 51 0 531) .



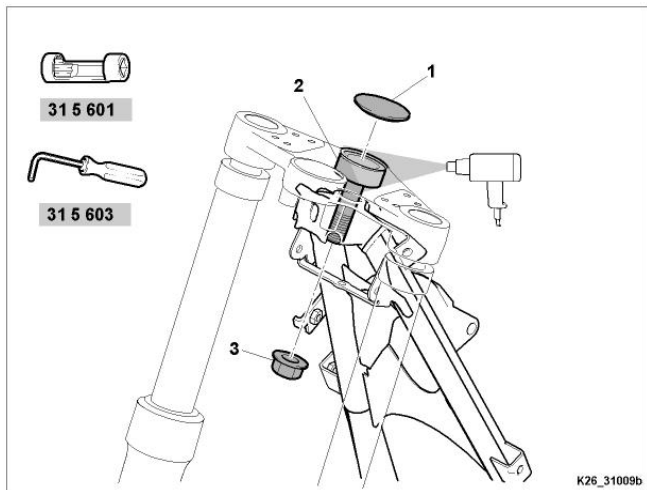
 Tightening torques		
Ignition/steering lock to fork bridge, M8 non-removable screw, Replace screws Micro-encapsulated	20 Nm	

◀ (-) **Installing upper fork bridge**

- Clean the threads.
- ▶ **Connecting plug for ignition switch/ring aerial**
 - Connect plugs (3) and (4).



- Install cover (2) and secure with screws (1).



⚠ **Attention**

Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

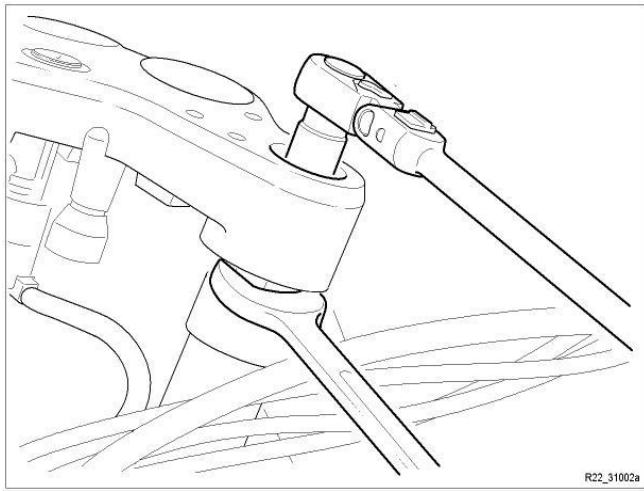
Avoidance: Do not overstretch brake or clutch hoses.

- Turn the fork bridge all the way to the left and carefully introduce the steering head bearing into the frame front section.
- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, install new nut (3) with socket wrench insert (No. 31 5 601) .


🔧 Tightening torques		
Fork bridge to front frame, M14 x 1.5, Replace nut Micro-encapsulated	130 Nm	

- Install cap (1).

▶ **Installing fixed fork tubes**

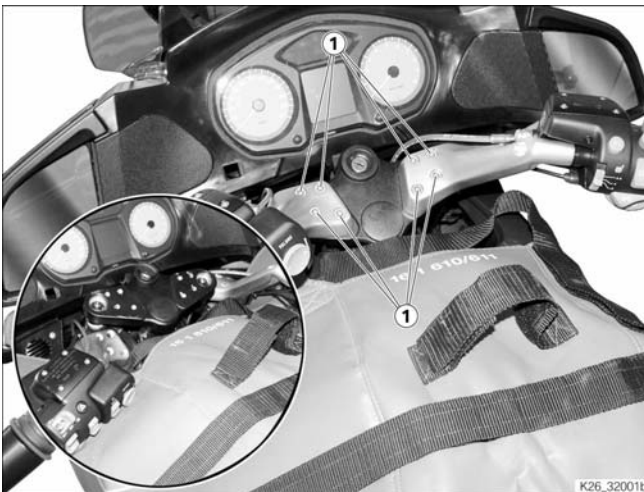


- Introduce the fixed fork tube into the fork bridge.
- Secure the fixed fork tube in the top fork bridge with a new nut, while holding the fixed fork tube at the hexagon underneath the fork bridge.


 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	



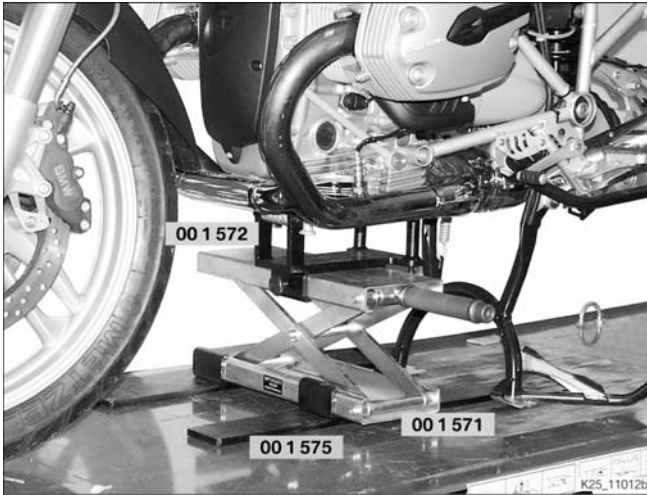
(-) Securing stub handlebars



- Position the stub handlebars on the top fork bridge, noting the seals.
- Install screws (1).

 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	

 **31 42 029 Replacing lower fork bridge**



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

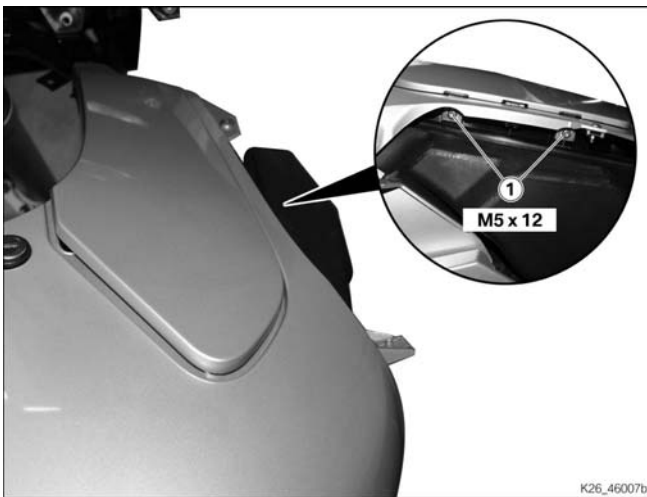
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



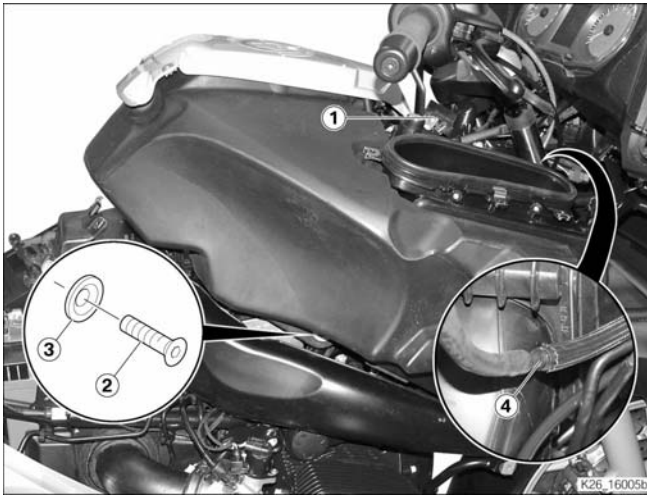
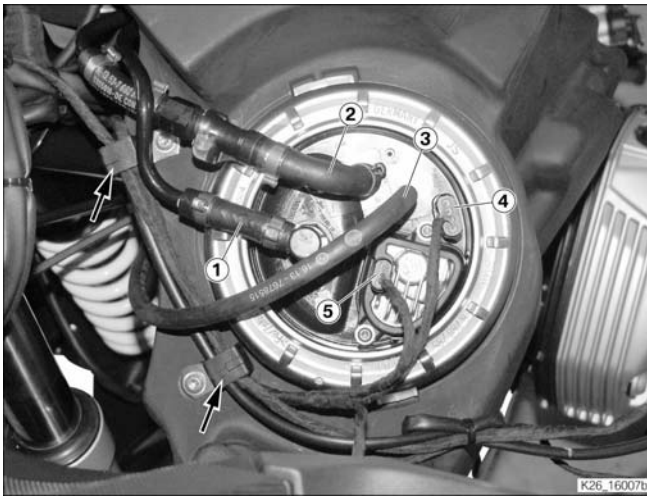
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

(-) Draining front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

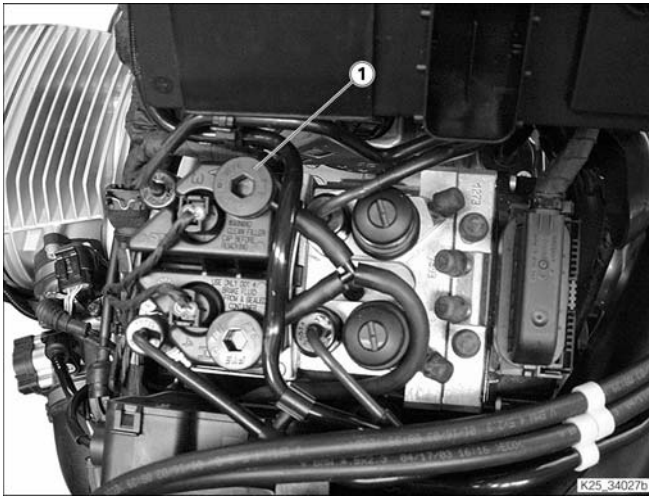
Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



⚠ Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

⚠ Attention

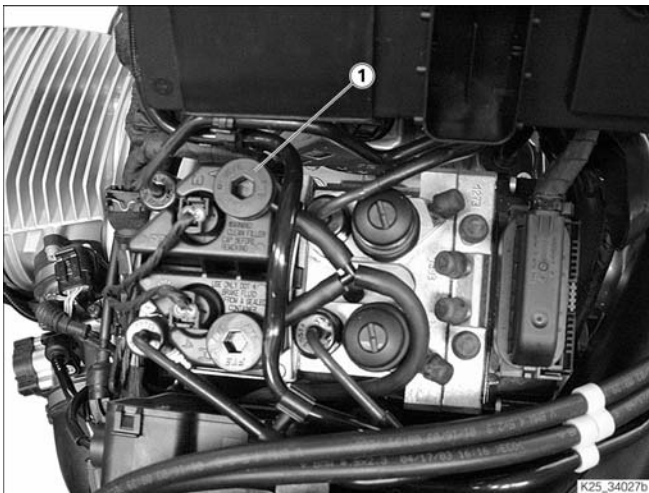
Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

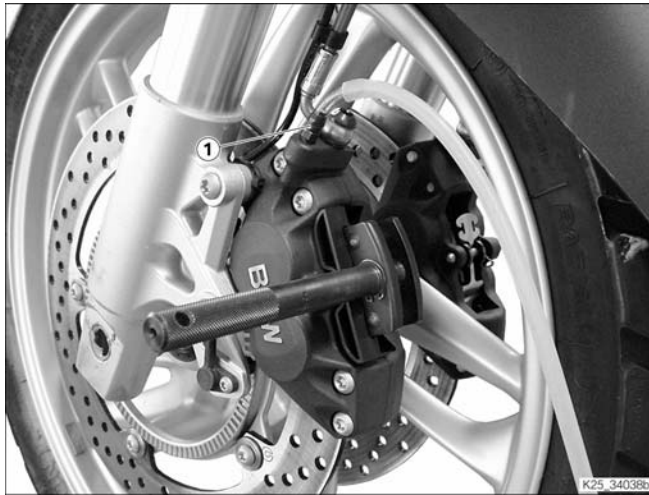
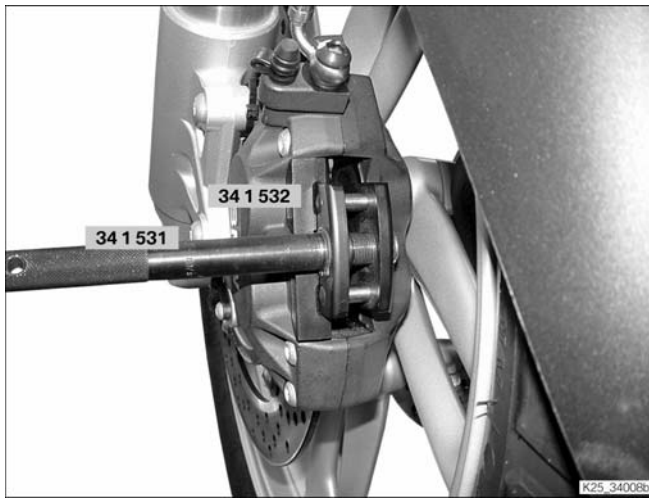
- Open wheel-circuit reservoir (1).

► **Removing front brake pads**

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Using piston resetting device (No. 34 1 531) and



locator (No. 34 1 532) , force the pistons of the brake caliper fully back, and secure them in this position.

- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Repeat this procedure with the second brake caliper.



Note

Drain the brake system only to the extent necessary for the tasks in question to be performed.

(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing left brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing right brake caliper



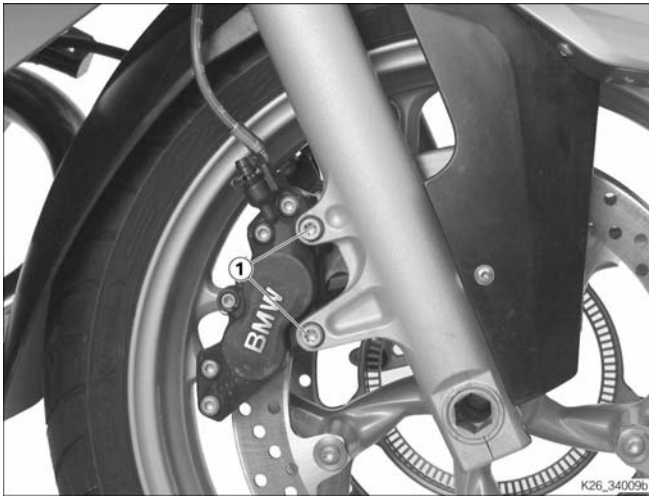
Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

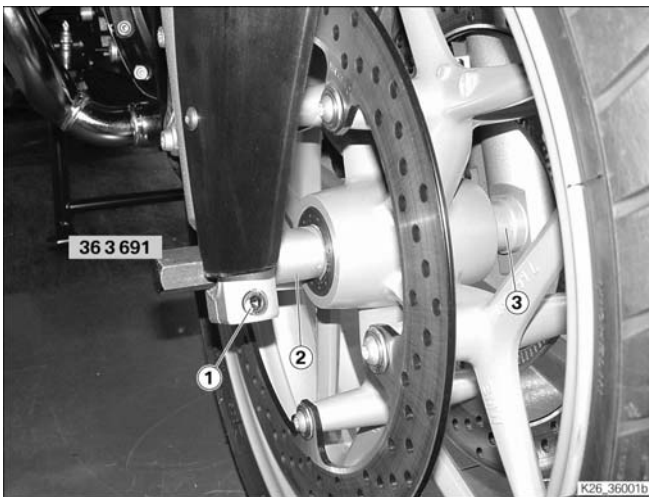
Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691) .
- Roll the front wheel forward to remove.



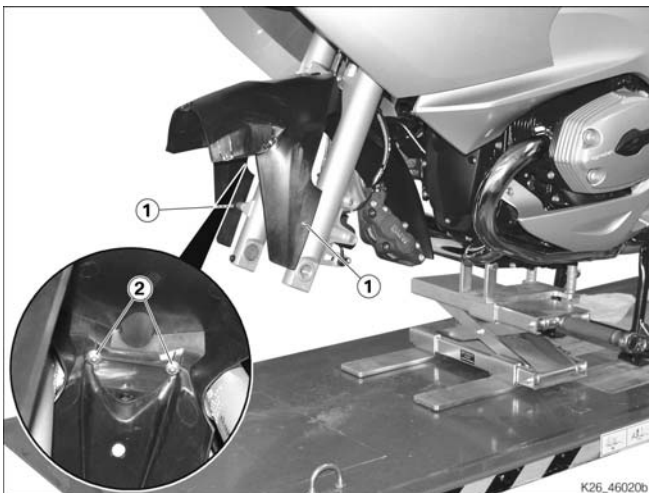
Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

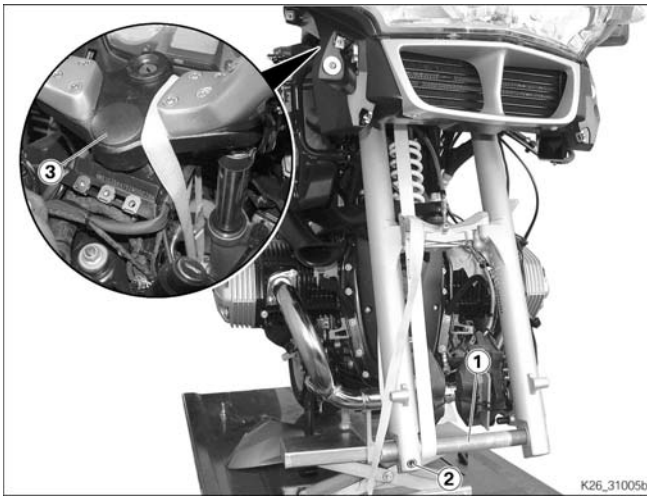
(-) Removing rear section of front mudguard

- Remove screws (1) on left and right.
- Remove screws (2).
- Lightly twist the rear section of the front mudguard and carefully pull in forward direction to remove.
- Detach rear section of front mudguard.



(-) Removing lower fork bridge

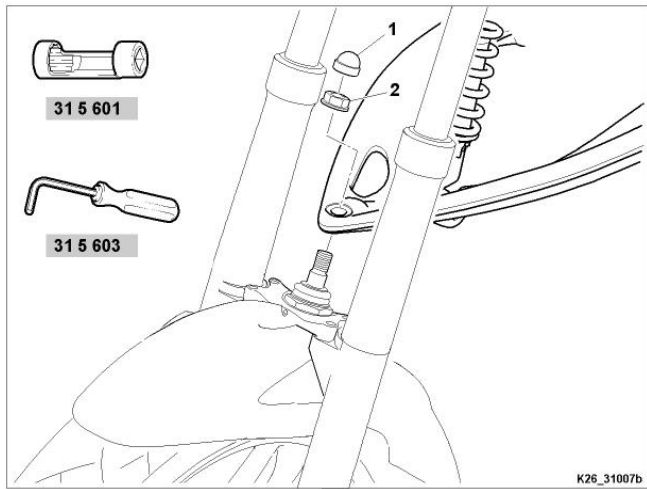
- Secure each brake caliper with one screw to the fork legs on left and right.
- Install quick-release axle (1) with hexagon (No. 36 3 691) .
- Tighten axle clamping screw (2).



Tightening torques

Quick-release axle clamp screws, M8 x 35	19 Nm	
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- Loop a strap over quick-release axle (1) and top fork bridge (3) and tighten the strap.



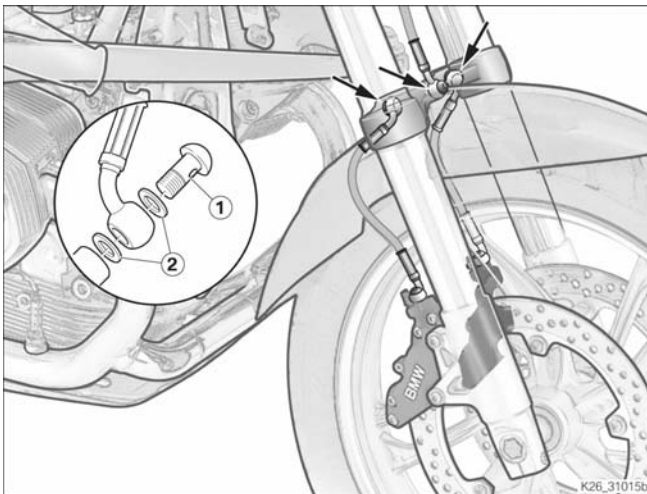
- Remove cap (1).
- Heat nut (2).



Technical data

Release temperature, bottom ball joint	120 °C	
--	--------	--

- Remove nut (2), using socket wrench insert (No. 31 5 601) and Allen screw adapter (No. 31 5 603).



- Remove banjo bolts (1) complete with sealing rings (2).

- Remove screws (1).

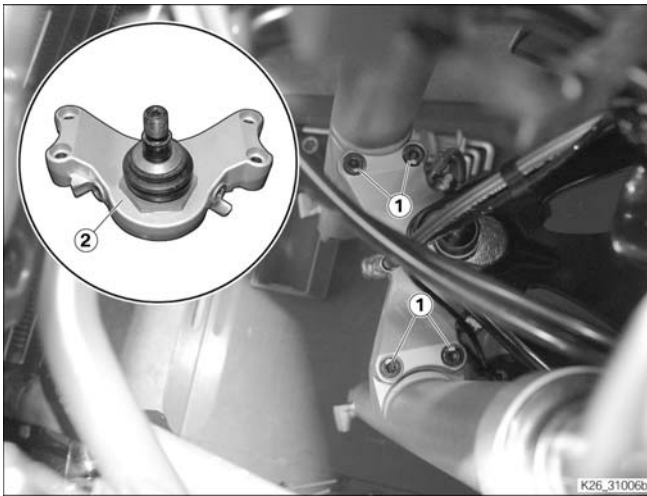


Attention

Nature: If the fixed fork tube is pulled out of the slider tube past the limit of its usual travel, the sharp-edged vent bore in the fixed fork tube can damage the shaft sealing ring in the slider tube.

Avoidance:

Do not pull the fixed fork tube out of the



slider tube past the as-installed position.

- Lower the fork legs slightly until the bottom fork bridge can be removed, noting the vent bore.
- Remove bottom fork bridge (2).

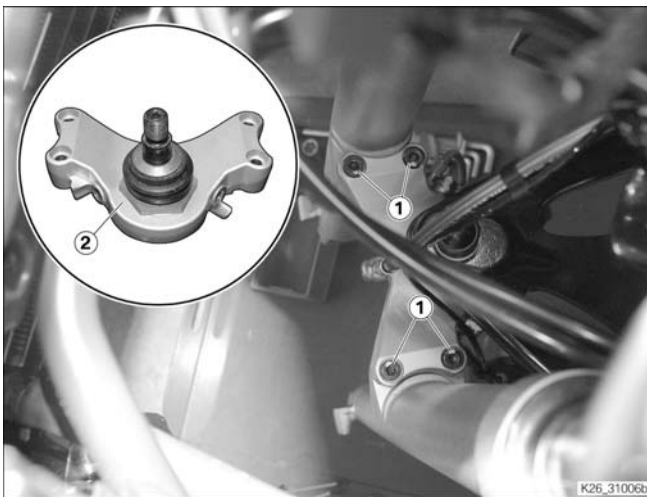
(-) Installing lower fork bridge



Attention

Nature: If the fixed fork tube is pulled out of the slider tube past the limit of its usual travel, the sharp-edged vent bore in the fixed fork tube can damage the shaft sealing ring in the slider tube.

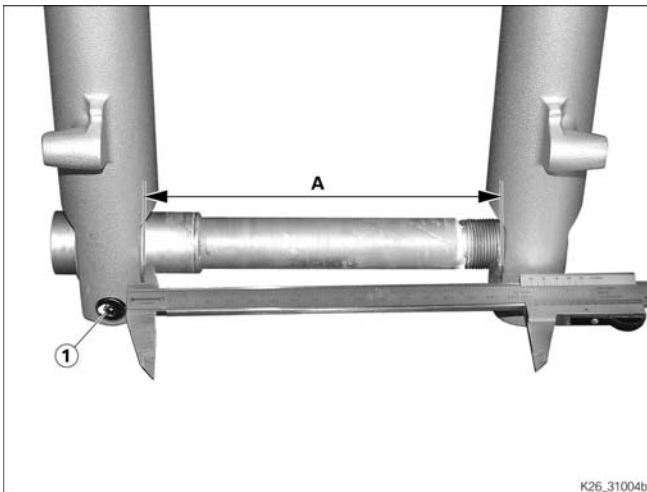
Avoidance: Do not pull the fixed fork tube out of the slider tube past the as-installed position.



- Lower the fork legs slightly until bottom fork bridge (2) can be installed, noting the vent bore.
- Install new screws (1), but do not tighten them to the specified torque at this point.

► Assembly instructions, telescopic forks

- Release axle clamping screw (1).
- Preassemble fork legs and quick-release axle and adjust to size (A).



Technical data

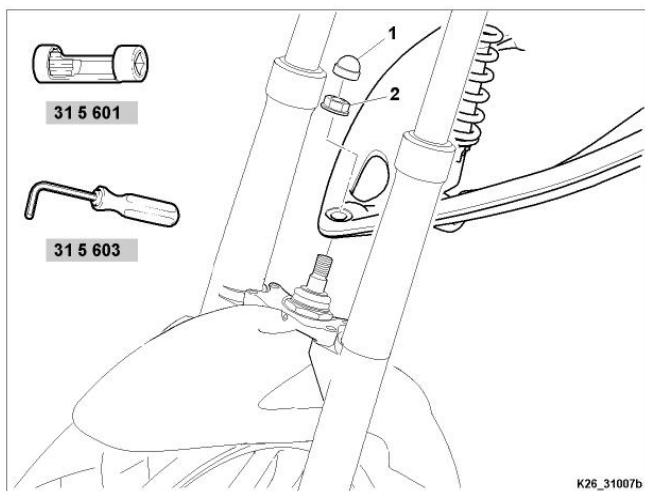
Adjustment dimension of fork slider tubes with respect to each other		170 _{-0.5} ^{+0.5} mm	
--	--	--	--

- Tighten axle clamping screw (1).



Tightening torques

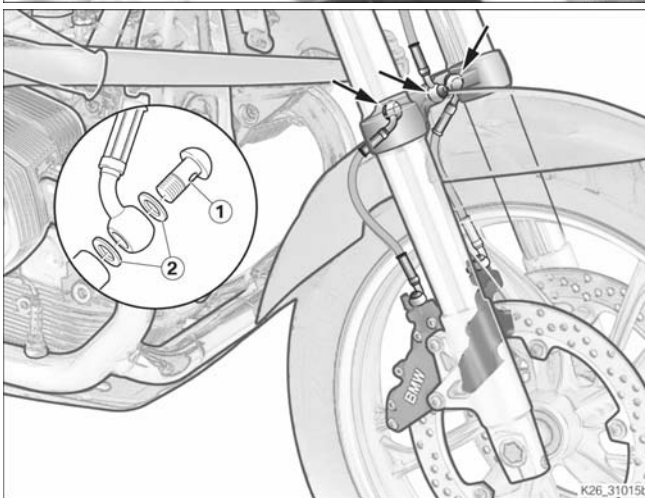
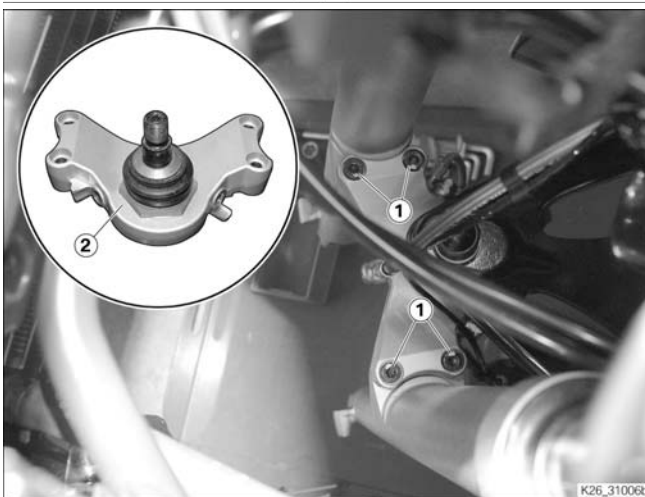
Quick-release axle clamp screws, M8 x 35	19 Nm	
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- Hold the leading link in position at the bottom fork bridge.
- Install new nut (2), using socket wrench insert (No. 31 5 601) and Allen screw adapter (No. 31 5 603).

Tightening torques		
Ball joint to leading link, M14 x 1.5, Replace nut Micro-encapsulated	130 Nm	

- Install cap (1).
- Tighten screws (1).



⚠ Attention

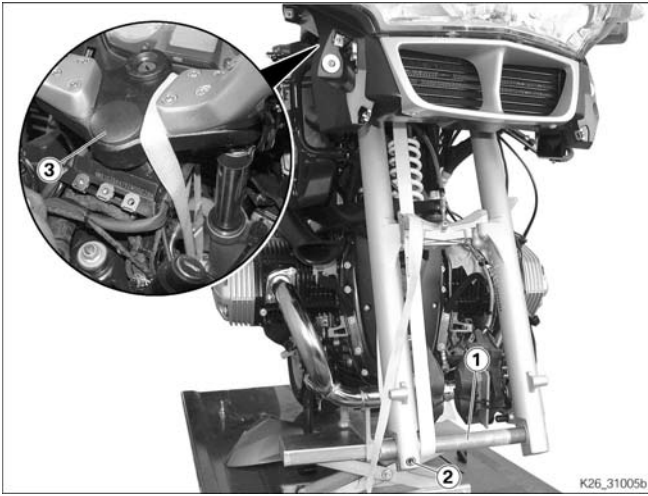
Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

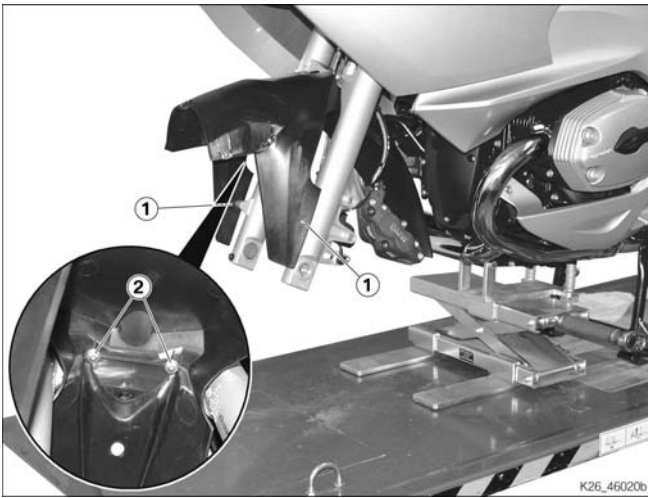
- Hold the brake hose in position and install banjo bolts (1) with new sealing rings (2) in the fork bridge.
- Tighten banjo bolts (1).

Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

- Remove the strap from quick-release axle (1) and top fork bridge (3).
- Release axle clamping screw (2).
- Remove quick-release axle (1) with hexagon (No. 36 3




691) .




(-) Install rear section of front mudguard

- Fit the rear section of the front mudguard at a slight angle and opposite direction of travel.
- Align rear section of front mudguard and secure with new screws (2).

 Tightening torques		
Front mudguard, rear, to slider tube bridge, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

- Install new screws (1) on left and right.

 Tightening torques		
Front mudguard, rear section, to axle clamp, left/right, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

(-) Installing the front wheel

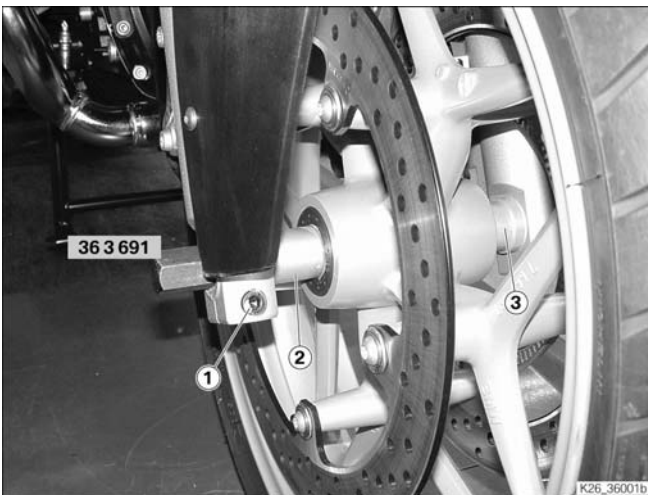
- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.


- Clean quick-release axle (2) and grease it with lubricant.




 Consumables/lubricants		

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.


 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

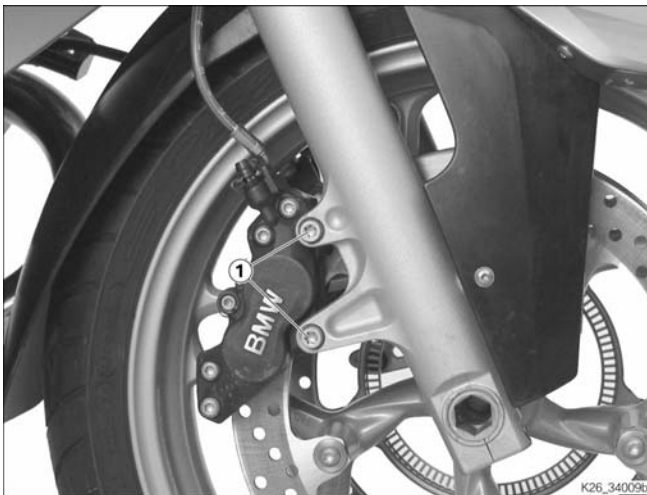
- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Securing right brake caliper

- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.



(-) Filling front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-

compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

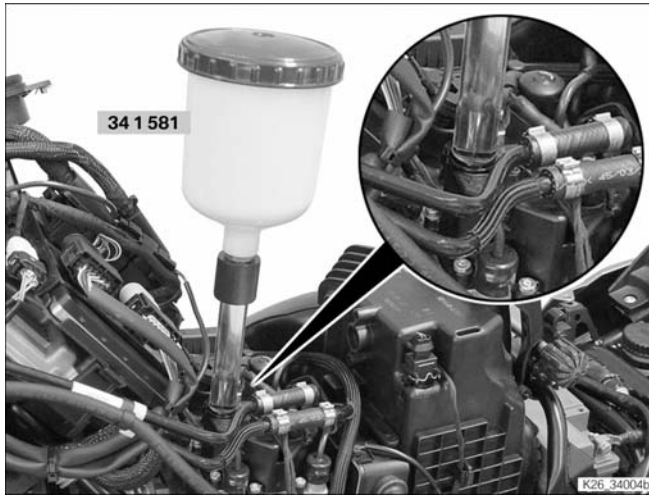
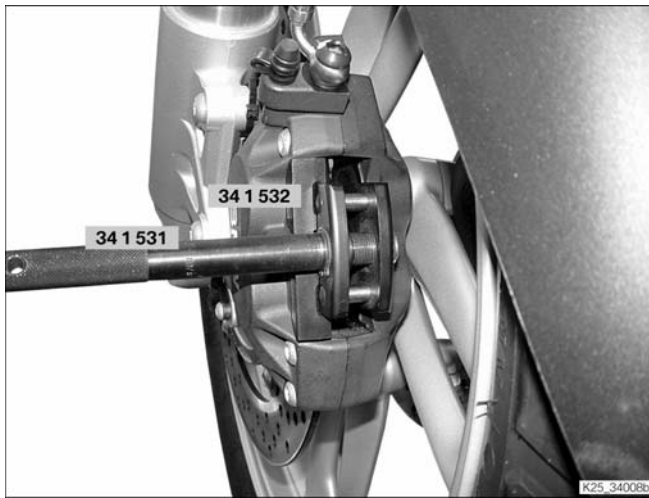


Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.


Avoidance: Do not disconnect the plugs from the pressure modulator.

- Wrap cloths around the left and right brake callipers.
- Use piston resetting device (No. 34 1 531) and locator (No. 34 1 532) to force the pistons in the left and right brake callipers all the way back and hold them in this



position.

- Screw container (No. 34 1 581) onto front wheel circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/2 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw of the right brake calliper, but **do not switch on**.
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.




Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.


- Continue pumping off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

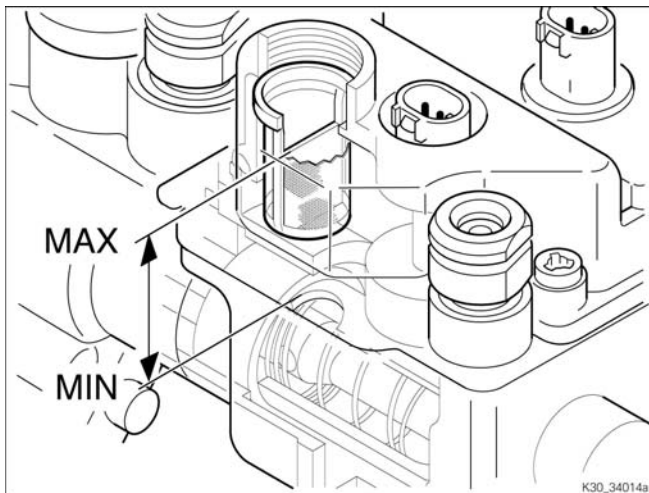
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Connect the brake bleeding device to the bleed screw of the left brake calliper, but **do not switch on**.
- If necessary, use a cable tie to secure the hose of the brake bleeding device to the bleed screw.
- The procedure for changing the brake fluid in the left brake calliper is the same as that for the right calliper.
- When the fluid exits clear and free of bubbles,

continue pumping until the fluid in the container just disappears from view.

- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

- Release the brake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the **MAX** mark.

► Instructions for filling front wheel circuit reservoir

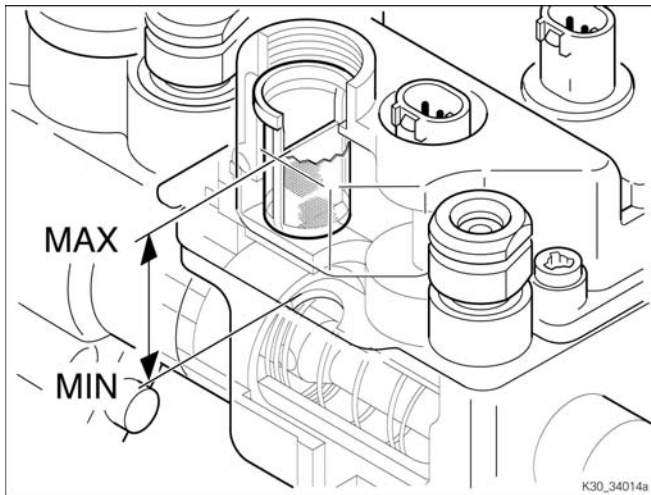


Attention


Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Make sure that the front wheel-circuit reservoir is topped up to the "MAX" mark.
- Install adapter 22 (No. 34 1 533) in piston resetting device (No. 34 1 531) and locator (No. 34 1 532) in both front brake callipers and **fully compress** them until the adapter cannot move.
- Switch on the ignition.
- Pull handbrake lever until the pistons of the front brake callipers are in contact with piston resetting device (No. 34 1 531).



- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Hand-tighten the cap of the wheel-circuit reservoir.
- Using piston resetting device (No. 34 1 531) , force the brake pistons all the way back and remove, together with adapter 22 (No. 34 1 533) .
- Replace the front brake pads after removal, if necessary.

▷ **Installing front brake pads**




Warning

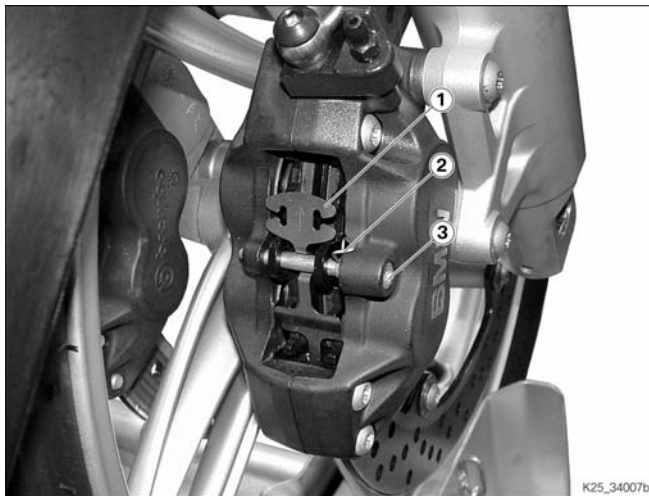
Nature: Greasing the backing plate can allow grease to make its way onto the friction pad and the brake disc.

Avoidance: Take care to grease only the rear and the trailing end face of the backing plate.

- Grease the rear and the trailing end face of the backing plate.

 Consumables/lubricants		
Never Seez compound	Protective grease	83 23 9 407 830

- Install the brake pads.



- Install spring (1) with the arrow pointing in the forward direction of travel.
- Install screw (3).
- Install retainer (2).

Tightening torques	
Grub screw, brake pads	7 Nm



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

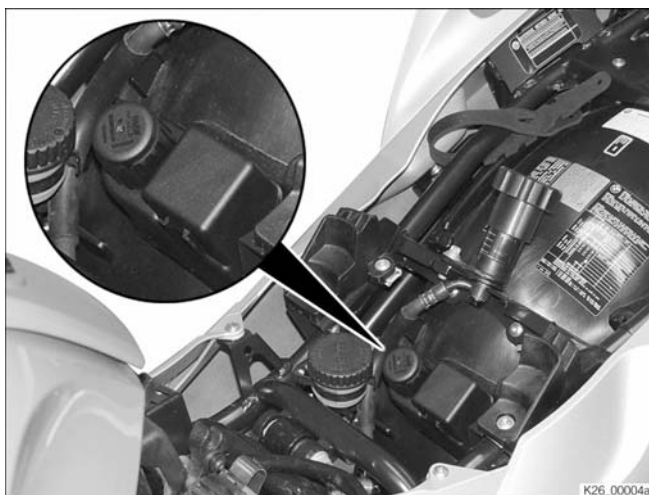
- Check operation of the brake system with the ignition switched on.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581), (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



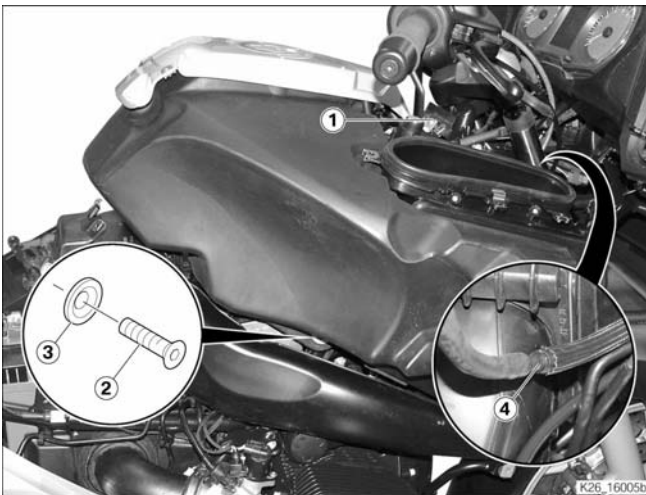
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.


Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

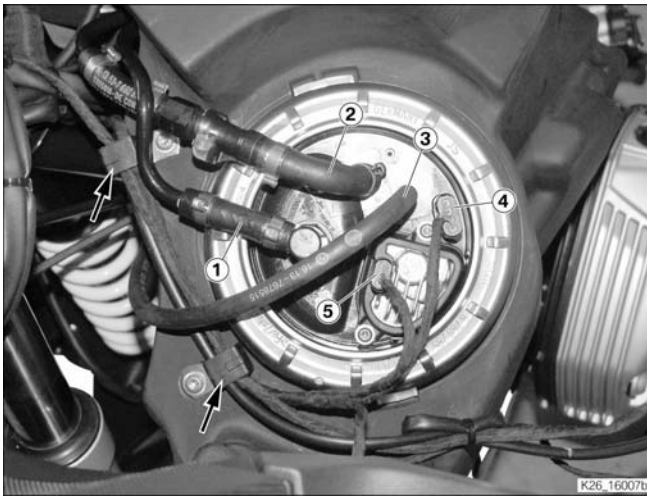
 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and



force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

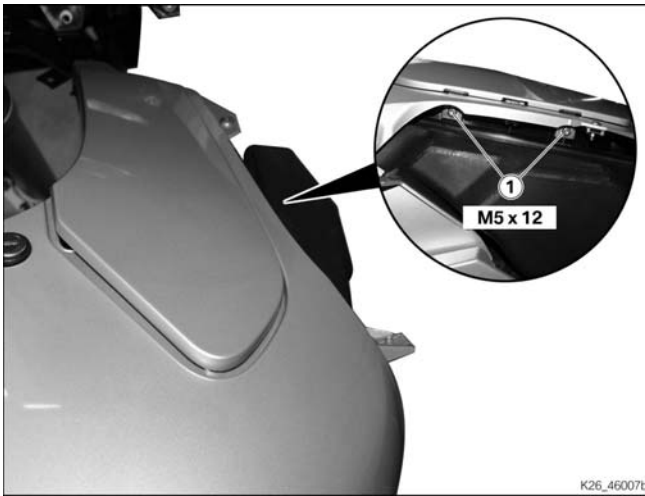
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.



- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover

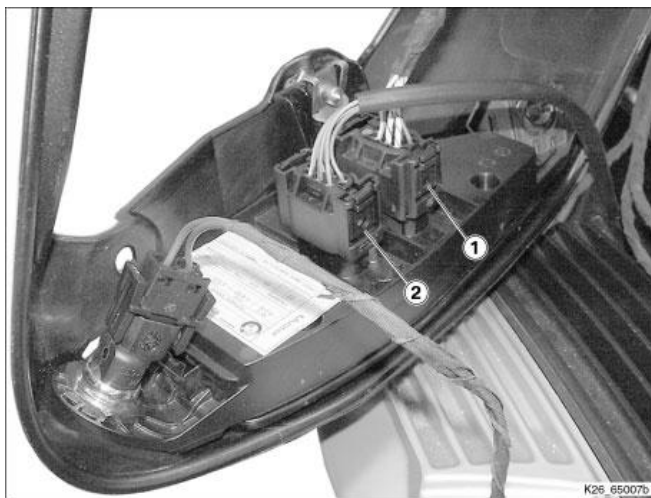


- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



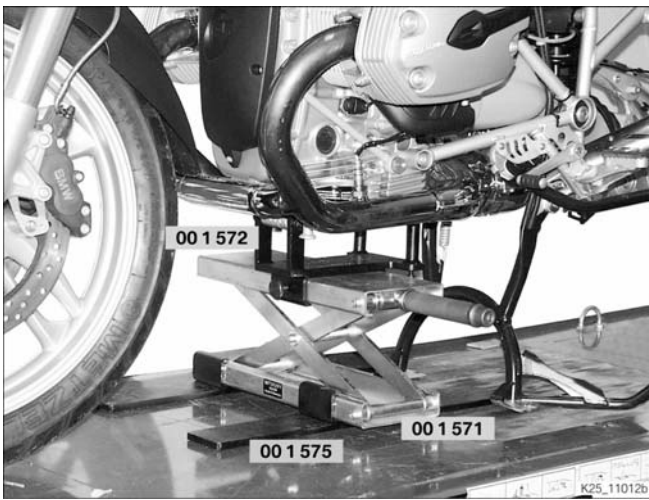
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

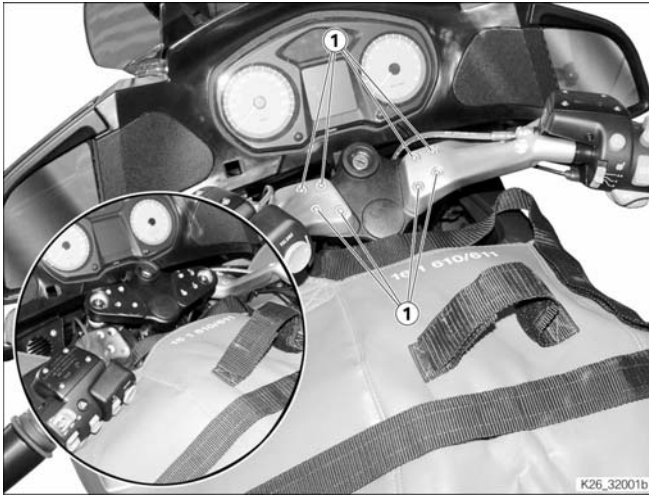


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



31 42 041 Replacing bearing in upper fork bridge



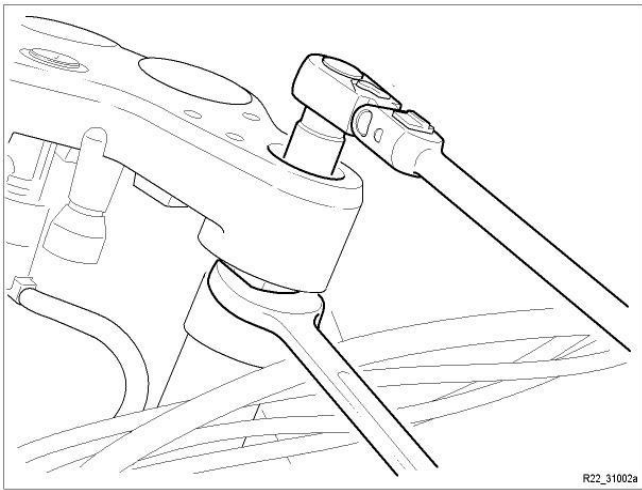
(-) Releasing stub handlebars

- Cover the fuel tank with fuel-tank protective cloth (No. 16 1 611) .
- Remove screws (1) from the stub handlebars.
- Lay the stub handlebars back out of the way.

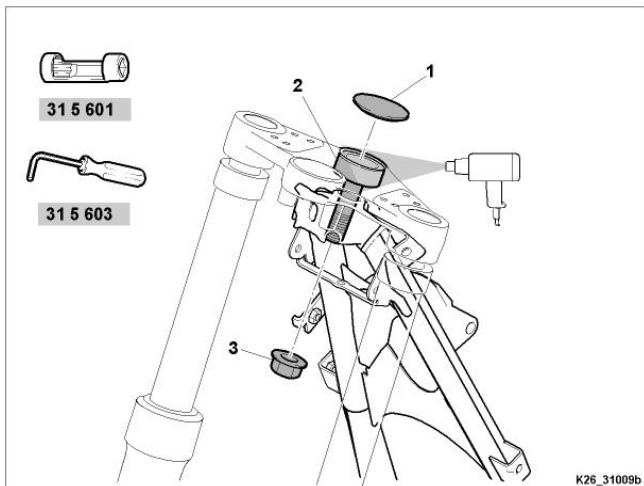
(-) Removing upper fork bridge


► Releasing fixed fork tubes

- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



- Remove cap (1).
- Heat threaded fastener (2) of the fork bridge from above.



 Technical data			
Release temperature, top fork bridge		120 °C	

- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, remove nut (3) with socket wrench insert (No. 31 5 601) .

⚠ Attention

Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

- Turn the fork bridge all the way to the left and carefully remove the steering head bearing from the frame front section.
- Carefully lay the fork bridge back out of the way.

► **Disconnecting plug for ignition switch/ring aerial**

- Remove screws (1).
- Remove cover (2).




- Disconnect plugs (3) and (4).

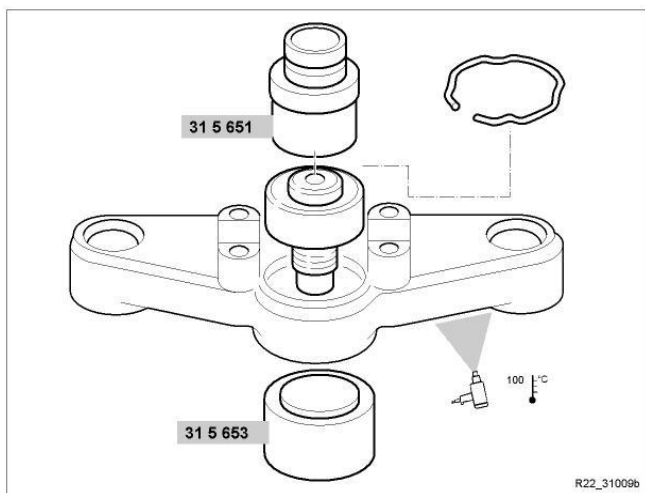


◄ **(-) Removing bearing from top fork bridge**

- Remove protective cap (2).
- Remove circlip (1).
- Heat the fork bridge.

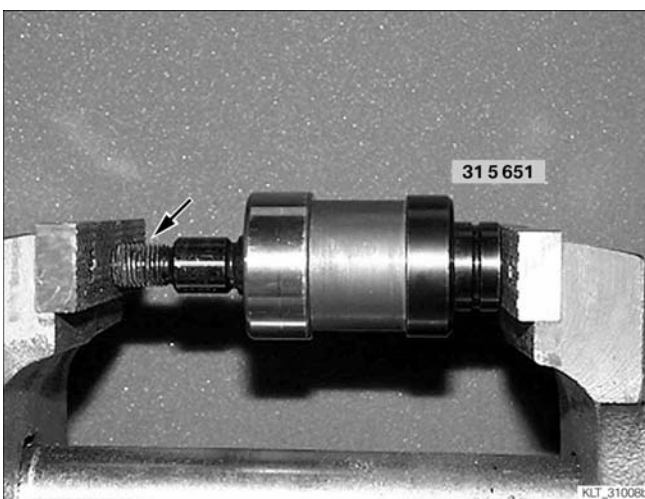
 Technical data			
Release temperature, top fork bridge		120 °C	

- Remove the angular-contact ball bearing with mandrel



(No. 31 5 651) and bushing (No. 31 5 653) , tapping lightly with a plastic-faced hammer if necessary.

(-) Removing threaded stud



- Press out the threaded stud with mandrel (No. 31 5 651) , taking care not to damage the thread (arrow).


(-) Installing threaded stud

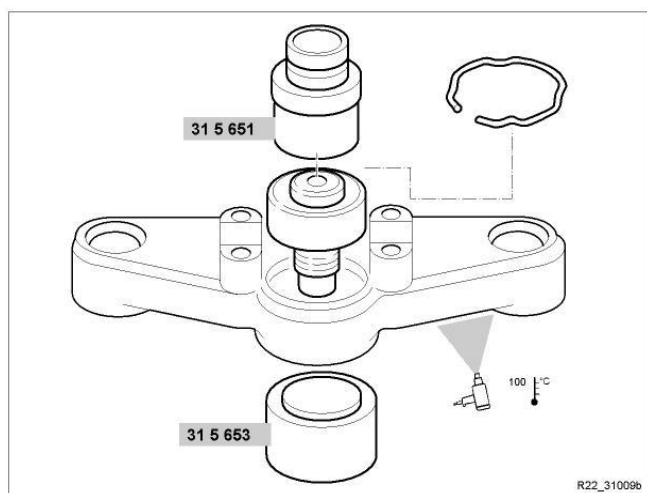


- Press threaded stud (1), using mandrel (No. 31 5 651) as support, into new angular-contact ball bearing (2).

(-) Installing bearing in top fork bridge

- Heat the fork bridge.

	Technical data			



Release temperature, top fork bridge	120 °C	
--------------------------------------	--------	--

- Press the angular-contact ball bearing into the fork bridge with mandrel (No. 31 5 651) and bushing (No. 31 5 653) .
- Install circlip (1).

(-) Installing upper fork bridge

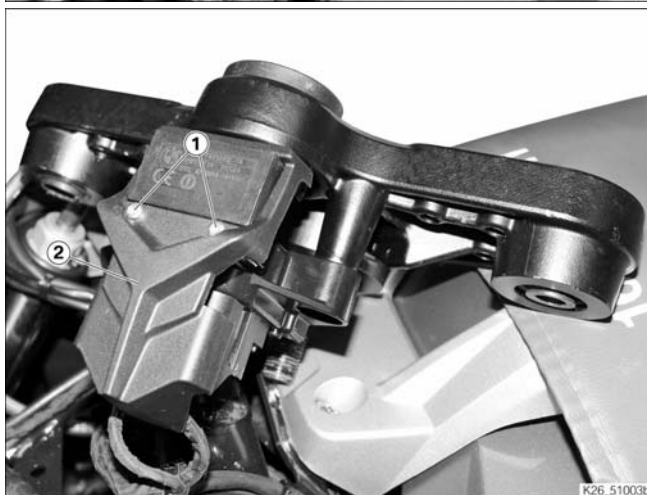
- Clean the threads.

► Connecting plug for ignition switch/ring aerial

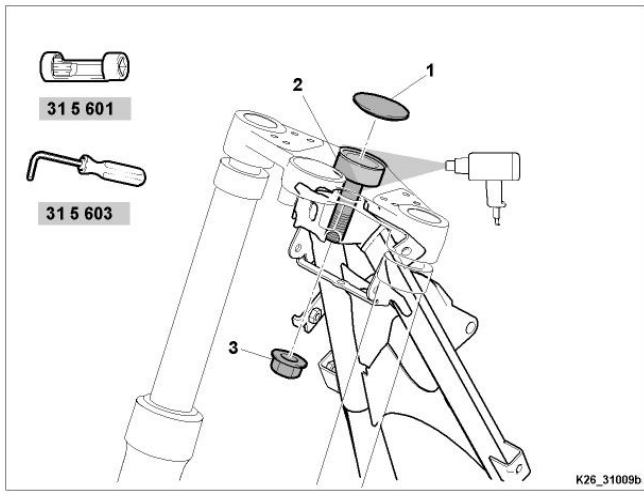
- Connect plugs (3) and (4).



- Install cover (2) and secure with screws (1).




! **Attention**
Nature: Excessive mechanical strain can damage



the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

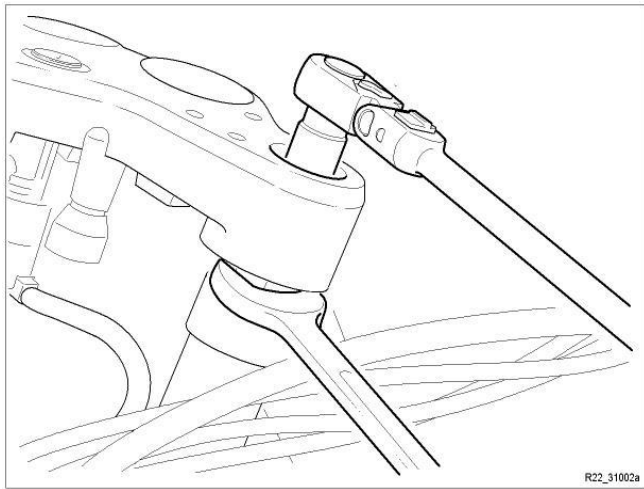
- Turn the fork bridge all the way to the left and carefully introduce the steering head bearing into the frame front section.
- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, install new nut (3) with socket wrench insert (No. 31 5 601) .


 Tightening torques		
Fork bridge to front frame, M14 x 1.5, Replace nut Micro-encapsulated	130 Nm	

- Install cap (1).

► **Installing fixed fork tubes**

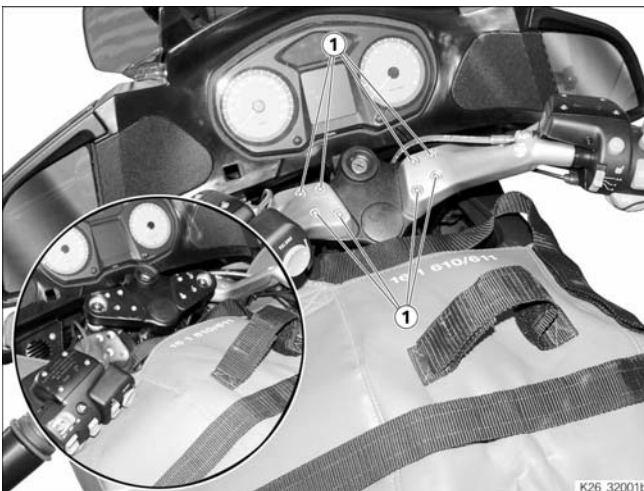
- Introduce the fixed fork tube into the fork bridge.
- Secure the fixed fork tube in the top fork bridge with a new nut, while holding the fixed fork tube at the hexagon underneath the fork bridge.




 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	

◀ **(-) Securing stub handlebars**

- Position the stub handlebars on the top fork bridge, noting the seals.
- Install screws (1).



 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	

31 42 046 Replacing pot-type joints in upper fork bridge



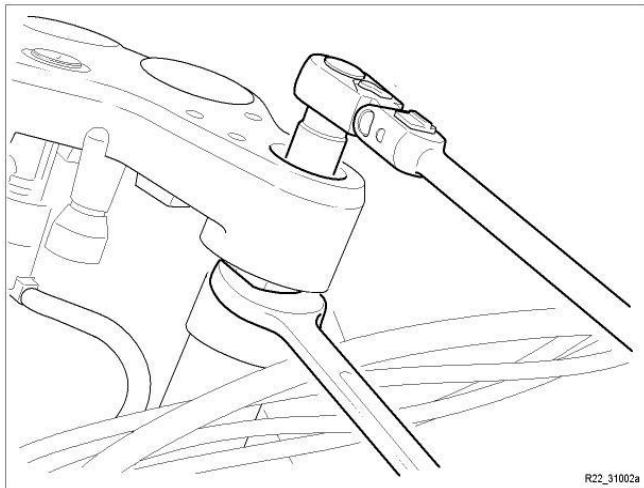
(-) Releasing stub handlebars

- Cover the fuel tank with fuel-tank protective cloth (No. 16 1 611) .
- Remove screws (1) from the stub handlebars.
- Lay the stub handlebars back out of the way.

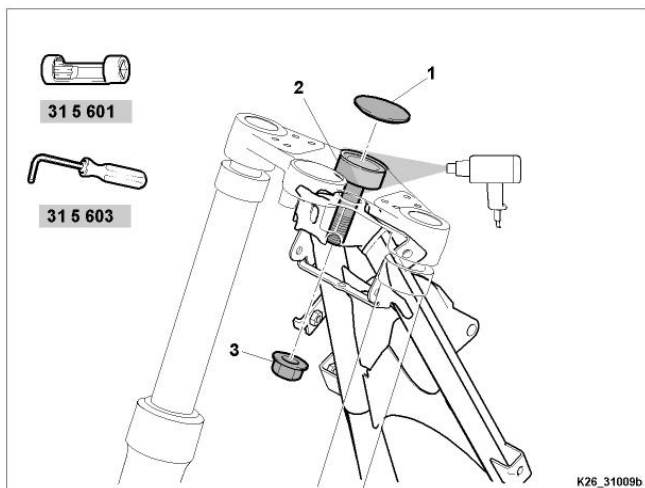
(-) Removing upper fork bridge

► Releasing fixed fork tubes

- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



- Remove cap (1).
- Heat threaded fastener (2) of the fork bridge from above.



Technical data			
Release temperature, top fork bridge		120 °C	

- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, remove nut (3) with socket wrench insert (No. 31 5 601) .



Attention

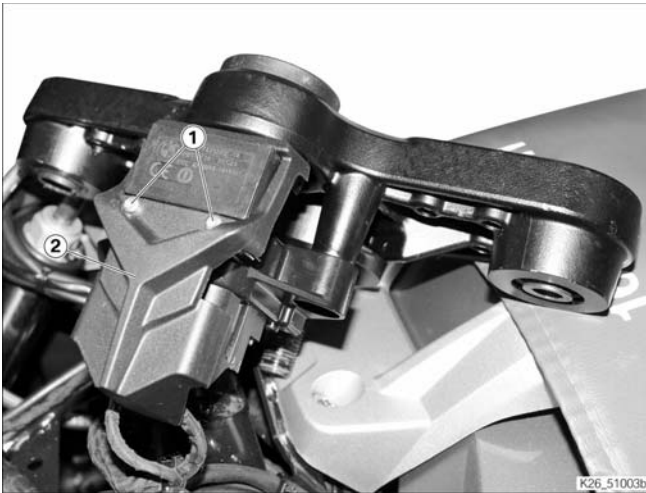
Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

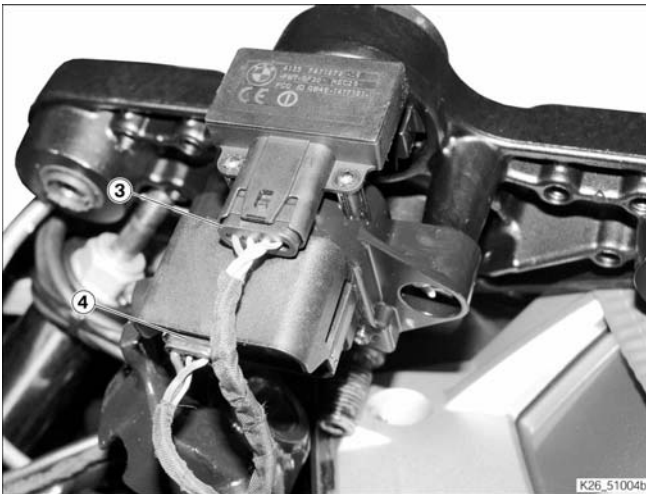
- Turn the fork bridge all the way to the left and carefully remove the steering head bearing from the frame front section.
- Carefully lay the fork bridge back out of the way.

► **Disconnecting plug for ignition switch/ring aerial**

- Remove screws (1).
- Remove cover (2).

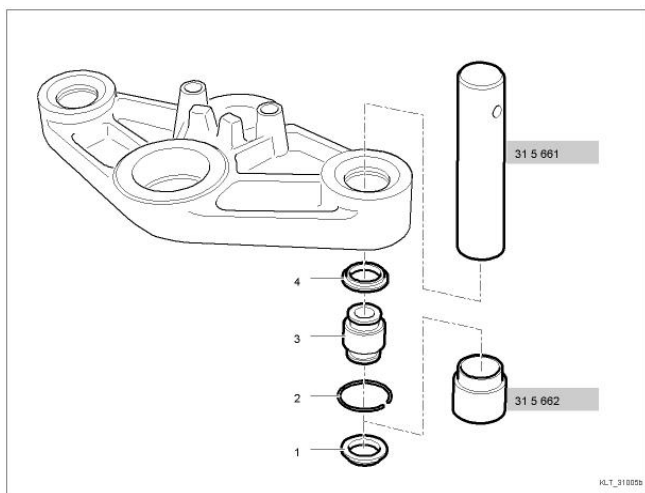


- Disconnect plugs (3) and (4).



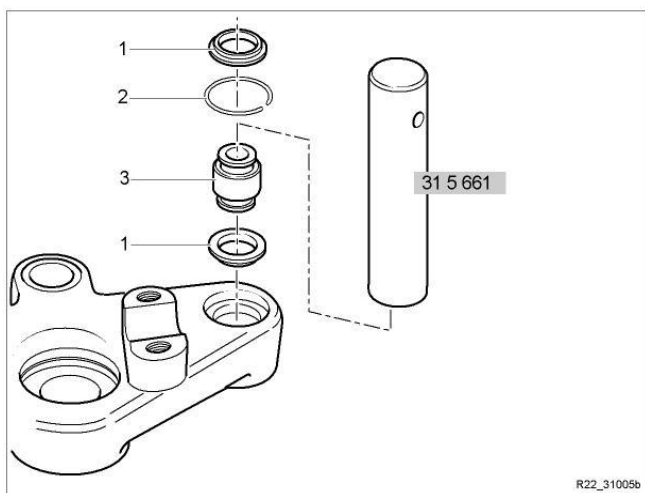
◄ **(-) Removing pot-type joints from top fork bridge**

- Remove sealing boot (1).
- Remove circlip (2).
- Press out pot-type joint (3) with sealing boot (4) using mandrel (No. 31 5 661) and bushing (No. 31 5 662) .



(-) Installing pot-type joints in top fork bridge

- Press in pot-type joint (3) with mandrel (No. 31 5 661).
- Install circlip (2).
- If necessary, install replacement sealing boots (1).



(-) Installing upper fork bridge

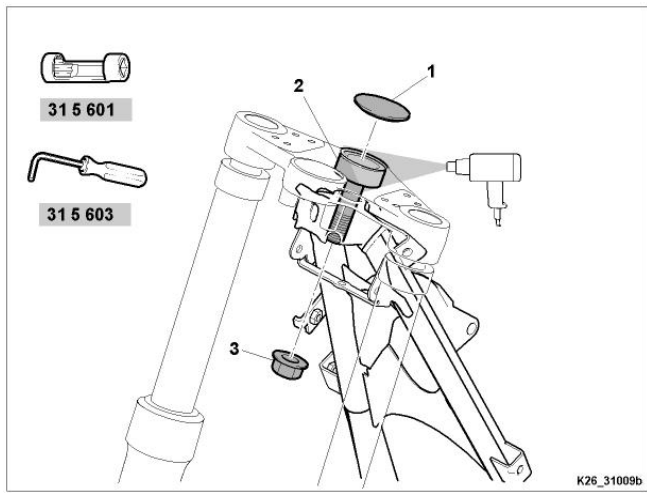
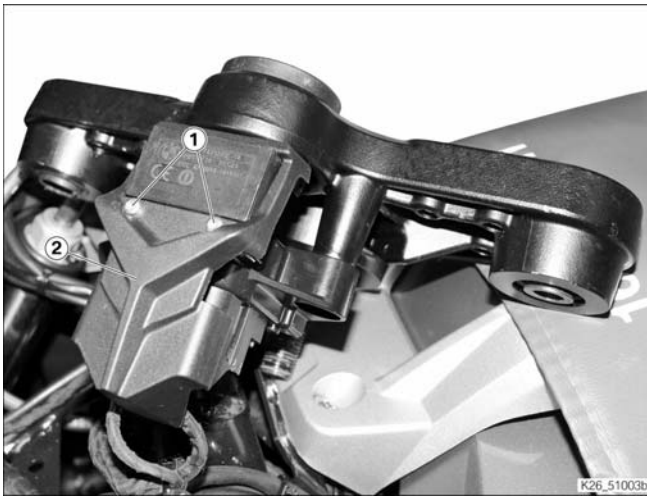
- Clean the threads.

► Connecting plug for ignition switch/ring aerial

- Connect plugs (3) and (4).



- Install cover (2) and secure with screws (1).




Attention

Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

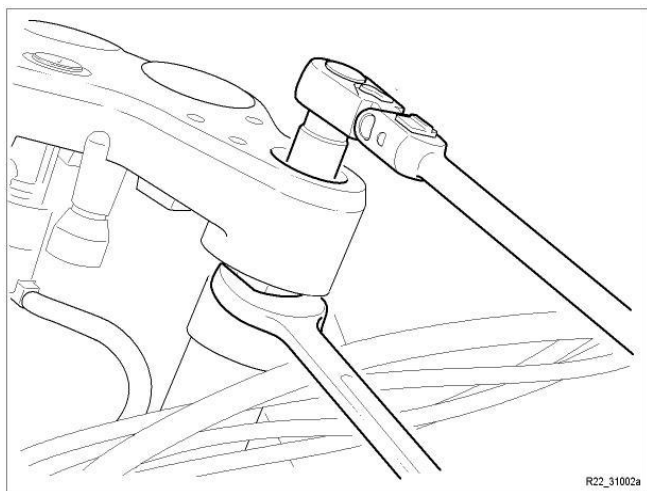
- Turn the fork bridge all the way to the left and carefully introduce the steering head bearing into the frame front section.
- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, install new nut (3) with socket wrench insert (No. 31 5 601).


 Tightening torques		
Fork bridge to front frame, M14 x 1.5, Replace nut Micro-encapsulated	130 Nm	

- Install cap (1).

► **Installing fixed fork tubes**

- Introduce the fixed fork tube into the fork bridge.
- Secure the fixed fork tube in the top fork bridge with a new nut, while holding the fixed fork tube at the hexagon underneath the fork bridge.




 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	



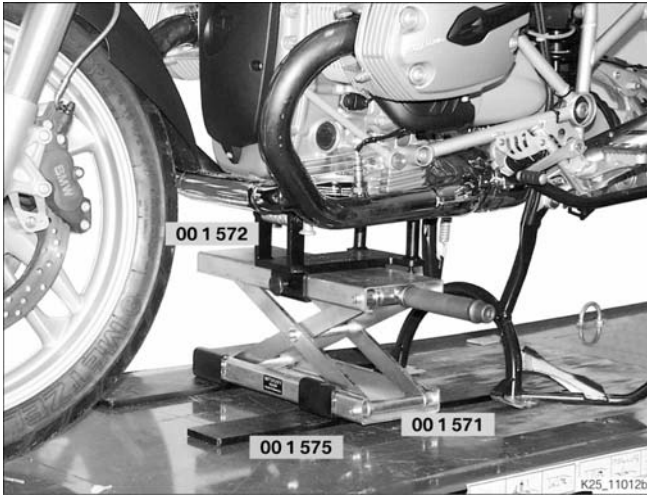
(-) Securing stub handlebars

- Position the stub handlebars on the top fork bridge, noting the seals.
- Install screws (1).

 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	

 **31 42 048 Replacing ball joint in bottom fork bridge**

(-) Installing engine stand



- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

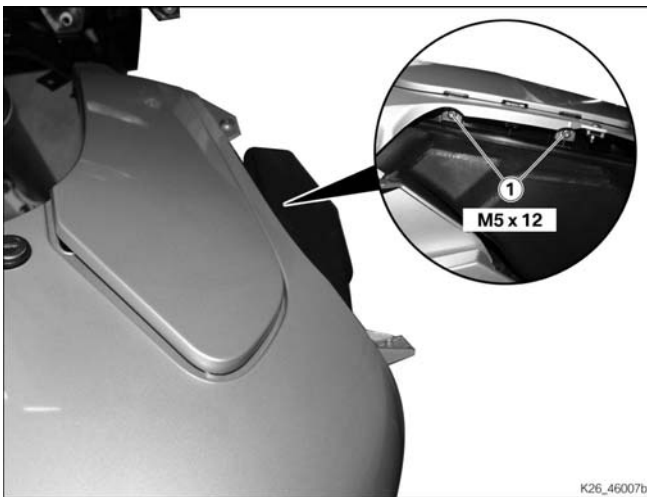
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



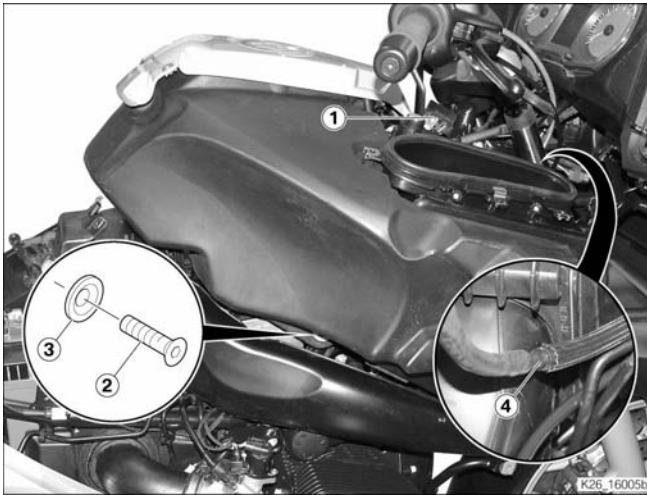
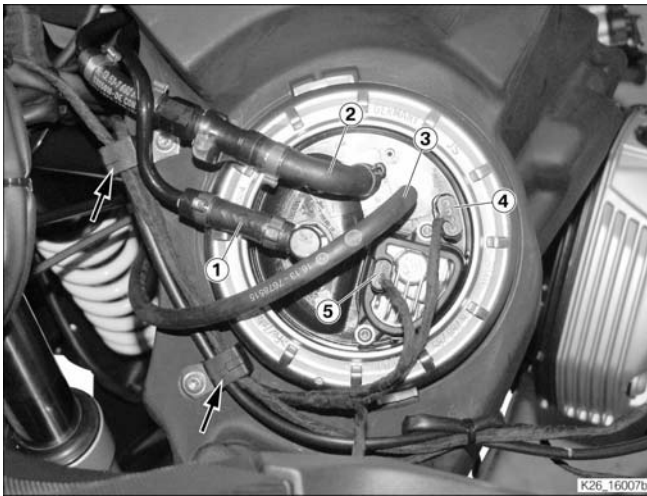
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

(-) Draining front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

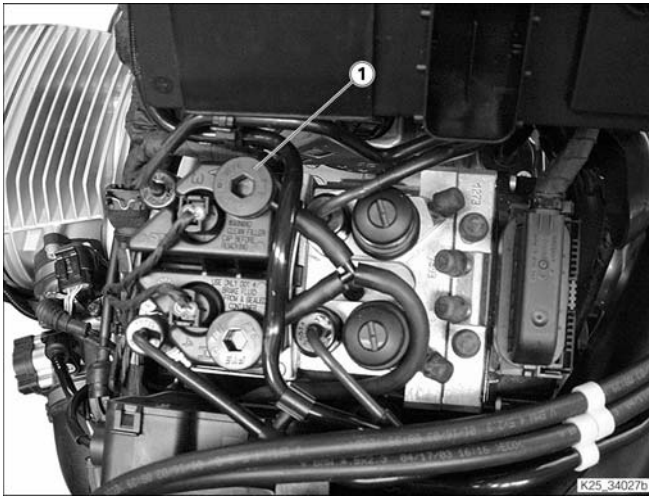
Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



⚠ Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

⚠ Attention

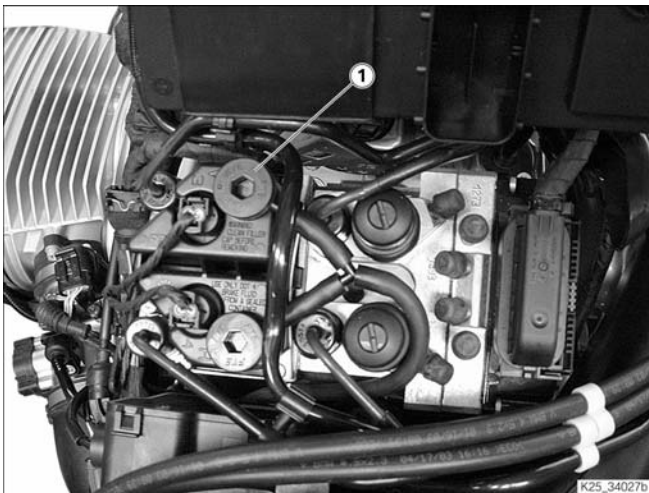
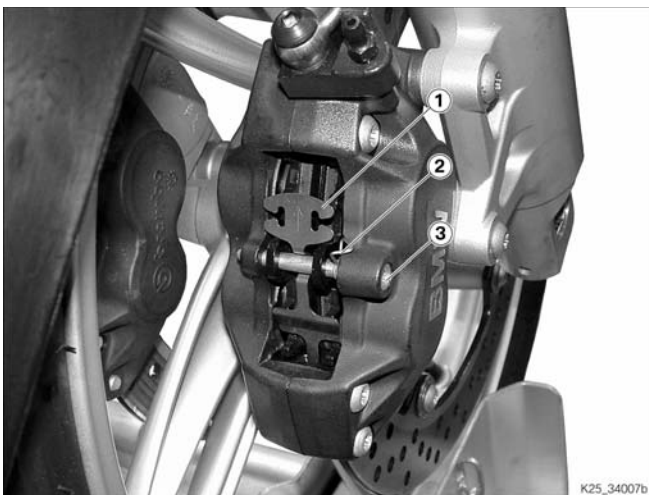
Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

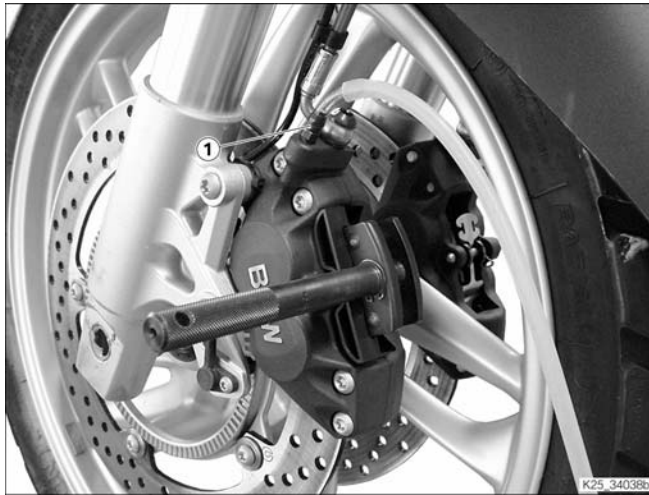
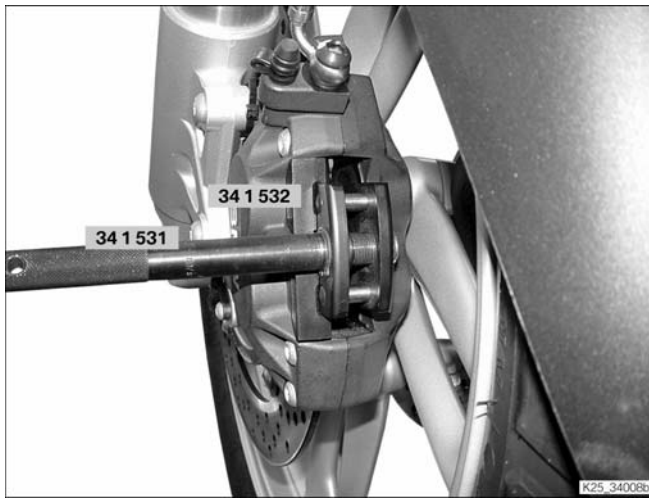
- Open wheel-circuit reservoir (1).

▶ **Removing front brake pads**

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Using piston resetting device (No. 34 1 531) and



locator (No. 34 1 532) , force the pistons of the brake caliper fully back, and secure them in this position.

- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

- Avoidance:** Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Repeat this procedure with the second brake caliper.



Note

Drain the brake system only to the extent necessary for the tasks in question to be performed.

(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing left brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing right brake caliper



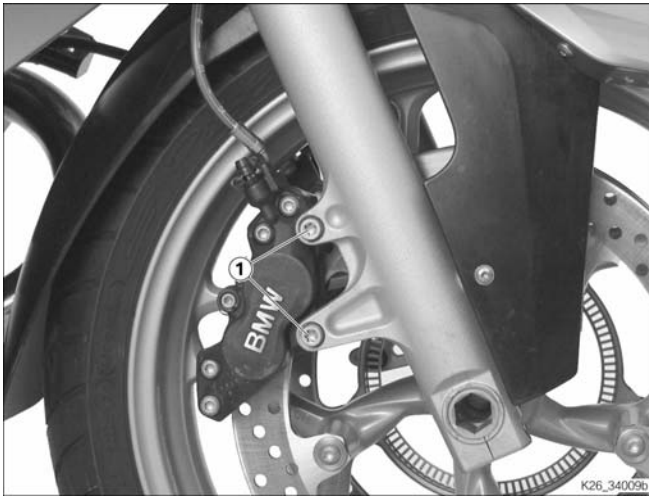
Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



⚠ Attention

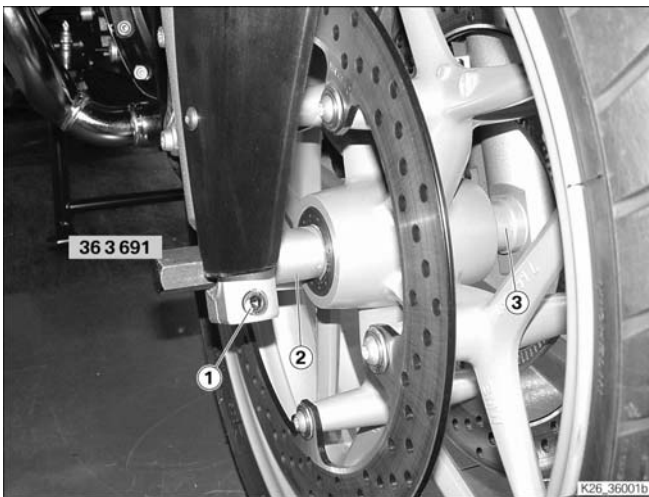
Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691) .
- Roll the front wheel forward to remove.



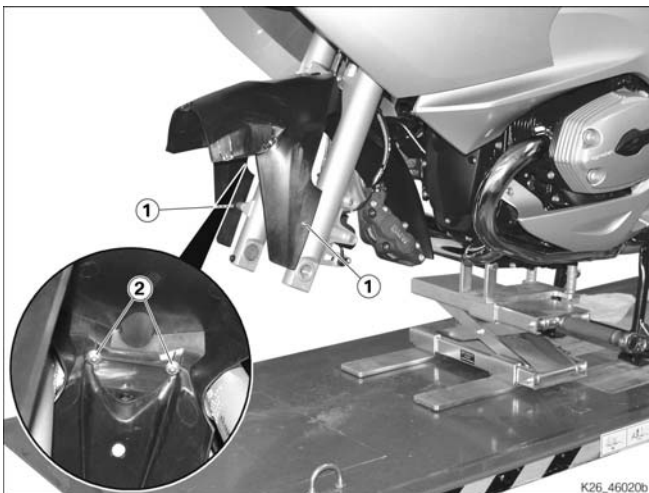
📄 Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

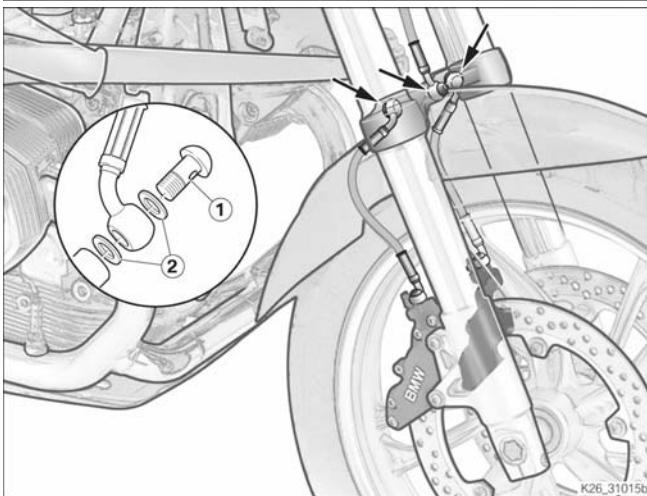
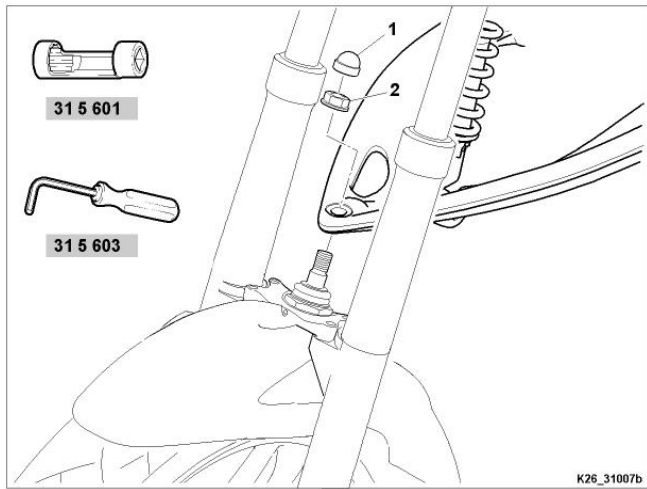
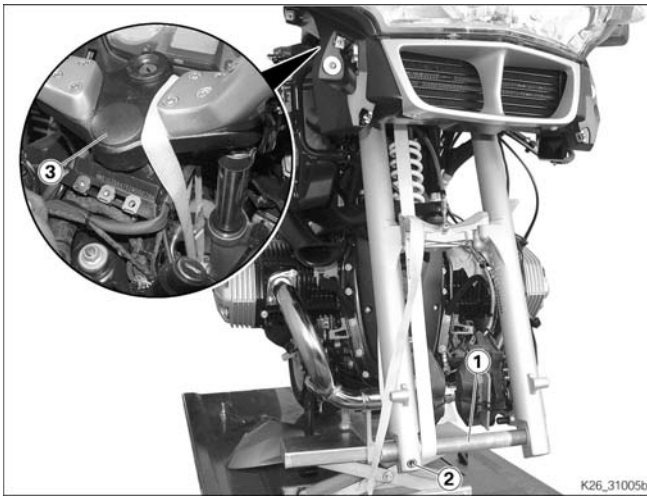
(-) Removing rear section of front mudguard

- Remove screws (1) on left and right.
- Remove screws (2).
- Lightly twist the rear section of the front mudguard and carefully pull in forward direction to remove.
- Detach rear section of front mudguard.



(-) Removing lower fork bridge

- Secure each brake caliper with one screw to the fork legs on left and right.
- Install quick-release axle (1) with hexagon (No. 36 3 691) .
- Tighten axle clamping screw (2).



 **Tightening torques**

Quick-release axle clamp screws, M8 x 35	19 Nm	
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- Loop a strap over quick-release axle (1) and top fork bridge (3) and tighten the strap.

- Remove cap (1).
- Heat nut (2).

 **Technical data**

Release temperature, bottom ball joint	120 °C	
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- Remove nut (2), using socket wrench insert (No. 31 5 601) and Allen screw adapter (No. 31 5 603).

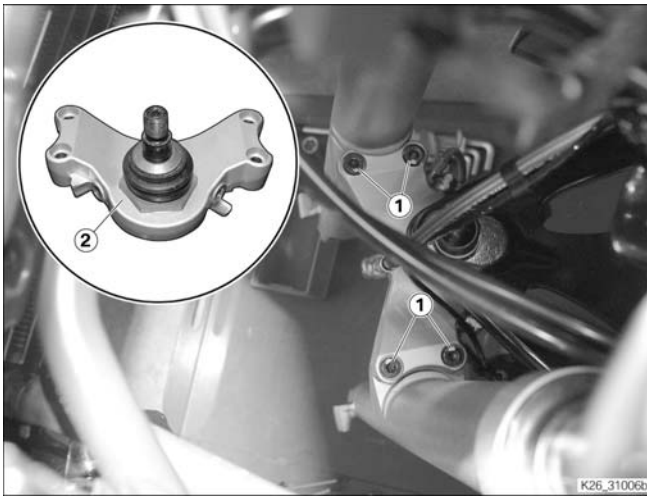
- Remove banjo bolts (1) complete with sealing rings (2).

- Remove screws (1).

 **Attention**

Nature: If the fixed fork tube is pulled out of the slider tube past the limit of its usual travel, the sharp-edged vent bore in the fixed fork tube can damage the shaft sealing ring in the slider tube.

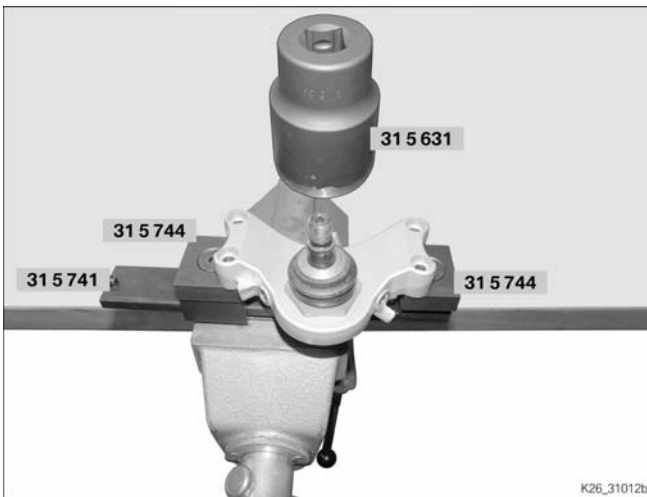
Avoidance: Do not pull the fixed fork tube out of the




slider tube past the as-installed position.

- Lower the fork legs slightly until the bottom fork bridge can be removed, noting the vent bore.
- Remove bottom fork bridge (2).

(-) Removing ball joint from bottom fork bridge



- Secure mounts (No. 31 5 744) (No. 31 5 741) to retaining fixture.
- Install the fork bridge in mounts (No. 31 5 744) and tighten the left mount.
- Heat the part of the slider tube fork bridge around the bearing.


 Technical data			
Release temperature, bottom ball joint		120 °C	

- Remove the ball joint with socket wrench insert (No. 31 5 631) .

(-) Installing ball joint in bottom fork bridge



- Grease the fastener for the ball joint and install with socket wrench insert (No. 31 5 631) in the fork bridge.

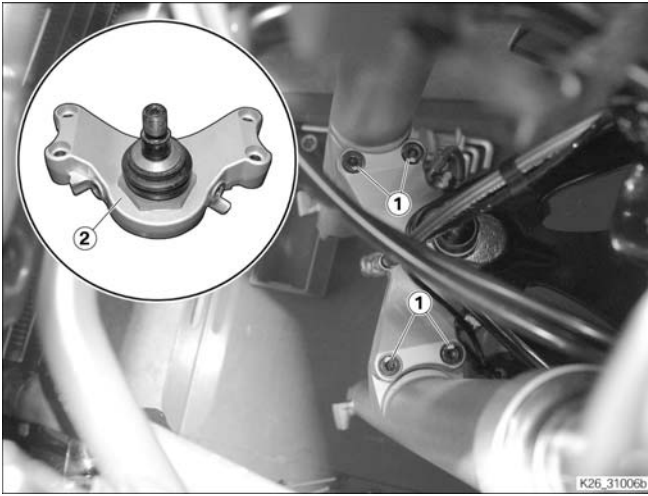
 Tightening torques		
Ball joint to fork bridge, bottom Optimoly TA	230 Nm	

- Remove the fork bridge from mounts (No. 31 5 744) .

(-) Installing lower fork bridge

 **Attention**

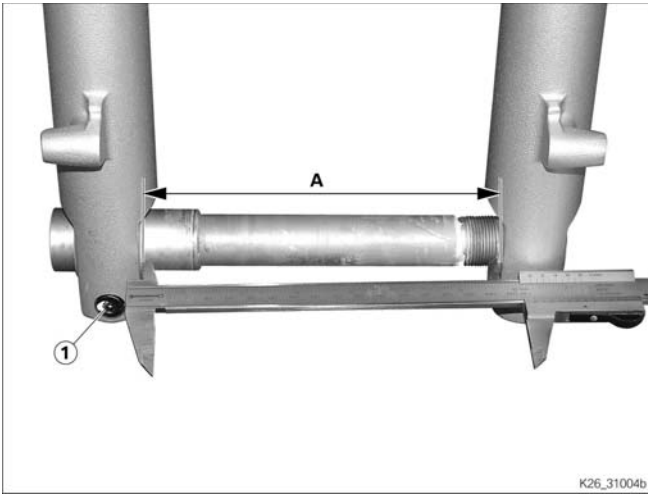
Nature: If the fixed fork tube is pulled out of the slider tube past the limit of its usual travel,



the sharp-edged vent bore in the fixed fork tube can damage the shaft sealing ring in the slider tube.


Avoidance: Do not pull the fixed fork tube out of the slider tube past the as-installed position.

- Lower the fork legs slightly until bottom fork bridge (2) can be installed, noting the vent bore.
- Install new screws (1), but do not tighten them to the specified torque at this point.




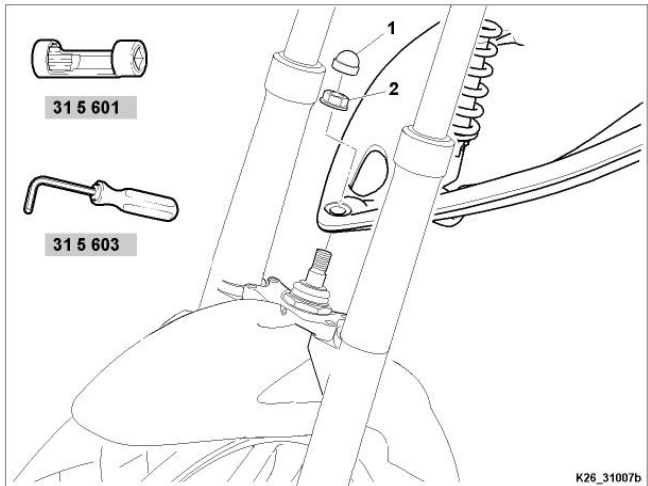
► **Assembly instructions, telescopic forks**

- Release axle clamping screw (1).
- Preassemble fork legs and quick-release axle and adjust to size (A).


 Technical data			
Adjustment dimension of fork slider tubes with respect to each other		170 _{-0.5} ^{+0.5} mm	

- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

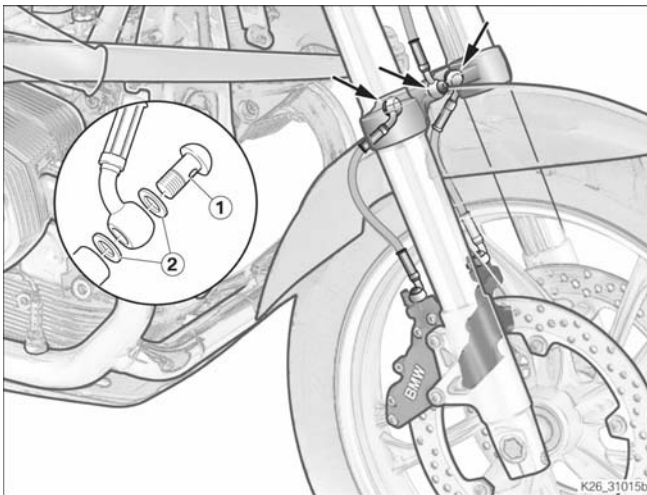
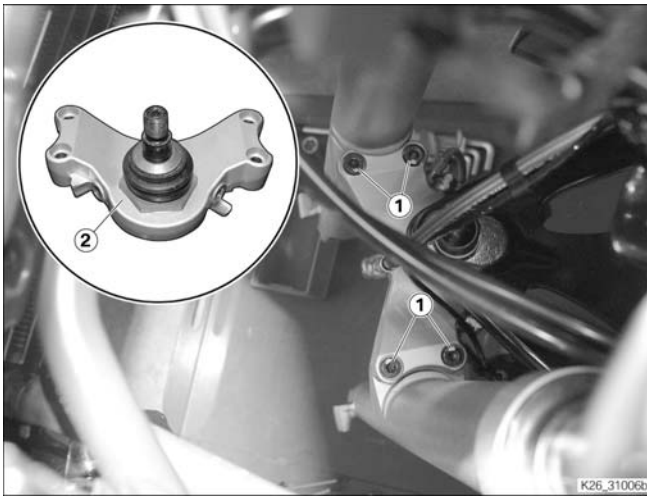


- Hold the leading link in position at the bottom fork bridge.
- Install new nut (2), using socket wrench insert (No. 31 5 601) and Allen screw adapter (No. 31 5 603).

 Tightening torques		
Ball joint to leading link, M14 x 1.5, Replace nut Micro-encapsulated	130 Nm	

- Install cap (1).

- Tighten screws (1).



! Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

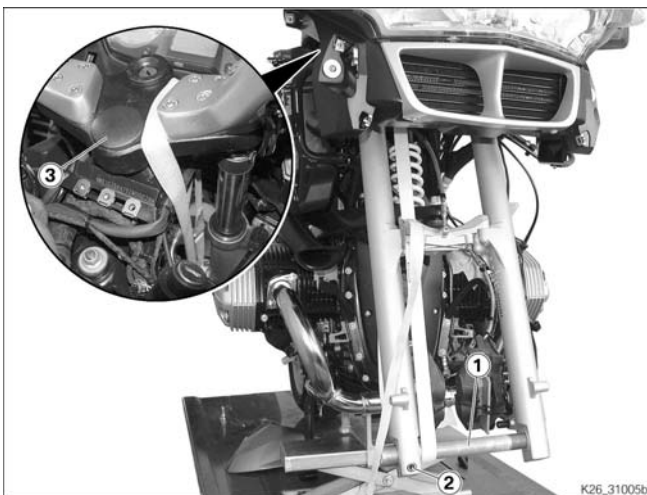
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Hold the brake hose in position and install banjo bolts (1) with new sealing rings (2) in the fork bridge.
- Tighten banjo bolts (1).



Tightening torques

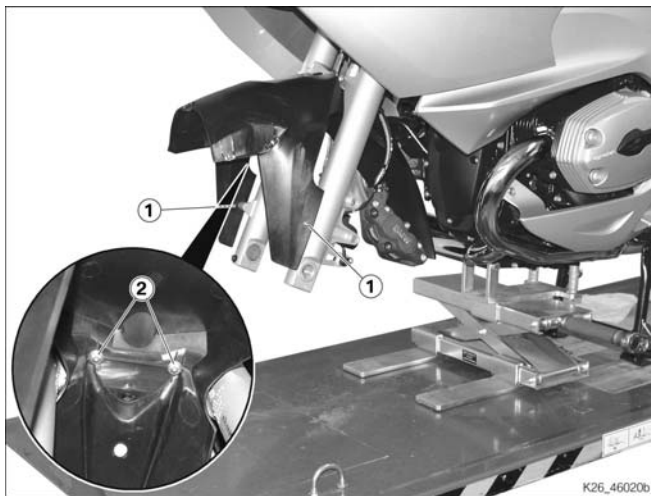
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	




- Remove the strap from quick-release axle (1) and top fork bridge (3).
- Release axle clamping screw (2).
- Remove quick-release axle (1) with hexagon (No. 36 3 691).

(-) Install rear section of front mudguard


- Fit the rear section of the front mudguard at a slight angle and opposite direction of travel.
- Align rear section of front mudguard and secure with



new screws (2).

 Tightening torques		
Front mudguard, rear, to slider tube bridge, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

- Install new screws (1) on left and right.

 Tightening torques		
Front mudguard, rear section, to axle clamp, left/right, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

(-) Installing the front wheel

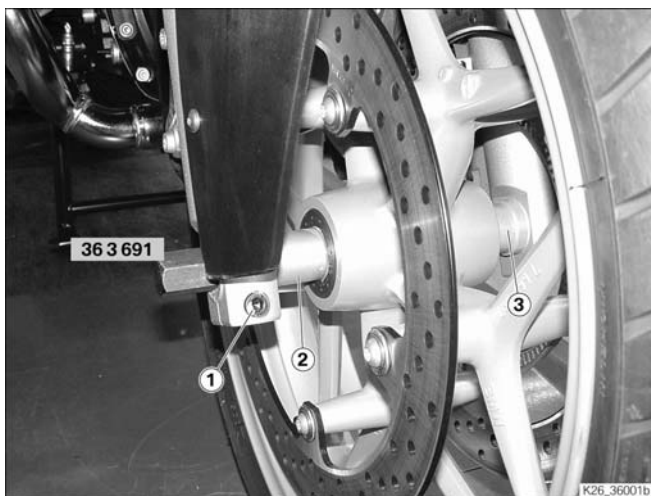
- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note


Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Clean quick-release axle (2) and grease it with lubricant.



 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

- Tighten axle clamping screw (1).


 Tightening torques		
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Quick-release axle clamp screws, M8 x 35	19 Nm	
--	-------	--

(-) Securing right brake caliper



- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing left brake caliper



- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions.

released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

-
- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.



(-) Filling front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them

to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

 **Attention**

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

 **Attention**


Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

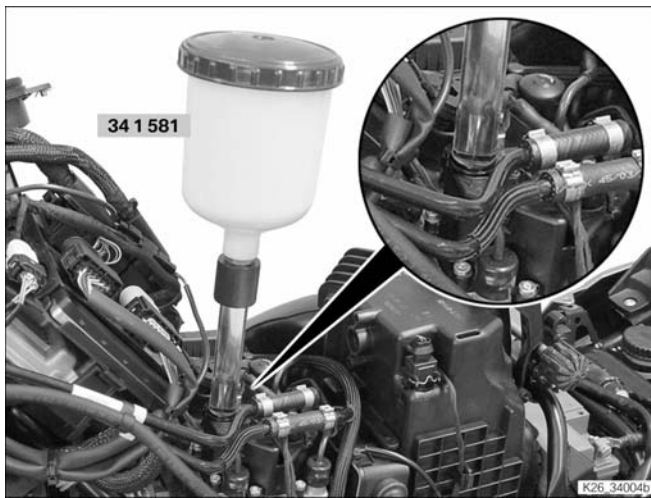
Avoidance: Do not disconnect the plugs from the pressure modulator.



- Wrap cloths around the left and right brake callipers.
- Use piston resetting device (No. 34 1 531) and locator (No. 34 1 532) to force the pistons in the left and right brake callipers all the way back and hold them in this position.

- Screw container (No. 34 1 581) onto front wheel circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/2 full.

		
Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895,



		83 13 0 139 896, 83 13 0 139 897
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- Connect the brake bleeding device to the bleed screw of the right brake calliper, but **do not switch on**.
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.




Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the

wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.




Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- Continue pumping off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Connect the brake bleeding device to the bleed screw of the left brake calliper, but **do not switch on**.
- If necessary, use a cable tie to secure the hose of the brake bleeding device to the bleed screw.
- The procedure for changing the brake fluid in the left brake calliper is the same as that for the right calliper.
- When the fluid exits clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

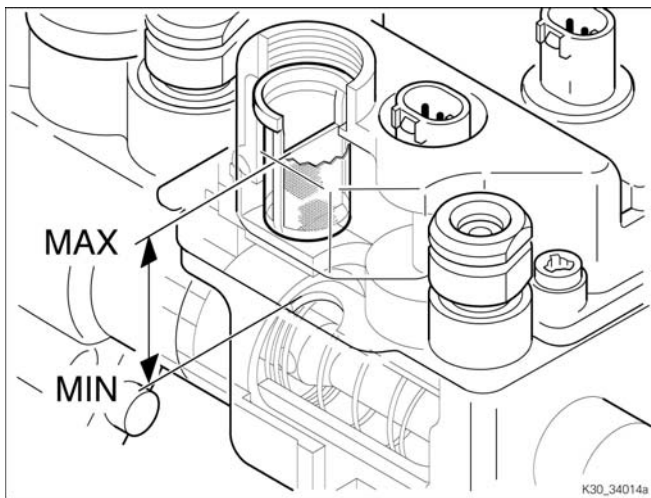
- Release the brake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.



- Top up the fluid in the wheel-circuit reservoir to the **MAX** mark.

► **Instructions for filling front wheel circuit reservoir**

 **Attention**


Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

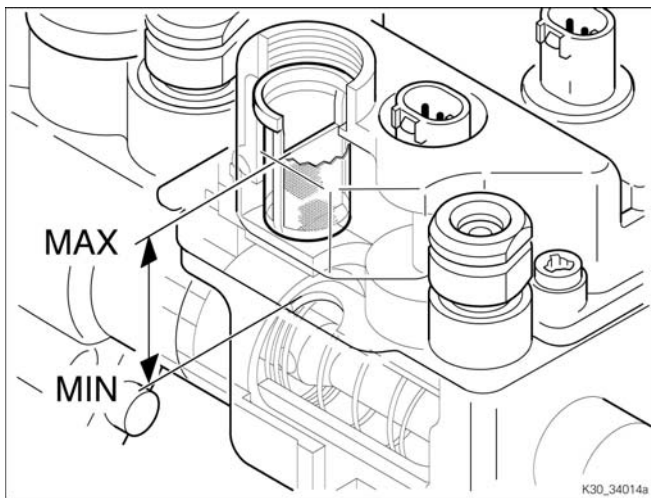
Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.



- Make sure that the front wheel-circuit reservoir is topped up to the "MAX" mark.
- Install adapter 22 (No. 34 1 533) in piston resetting device (No. 34 1 531) and locator (No. 34 1 532) in both front brake callipers and **fully compress** them until the adapter cannot move.
- Switch on the ignition.
- Pull handbrake lever until the pistons of the front brake callipers are in contact with piston resetting device (No. 34 1 531) .

- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896,



		83 13 0 139 897
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- Hand-tighten the cap of the wheel-circuit reservoir.
- Using piston resetting device (No. 34 1 531), force the brake pistons all the way back and remove, together with adapter 22 (No. 34 1 533).
- Replace the front brake pads after removal, if necessary.

▷ Installing front brake pads



Warning

Nature: Greasing the backing plate can allow grease to make its way onto the friction pad and the brake disc.

Avoidance: Take care to grease only the rear and the trailing end face of the backing plate.

- Grease the rear and the trailing end face of the backing plate.



Consumables/lubricants

Never Seez compound	Protective grease	83 23 9 407 830
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- Install the brake pads.
- Install spring (1) with the arrow pointing in the forward direction of travel.
- Install screw (3).
- Install retainer (2).



Tightening torques

Grub screw, brake pads	7 Nm	
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Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully

released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

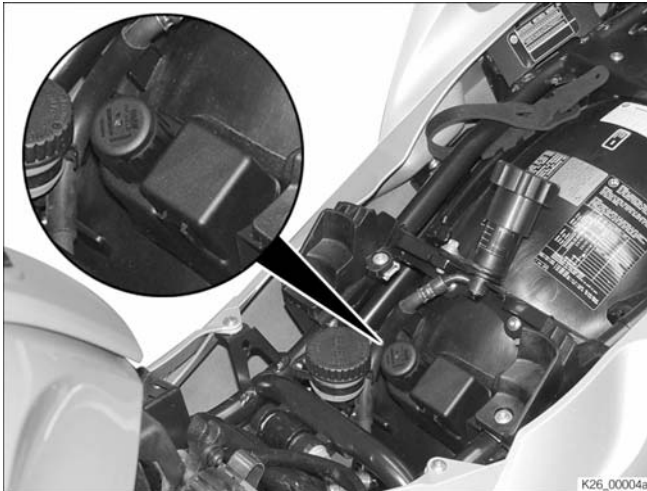
- Check operation of the brake system with the ignition switched on.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system

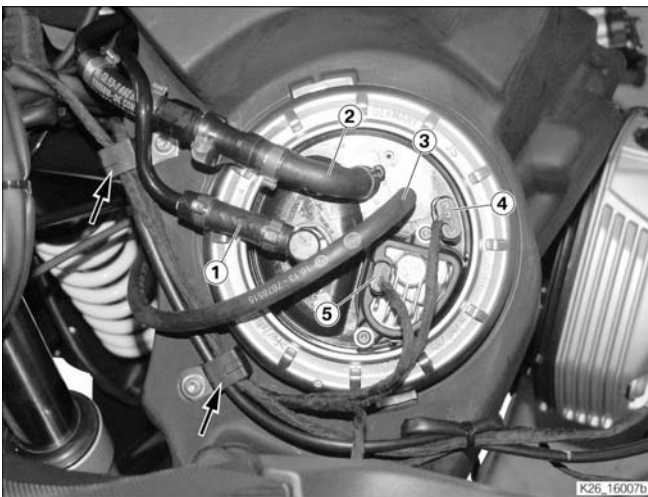
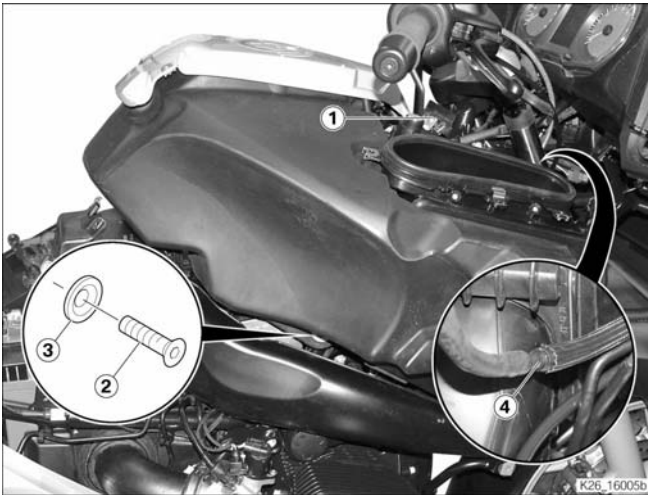


Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.


- Perform the bleed test with the BMW Motorrad diagnostic system.



- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

 **Attention**

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.

 **Note**

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

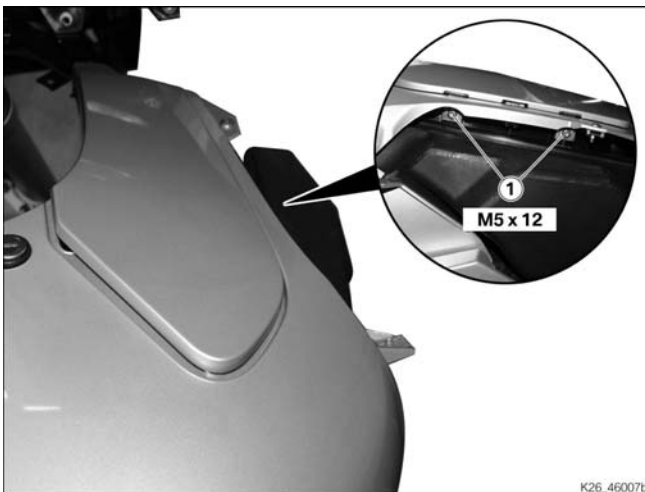
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



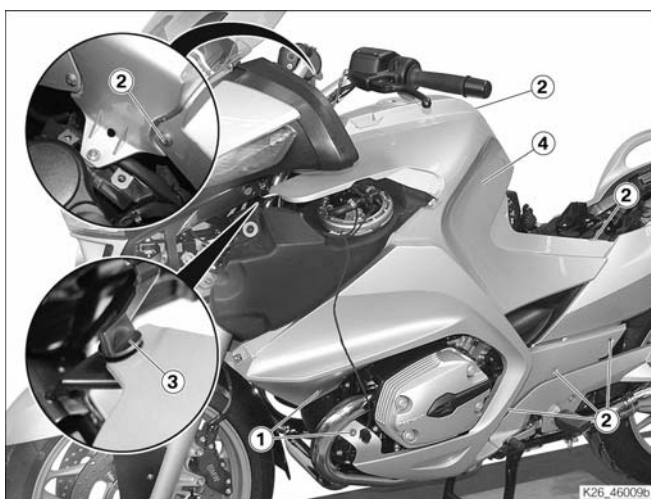
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

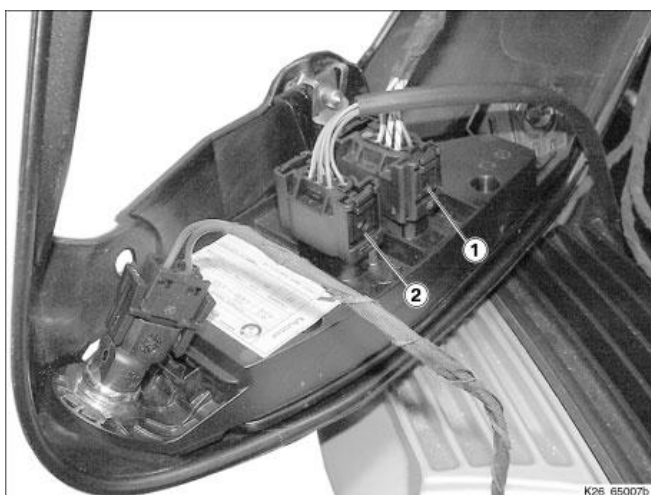
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



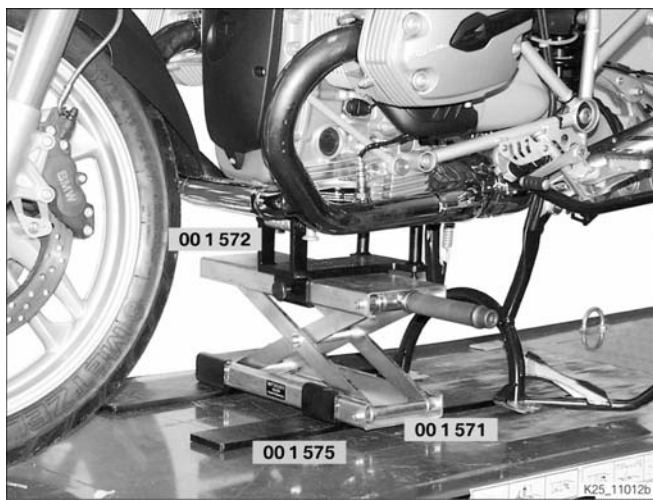
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

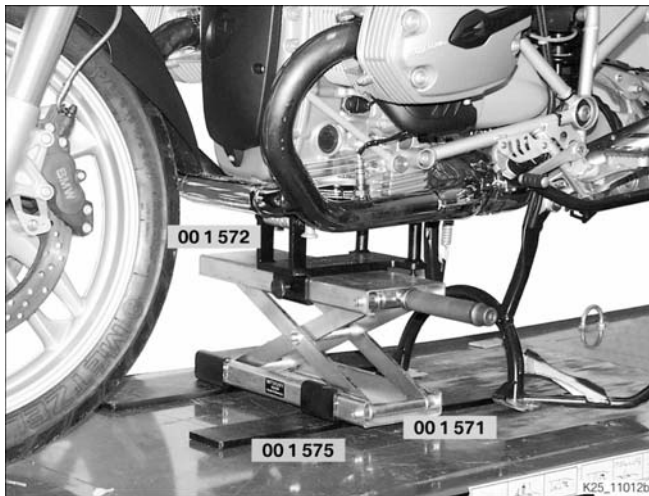


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



📁 31 42 151 Replacing fork slider tubes



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing left brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front ABS sensor

- Remove ABS sensor (1).
- Unclip the ABS sensor cable from holder (2).



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

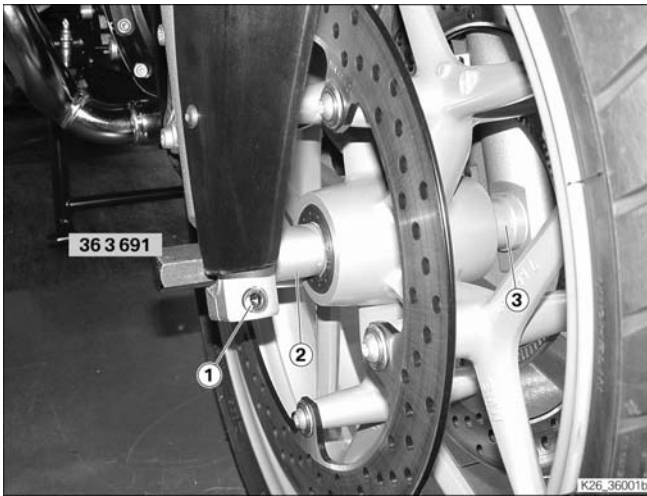
(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691).
- Roll the front wheel forward to remove.



Note

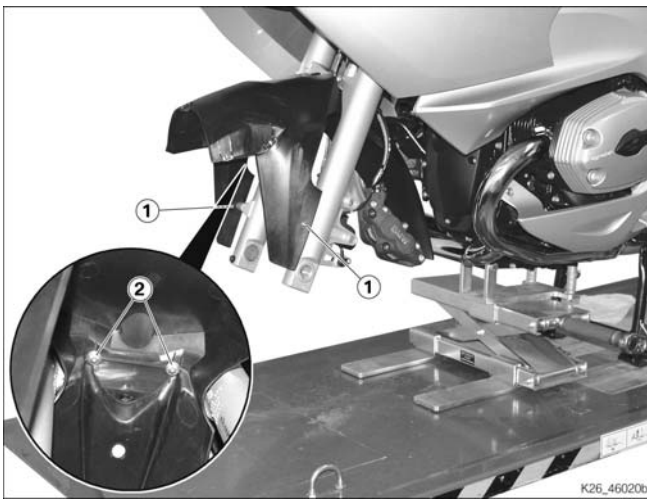
Do not damage the ABS sensor when rolling the front



wheel in or out between the forks.

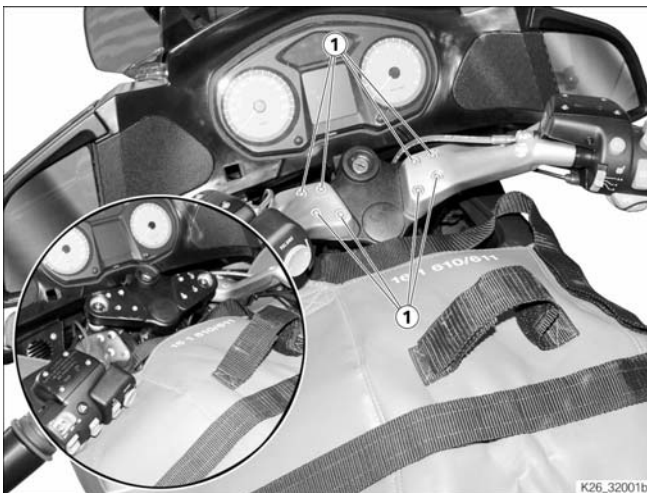
- Remove spacing bushing (3) from the wheel hub.

(-) Removing rear section of front mudguard



- Remove screws (1) on left and right.
- Remove screws (2).
- Lightly twist the rear section of the front mudguard and carefully pull in forward direction to remove.
- Detach rear section of front mudguard.

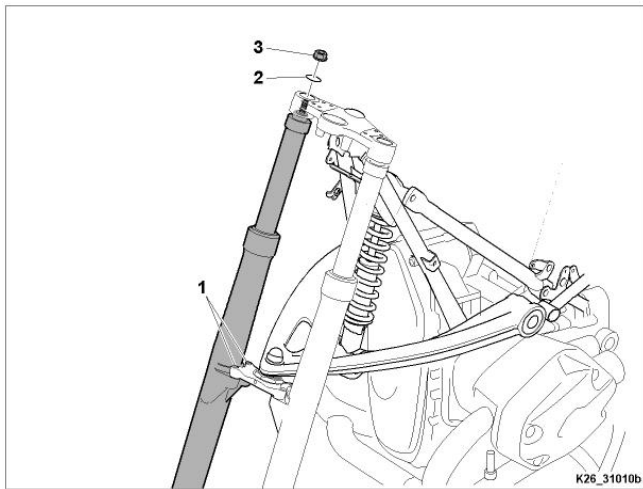
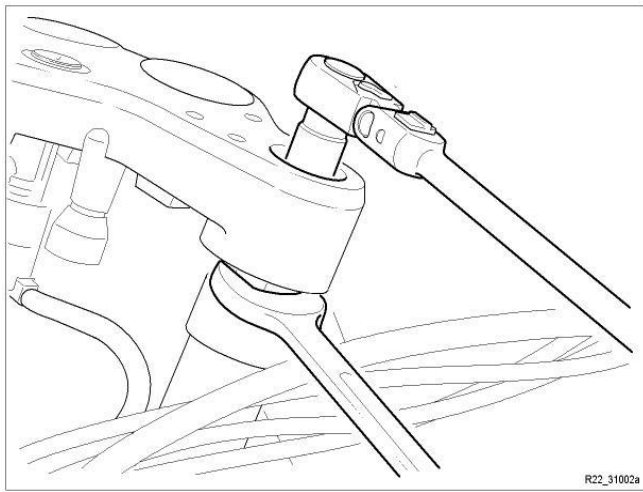
(-) Releasing stub handlebars



- Cover the fuel tank with fuel-tank protective cloth (No. 16 1 611) .
- Remove screws (1) from the stub handlebars.
- Lay the stub handlebars back out of the way.

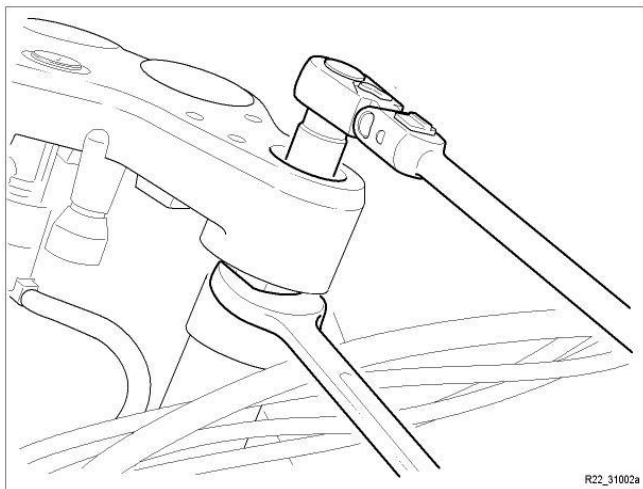
(-) Removing right fork leg

- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



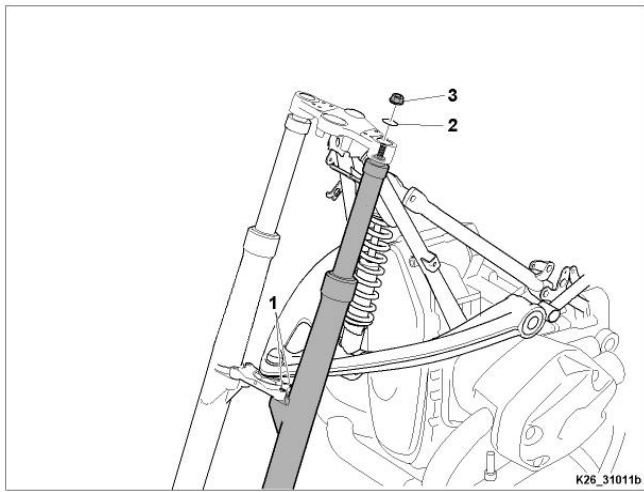
- Remove nut (3) with sealing ring (2).
- Support the fork leg from below.
- Remove screws (1).
- Pull the fork leg down and clear of the top fork bridge.
- Remove the fork leg.

(-) Removing left fork leg



- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.

- Remove nut (3) with sealing ring (2).
- Support the fork leg from below.
- Remove screws (1).
- Pull the fork leg down and clear of the top fork bridge.
- Remove the fork leg.



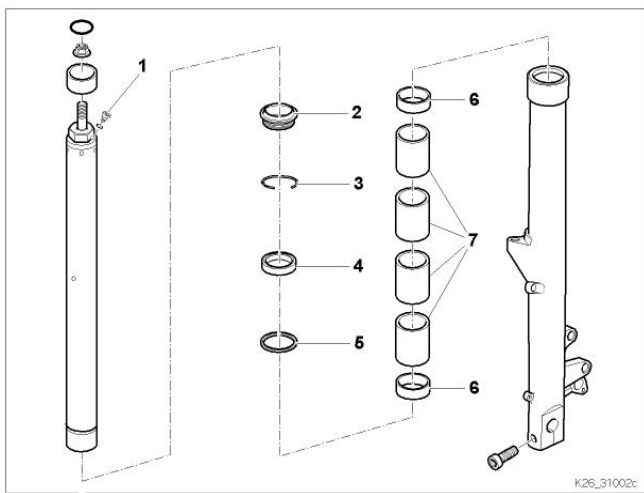
(-) Removing rotary shaft seal

- Remove vent screw (1).
- Carefully pull the fixed fork tube out of the slider tube and catch escaping oil.

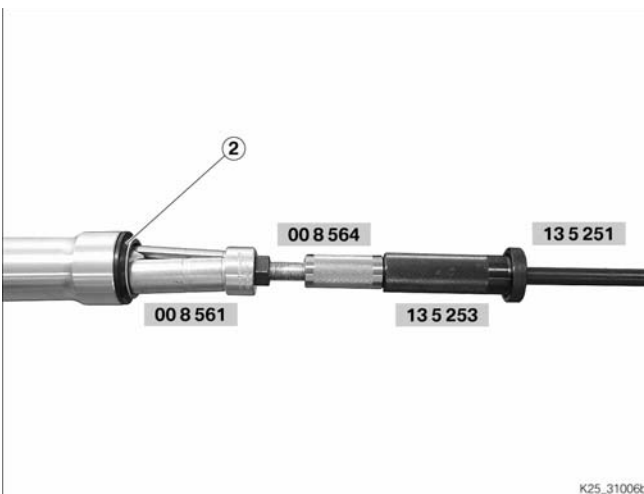
Attention

Nature: The slider tube will develop an irreparable leak if the threaded fastener in the quick-release axle bore of the slider tube is slackened. This fastener secures the displacer - it is not an oil drain plug.

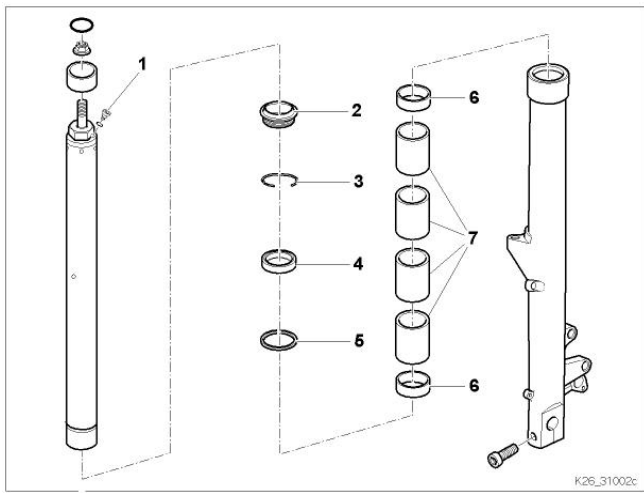
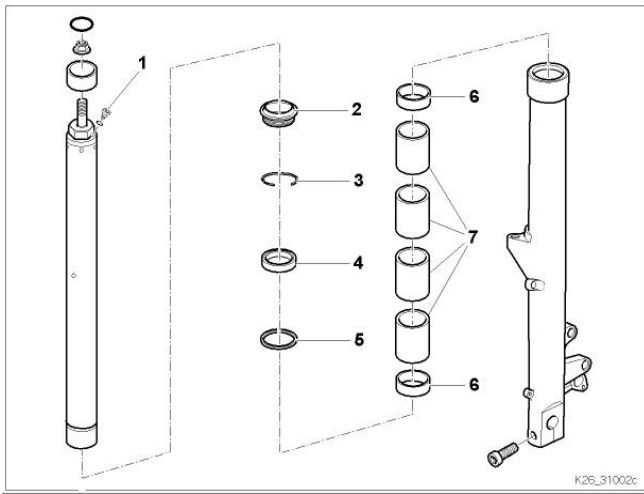
Avoidance: Do not slacken the securing screw in the quick-release axle bore of the slider tube.



- To drain the oil turn the slider tube over and catch the escaping oil.
- Remove sealing boot (2) with inside puller (No. 00 8 561) , adapter (No. 00 8 564) , pull rod (No. 13 5 251) and impact weight (No. 13 5 253) .




- Remove circlip (3).
- Remove shaft sealing ring (4) with inside puller (No. 00 8 561) , adapter (No. 00 8 564) , pull rod (No. 13 5 251) and impact weight (No. 13 5 253) .
- Remove the shaft sealing ring.



(-) Installing rotary shaft seal

- Pour the correct quantity of oil into the slider tube.

 Technical data		
Capacity, fork oil per fork leg	0.62 l	
Consumables/lubricants		
Hydraulic fluid		

- Install the fixed fork tube.
- Provisionally install vent screw (1).
- Install washer (5).

! Attention

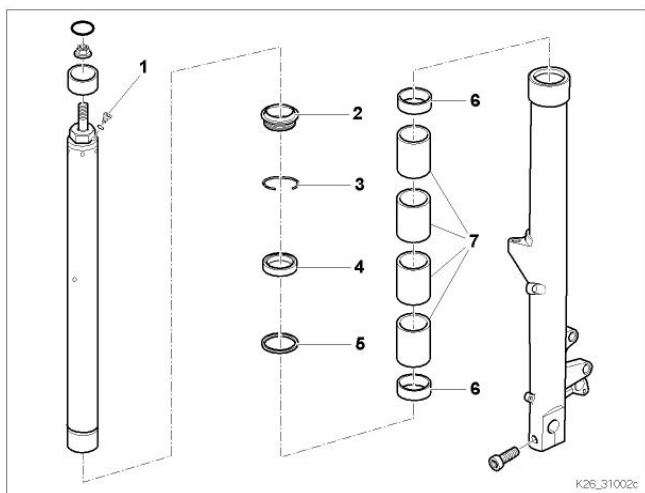
Nature: If the fixed fork tube is pulled out of the slider tube past the limit of its usual travel, the sharp-edged vent bore in the fixed fork tube can damage the shaft sealing ring in the slider tube.

Avoidance: Do not pull the fixed fork tube out of the slider tube past the as-installed position.

- Push lightly oiled shaft sealing ring (4) onto the slider tube until seated, and press in with threaded bush (No. 31 5 611), reducing adapter with tabs (No. 31 5 613) and sleeve (No. 31 5 614), allowing the weight of the tool to press in the shaft sealing ring.
- Install circlip (3) and sealing boot (2).

📄 Note

After installation, the fork leg has to be vented.

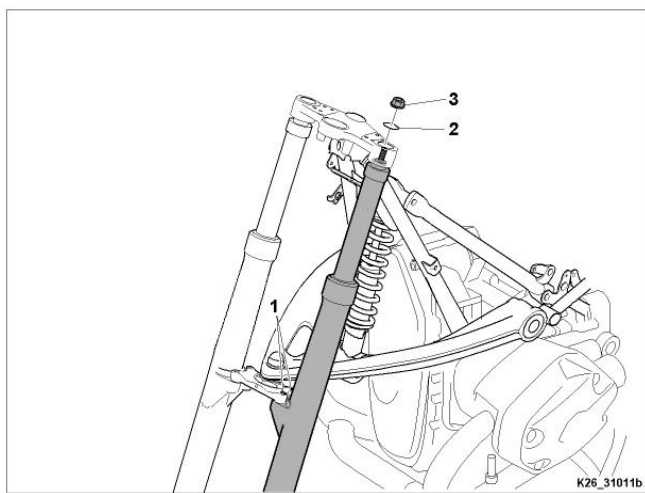


(-) Venting fork leg

- From below, push the fork leg as far as it will go into the fork bridge.
- Tighten the screws in the bottom fork bridge until hand-tight.
- Remove the plug and dispose of the sealing ring in the approved, environmentally friendly manner.
- Loosely install the plug, fitted with a new sealing ring.
- Push the fixed fork tube as far as it will go into the upper fork bridge and tighten the plug.


(-) Installing left fork leg

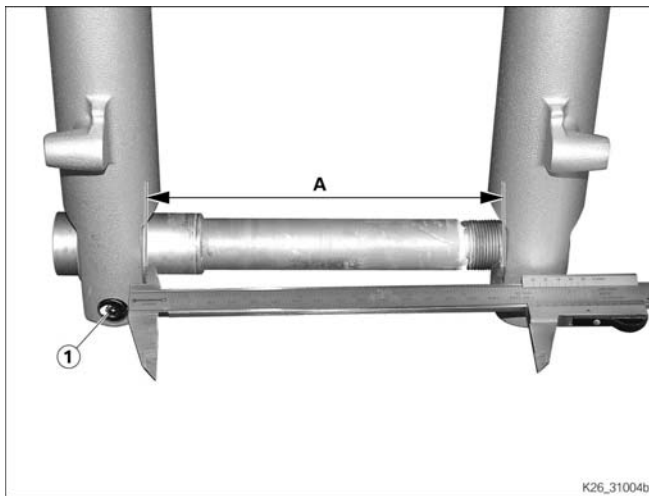
- Working from below, introduce the fork leg into the top fork bridge.
- Tighten new screws (1) in the bottom fork bridge until hand-tight.
- Tighten new nut (3) until hand-tight to hold the fixed fork tube in the top fork bridge.



► Assembly instructions, telescopic forks


- Release axle clamping screw (1).
- Preassemble fork legs and quick-release axle and adjust to size (A).

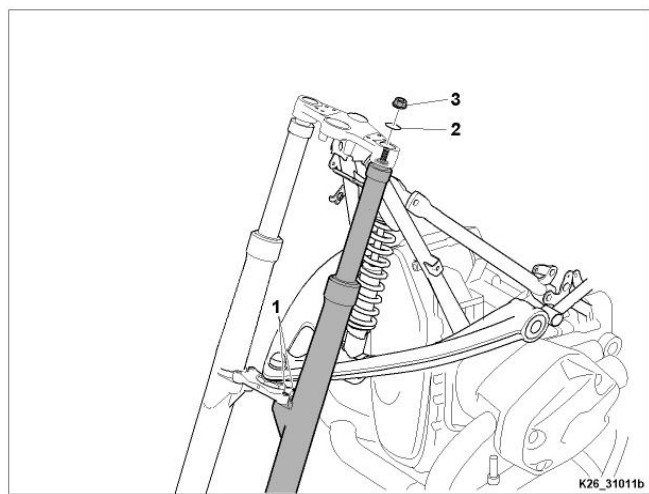
 Technical data			
Adjustment dimension of fork slider tubes with		170 _{-0.5} ^{+0.5} mm	




respect to each other			
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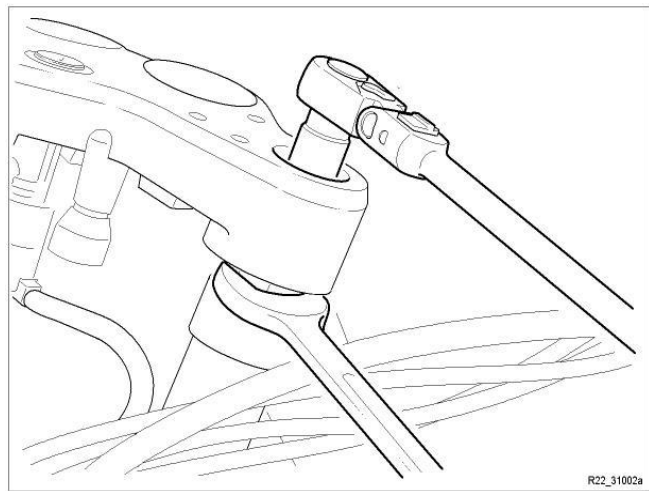
- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	




- Tighten screws (1) in the bottom fork bridge.

 Tightening torques		
Fork bridge, bottom to slider tubes, M8 x 35, Replace screws Micro-encapsulated	25 Nm	

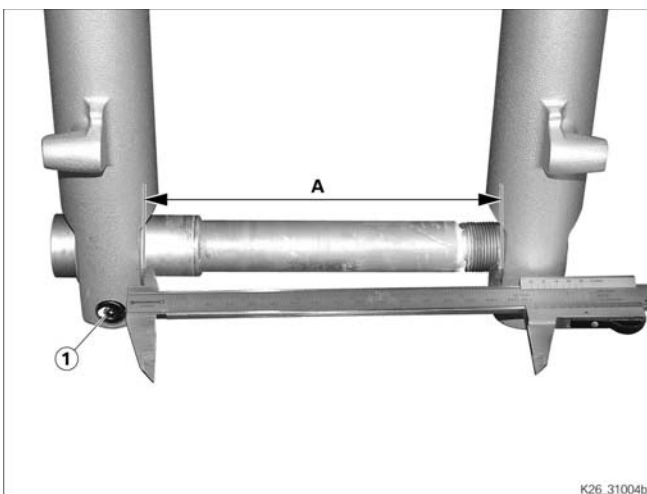
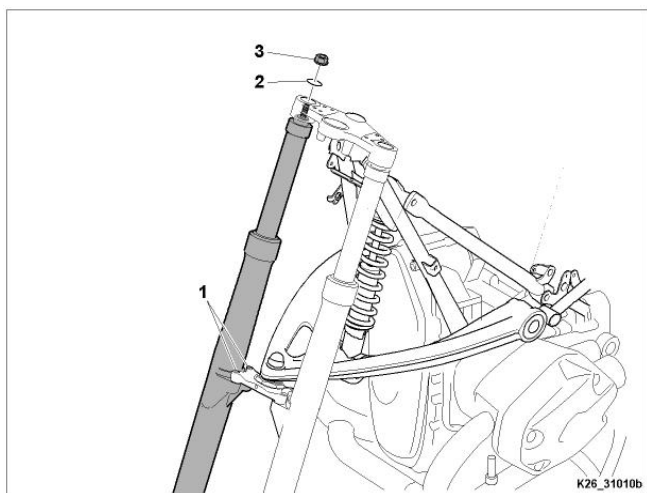


- Tighten the fixed-tube fastener using a new nut, while holding the fixed fork tube at the hexagon underneath the fork bridge.

 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	


(-) Installing right fork leg

- Working from below, introduce the fork leg into the top fork bridge.
- Tighten new screws (1) in the bottom fork bridge until hand-tight.
- Tighten new nut (3) until hand-tight to hold the fixed fork tube in the top fork bridge.




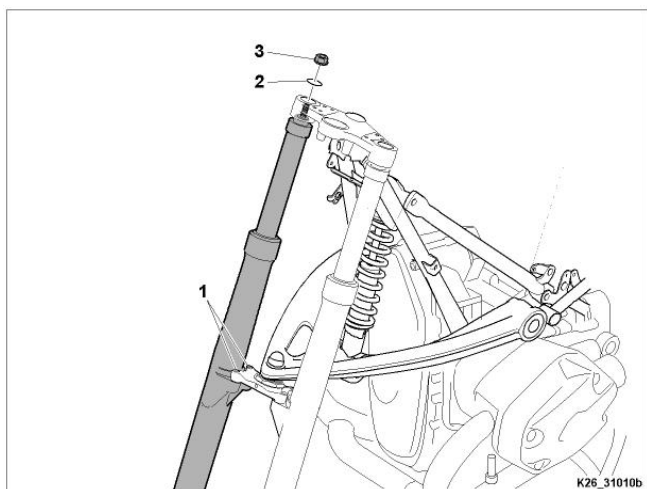
► **Assembly instructions, telescopic forks**

- Release axle clamping screw (1).
- Preassemble fork legs and quick-release axle and adjust to size (A).


 Technical data		
Adjustment dimension of fork slider tubes with respect to each other		170 _{-0.5} ^{+0.5} mm

- Tighten axle clamping screw (1).

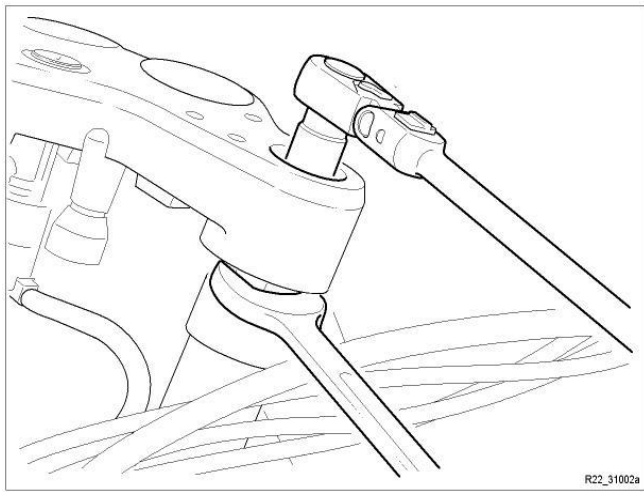
 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	




- Tighten screws (1) in the bottom fork bridge.

 Tightening torques		
Fork bridge, bottom to slider tubes, M8 x 35, Replace screws Micro-encapsulated	25 Nm	

- Tighten the fixed-tube fastener using a new nut, while holding the fixed fork tube at the hexagon underneath




the fork bridge.

 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	

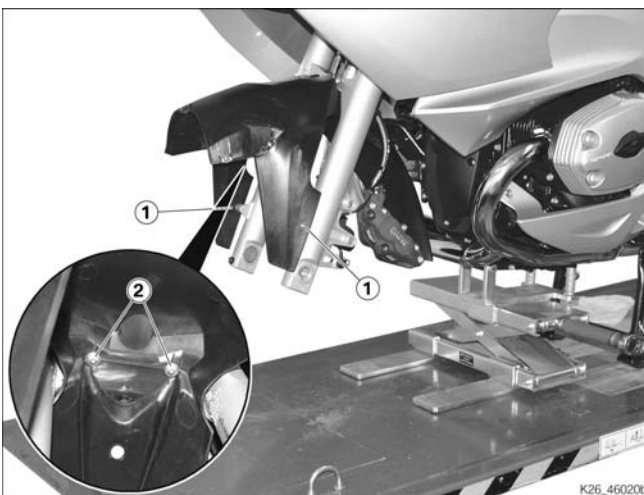
(-) Securing stub handlebars




- Position the stub handlebars on the top fork bridge, noting the seals.
- Install screws (1).

 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	


(-) Install rear section of front mudguard



- Fit the rear section of the front mudguard at a slight angle and opposite direction of travel.
- Align rear section of front mudguard and secure with new screws (2).

 Tightening torques		
Front mudguard, rear, to slider tube bridge, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

- Install new screws (1) on left and right.

 Tightening torques		
Front mudguard, rear section, to axle clamp, left/right, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	



(-) Installing the front wheel


- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.


- Clean quick-release axle (2) and grease it with lubricant.

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.


 <p>Tightening torques</p>		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

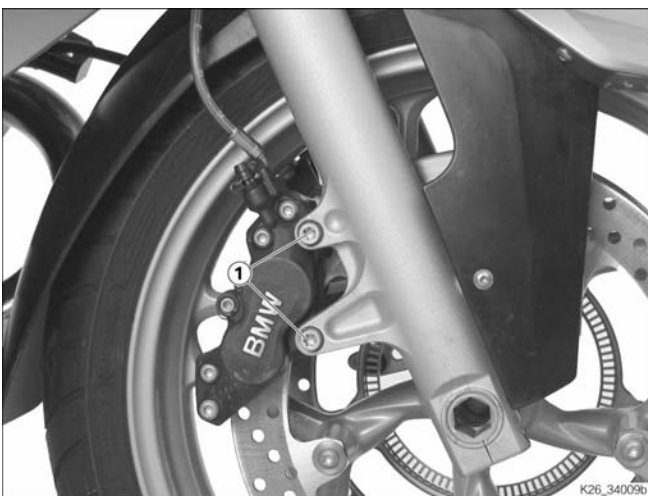
- Tighten axle clamping screw (1).

 <p>Tightening torques</p>		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Securing right brake caliper

- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 <p>Tightening torques</p>		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	





Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing front ABS sensor

- Install ABS sensor (1).




 Tightening torques		
Speed sensor to fork leg, M5 x 10	4 Nm	

- Clip the ABS sensor cable into holder (2).

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

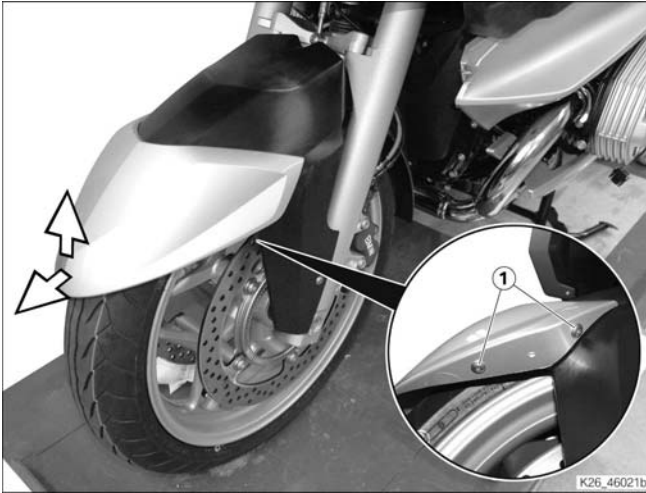
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

-
- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

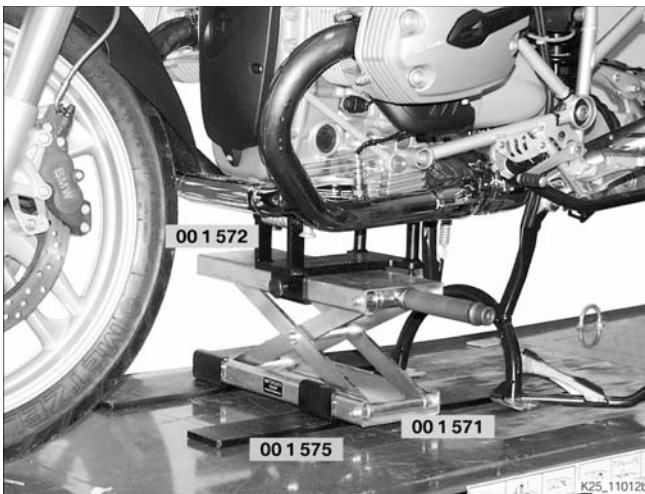
(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

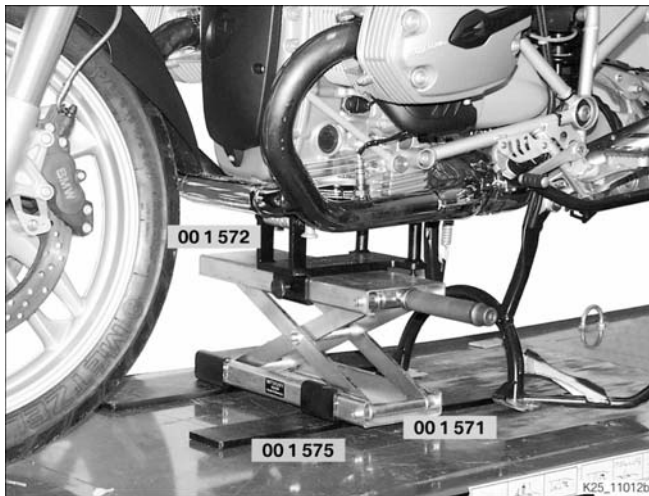


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 **31 42 181 Replacing seals of fork legs**



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing left brake caliper

 **Attention**

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

 **Attention**

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front ABS sensor

- Remove ABS sensor (1).
- Unclip the ABS sensor cable from holder (2).



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

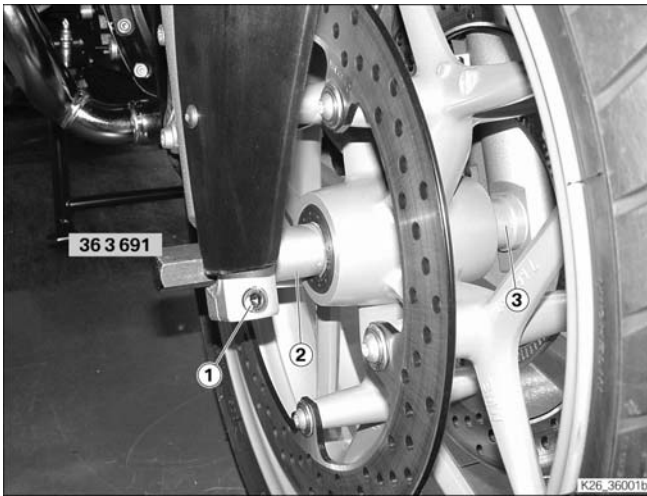
(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691).
- Roll the front wheel forward to remove.



Note

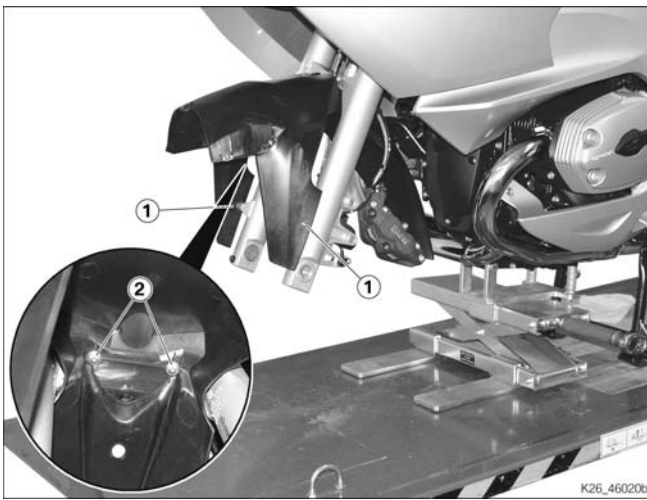
Do not damage the ABS sensor when rolling the front



wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

(-) Removing rear section of front mudguard



- Remove screws (1) on left and right.
- Remove screws (2).
- Lightly twist the rear section of the front mudguard and carefully pull in forward direction to remove.
- Detach rear section of front mudguard.

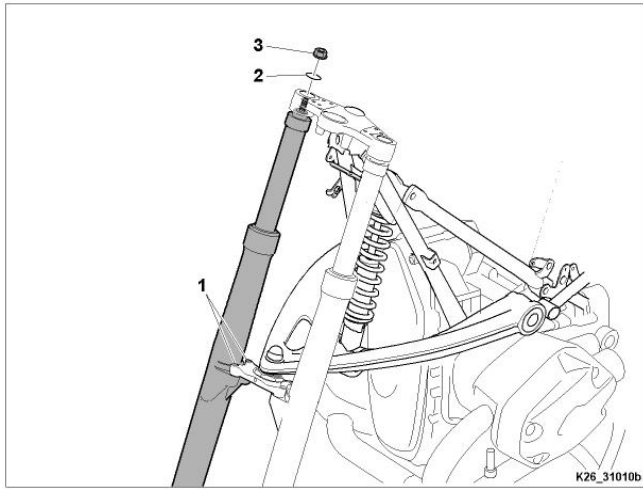
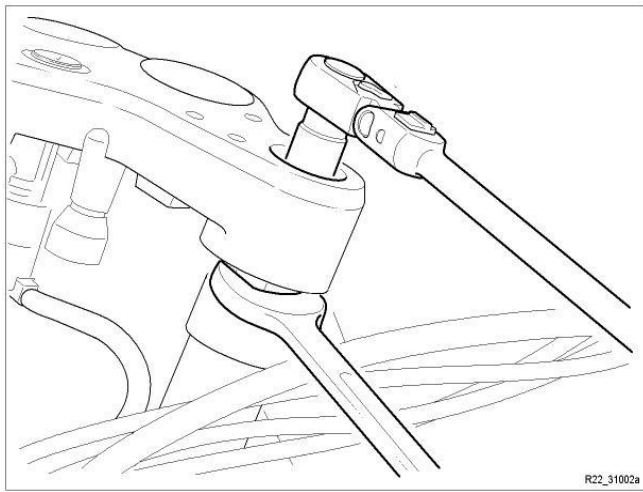
(-) Releasing stub handlebars



- Cover the fuel tank with fuel-tank protective cloth (No. 16 1 611).
- Remove screws (1) from the stub handlebars.
- Lay the stub handlebars back out of the way.

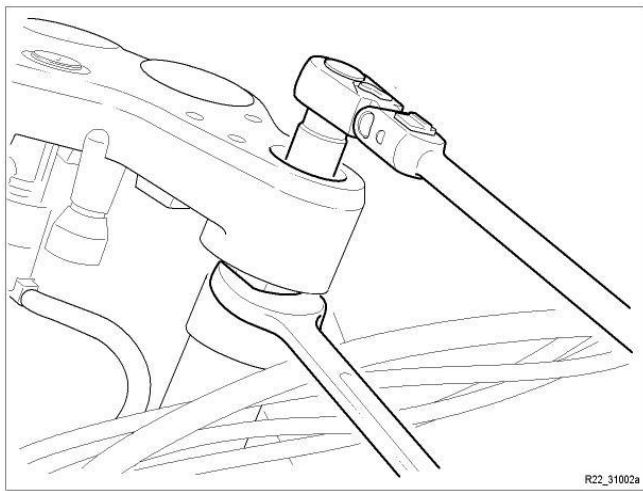
(-) Removing right fork leg

- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



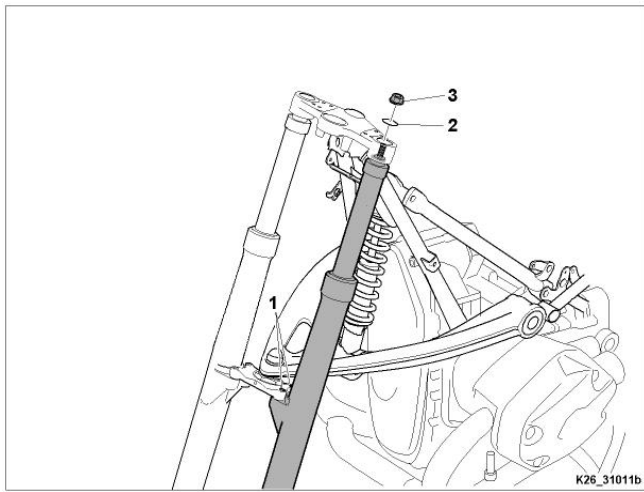
- Remove nut (3) with sealing ring (2).
- Support the fork leg from below.
- Remove screws (1).
- Pull the fork leg down and clear of the top fork bridge.
- Remove the fork leg.

(-) Removing left fork leg



- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.

- Remove nut (3) with sealing ring (2).
- Support the fork leg from below.
- Remove screws (1).
- Pull the fork leg down and clear of the top fork bridge.
- Remove the fork leg.



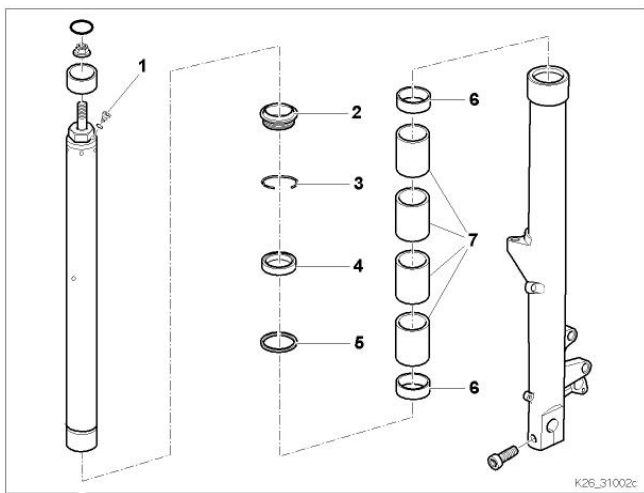
(-) Removing rotary shaft seal

- Remove vent screw (1).
- Carefully pull the fixed fork tube out of the slider tube and catch escaping oil.

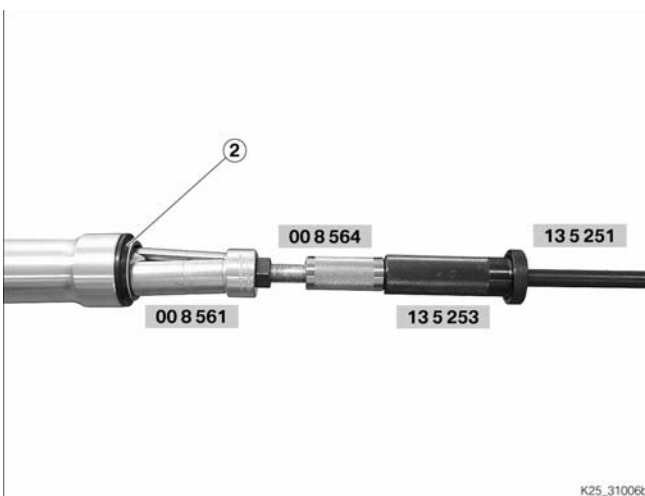
Attention

Nature: The slider tube will develop an irreparable leak if the threaded fastener in the quick-release axle bore of the slider tube is slackened. This fastener secures the displacer - it is not an oil drain plug.

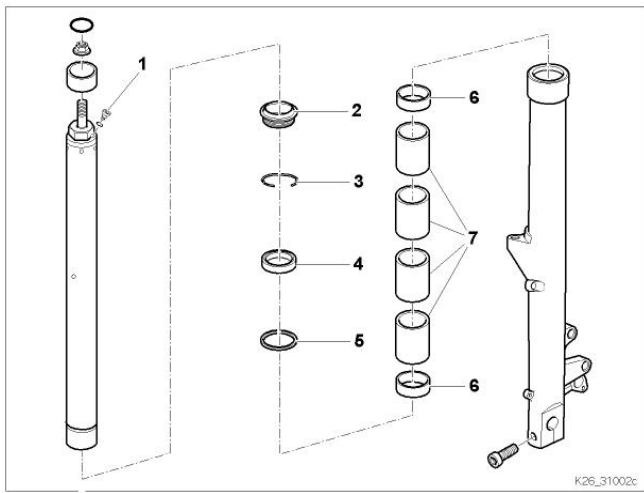
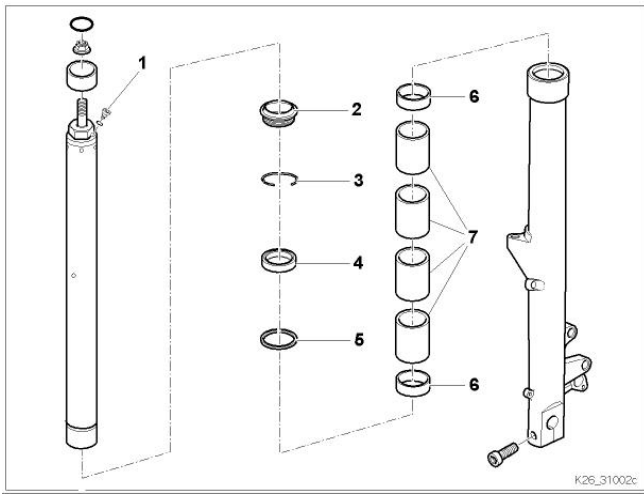
Avoidance: Do not slacken the securing screw in the quick-release axle bore of the slider tube.



- To drain the oil turn the slider tube over and catch the escaping oil.
- Remove sealing boot (2) with inside puller (No. 00 8 561) , adapter (No. 00 8 564) , pull rod (No. 13 5 251) and impact weight (No. 13 5 253) .




- Remove circlip (3).
- Remove shaft sealing ring (4) with inside puller (No. 00 8 561) , adapter (No. 00 8 564) , pull rod (No. 13 5 251) and impact weight (No. 13 5 253) .
- Remove the shaft sealing ring.



(-) Installing rotary shaft seal

- Pour the correct quantity of oil into the slider tube.

 Technical data		
Capacity, fork oil per fork leg	0.62 l	
Consumables/lubricants		
Hydraulic fluid		

- Install the fixed fork tube.
- Provisionally install vent screw (1).
- Install washer (5).

! Attention

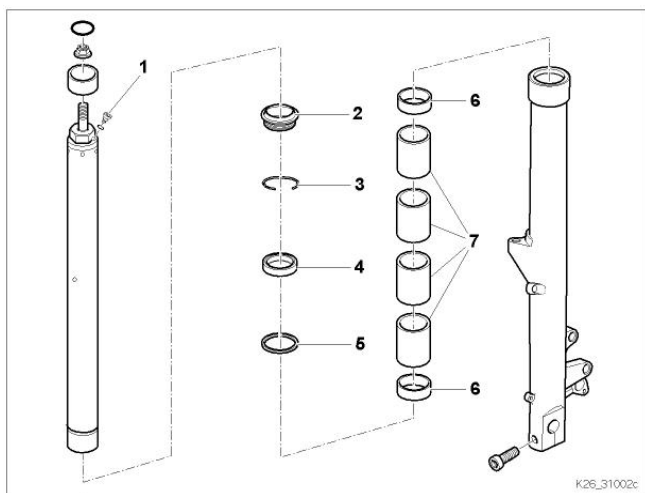
Nature: If the fixed fork tube is pulled out of the slider tube past the limit of its usual travel, the sharp-edged vent bore in the fixed fork tube can damage the shaft sealing ring in the slider tube.

Avoidance: Do not pull the fixed fork tube out of the slider tube past the as-installed position.

- Push lightly oiled shaft sealing ring (4) onto the slider tube until seated, and press in with threaded bush (No. 31 5 611), reducing adapter with tabs (No. 31 5 613) and sleeve (No. 31 5 614), allowing the weight of the tool to press in the shaft sealing ring.
- Install circlip (3) and sealing boot (2).

📄 Note

After installation, the fork leg has to be vented.

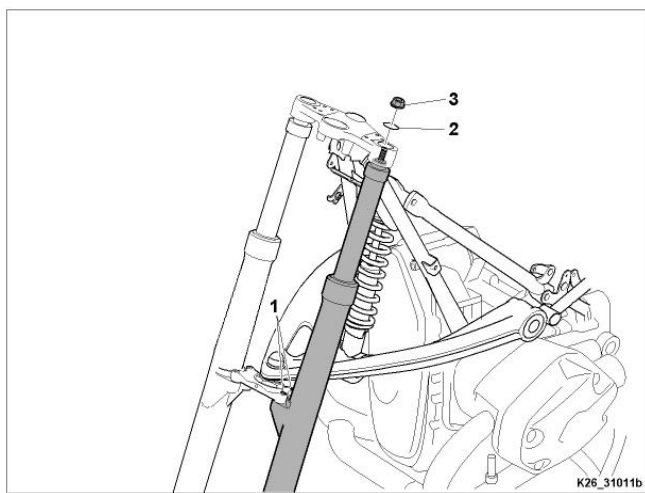


(-) Venting fork leg

- From below, push the fork leg as far as it will go into the fork bridge.
- Tighten the screws in the bottom fork bridge until hand-tight.
- Remove the plug and dispose of the sealing ring in the approved, environmentally friendly manner.
- Loosely install the plug, fitted with a new sealing ring.
- Push the fixed fork tube as far as it will go into the upper fork bridge and tighten the plug.


(-) Installing left fork leg

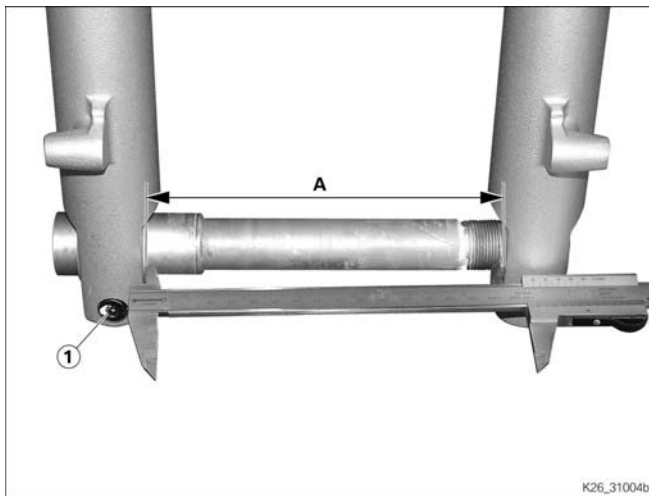
- Working from below, introduce the fork leg into the top fork bridge.
- Tighten new screws (1) in the bottom fork bridge until hand-tight.
- Tighten new nut (3) until hand-tight to hold the fixed fork tube in the top fork bridge.



► Assembly instructions, telescopic forks


- Release axle clamping screw (1).
- Preassemble fork legs and quick-release axle and adjust to size (A).

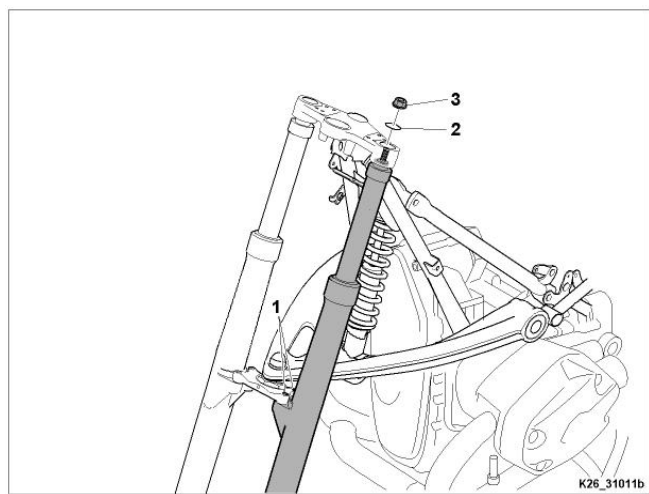
 Technical data			
Adjustment dimension of fork slider tubes with		170 _{-0.5} ^{+0.5} mm	




respect to each other			
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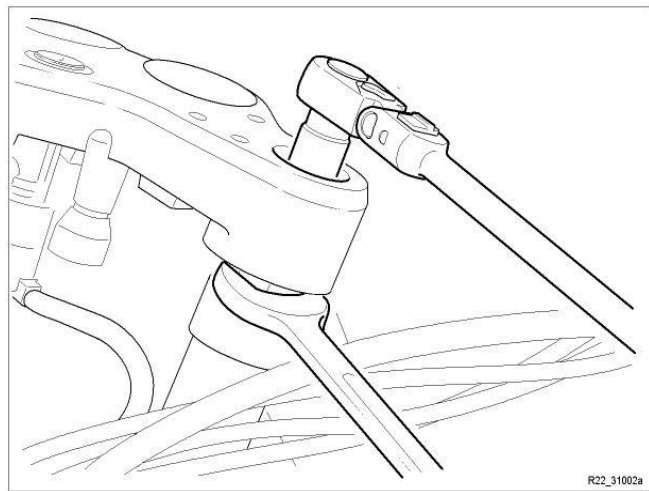
- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	




- Tighten screws (1) in the bottom fork bridge.

 Tightening torques		
Fork bridge, bottom to slider tubes, M8 x 35, Replace screws Micro-encapsulated	25 Nm	

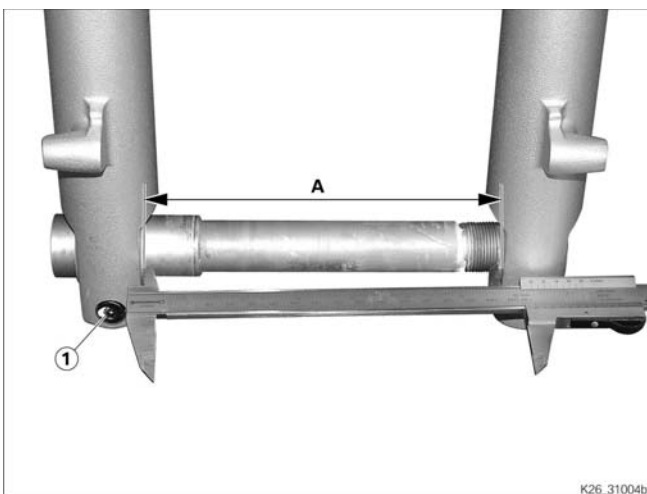
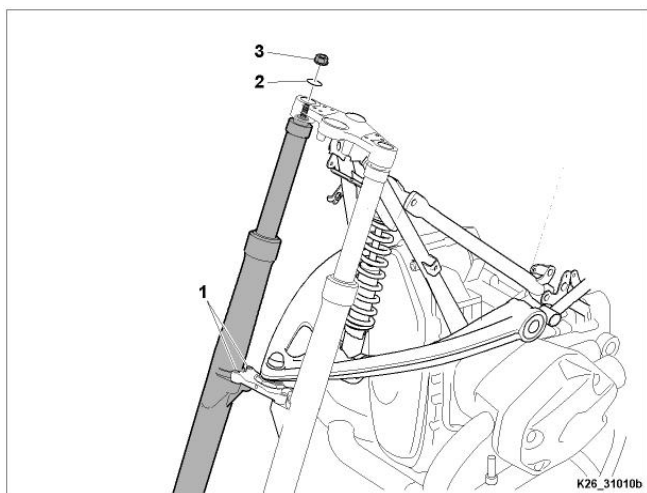


- Tighten the fixed-tube fastener using a new nut, while holding the fixed fork tube at the hexagon underneath the fork bridge.

 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	


(-) Installing right fork leg

- Working from below, introduce the fork leg into the top fork bridge.
- Tighten new screws (1) in the bottom fork bridge until hand-tight.
- Tighten new nut (3) until hand-tight to hold the fixed fork tube in the top fork bridge.




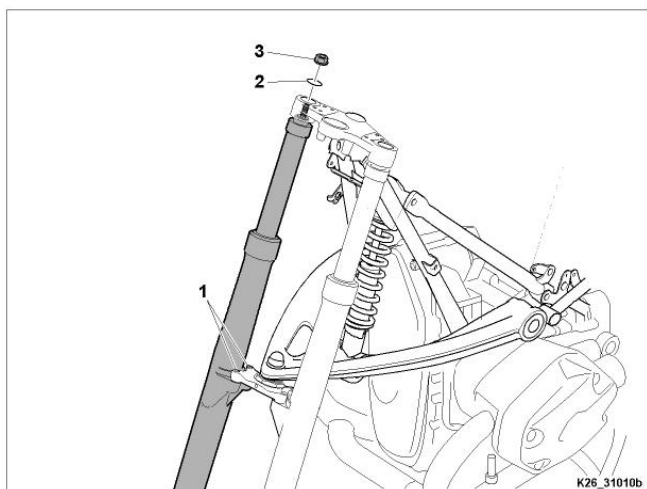
► **Assembly instructions, telescopic forks**

- Release axle clamping screw (1).
- Preassemble fork legs and quick-release axle and adjust to size (A).


 Technical data		
Adjustment dimension of fork slider tubes with respect to each other		170 _{-0.5} ^{+0.5} mm

- Tighten axle clamping screw (1).

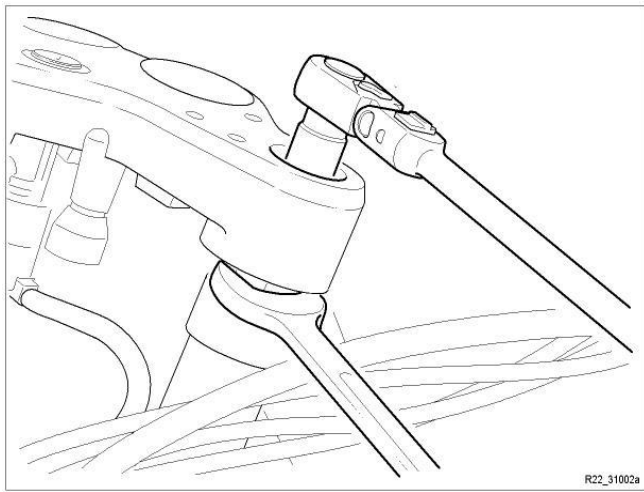
 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	




- Tighten screws (1) in the bottom fork bridge.

 Tightening torques		
Fork bridge, bottom to slider tubes, M8 x 35, Replace screws Micro-encapsulated	25 Nm	

- Tighten the fixed-tube fastener using a new nut, while holding the fixed fork tube at the hexagon underneath




the fork bridge.

 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	

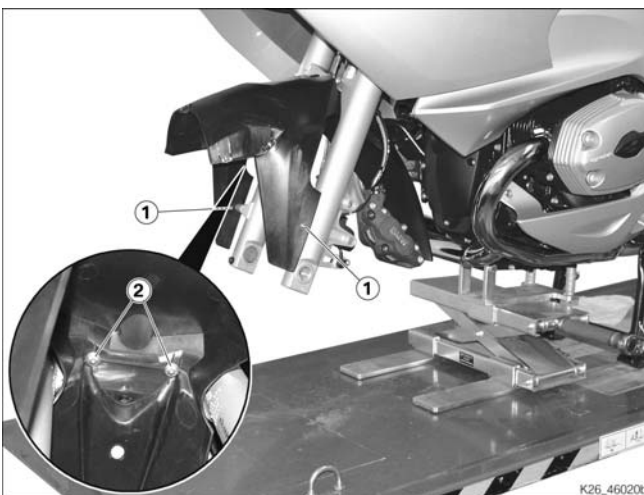
(-) Securing stub handlebars




- Position the stub handlebars on the top fork bridge, noting the seals.
- Install screws (1).

 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	


(-) Install rear section of front mudguard

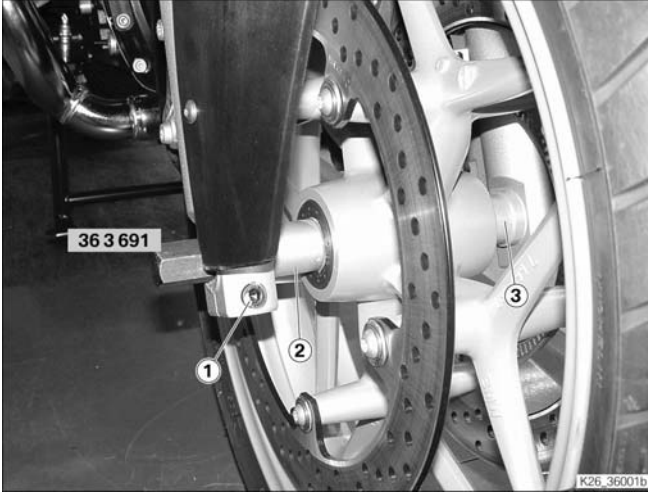


- Fit the rear section of the front mudguard at a slight angle and opposite direction of travel.
- Align rear section of front mudguard and secure with new screws (2).

 Tightening torques		
Front mudguard, rear, to slider tube bridge, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

- Install new screws (1) on left and right.

 Tightening torques		
Front mudguard, rear section, to axle clamp, left/right, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	



(-) Installing the front wheel


- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.


- Clean quick-release axle (2) and grease it with lubricant.

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.


 <p>Tightening torques</p>		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

- Tighten axle clamping screw (1).

 <p>Tightening torques</p>		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Securing right brake caliper

- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 <p>Tightening torques</p>		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	





Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing front ABS sensor

- Install ABS sensor (1).




 Tightening torques		
Speed sensor to fork leg, M5 x 10	4 Nm	

- Clip the ABS sensor cable into holder (2).

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

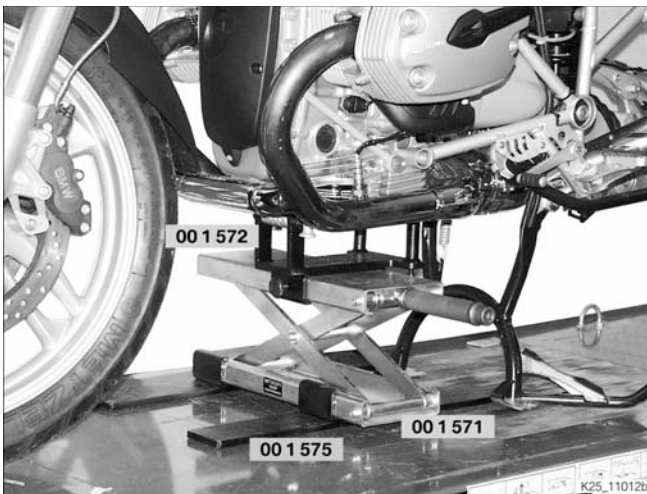
(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

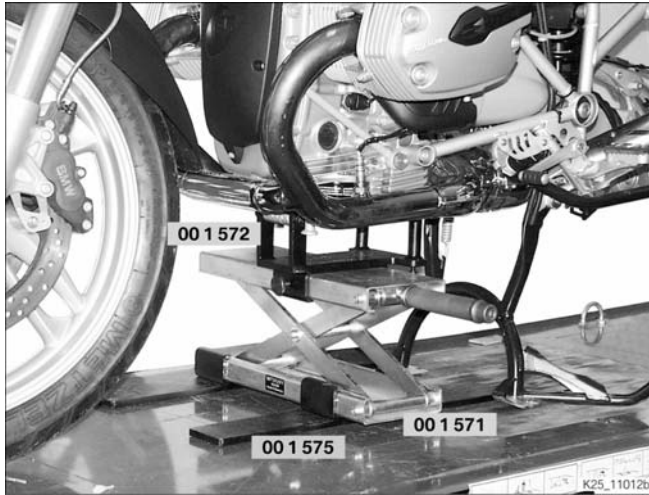


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 31 42 212 Replacing fixed fork tubes



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing left brake caliper

 **Attention**

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

 **Attention**

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front ABS sensor

- Remove ABS sensor (1).
- Unclip the ABS sensor cable from holder (2).



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

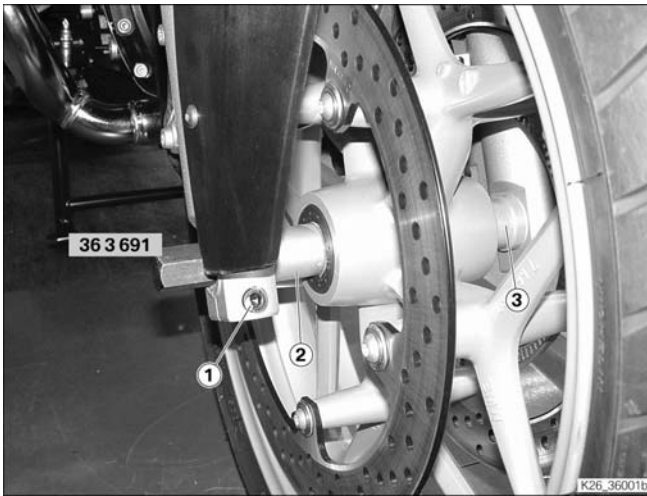
(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691).
- Roll the front wheel forward to remove.



Note

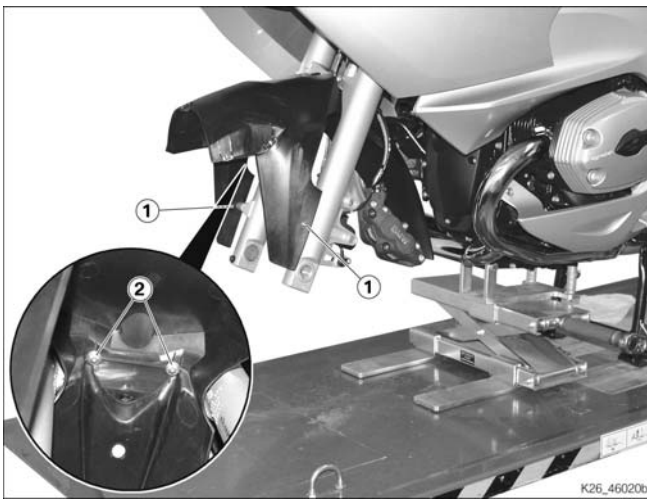
Do not damage the ABS sensor when rolling the front



wheel in or out between the forks.

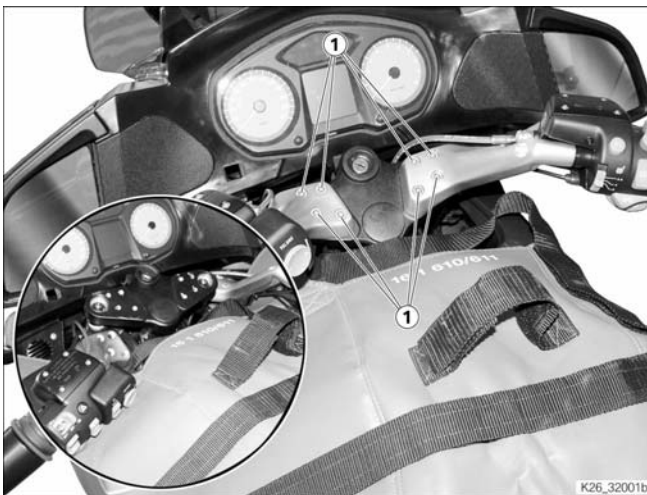
- Remove spacing bushing (3) from the wheel hub.

(-) Removing rear section of front mudguard



- Remove screws (1) on left and right.
- Remove screws (2).
- Lightly twist the rear section of the front mudguard and carefully pull in forward direction to remove.
- Detach rear section of front mudguard.

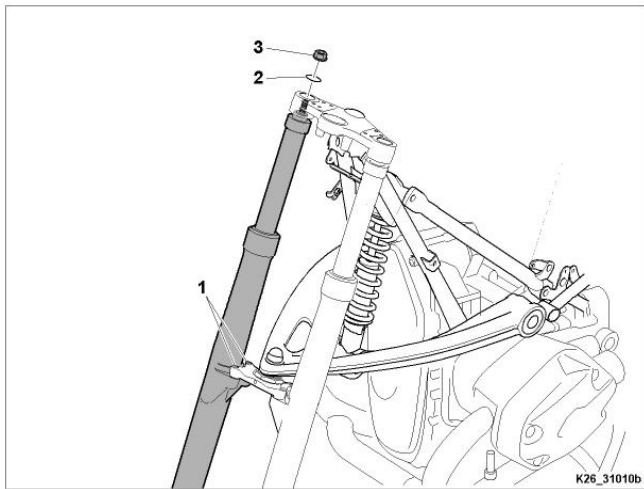
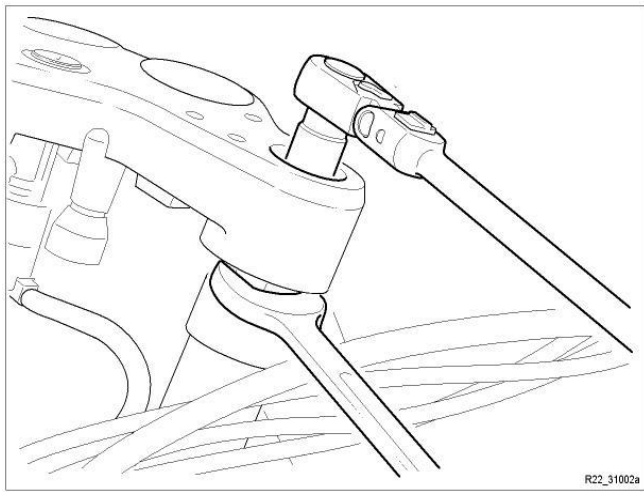
(-) Releasing stub handlebars



- Cover the fuel tank with fuel-tank protective cloth (No. 16 1 611).
- Remove screws (1) from the stub handlebars.
- Lay the stub handlebars back out of the way.

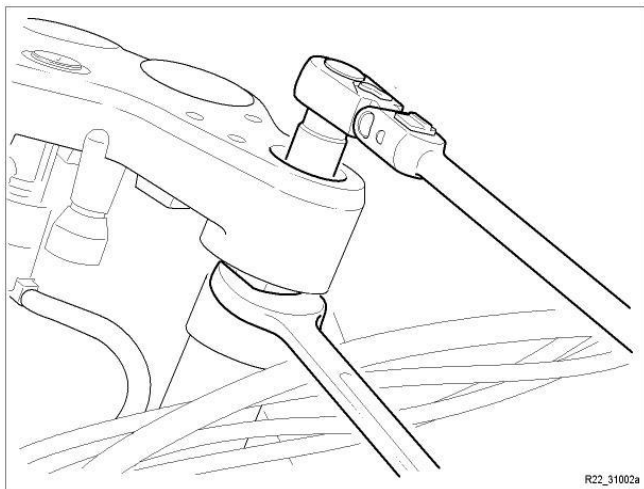
(-) Removing right fork leg

- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



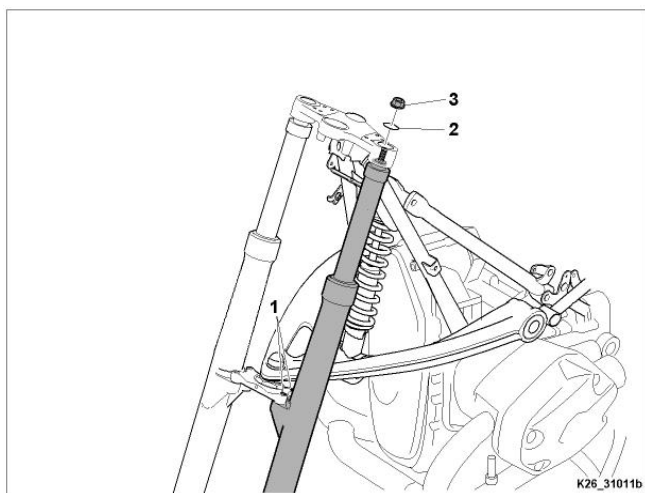
- Remove nut (3) with sealing ring (2).
- Support the fork leg from below.
- Remove screws (1).
- Pull the fork leg down and clear of the top fork bridge.
- Remove the fork leg.

(-) Removing left fork leg



- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.

- Remove nut (3) with sealing ring (2).
- Support the fork leg from below.
- Remove screws (1).
- Pull the fork leg down and clear of the top fork bridge.
- Remove the fork leg.



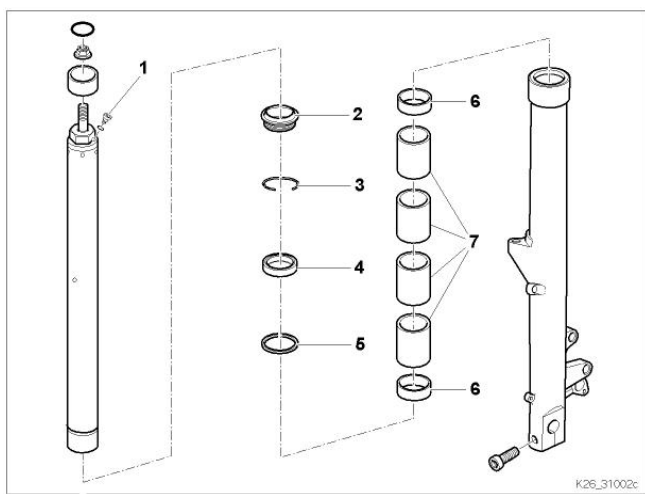
(-) Disassembling fork legs



Attention

Nature: If the fixed fork tube is pulled out of the slider tube past the limit of its usual travel, the sharp-edged vent bore in the fixed fork tube can damage the shaft sealing ring in the slider tube.

Avoidance: Do not pull the fixed fork tube out of the slider tube past the as-installed position.



- Remove vent screw (1).
- Carefully pull the fixed fork tube out of the slider tube and catch escaping oil.

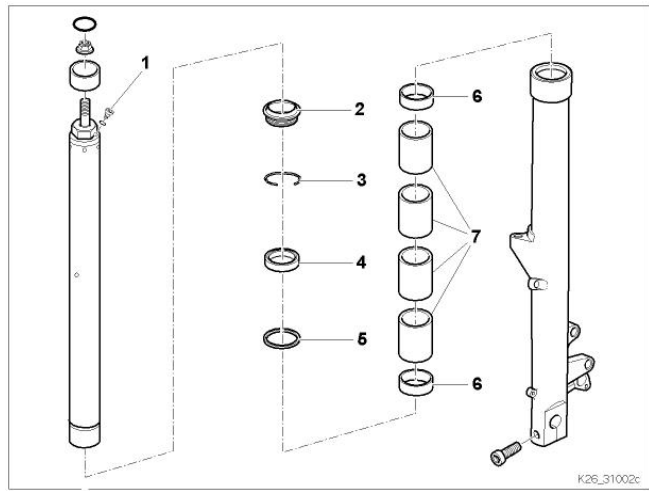
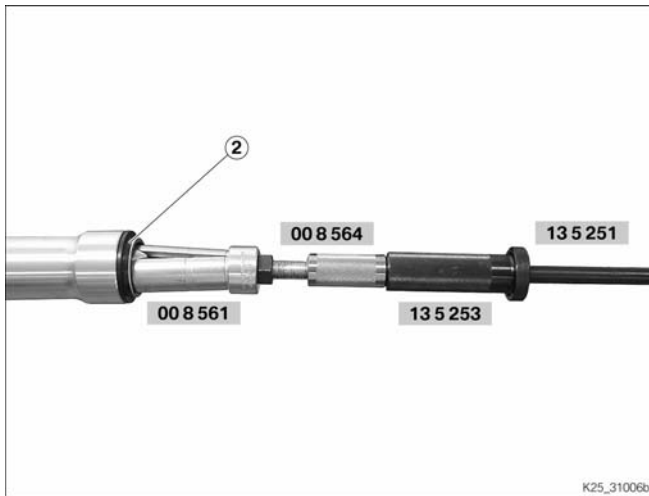


Attention

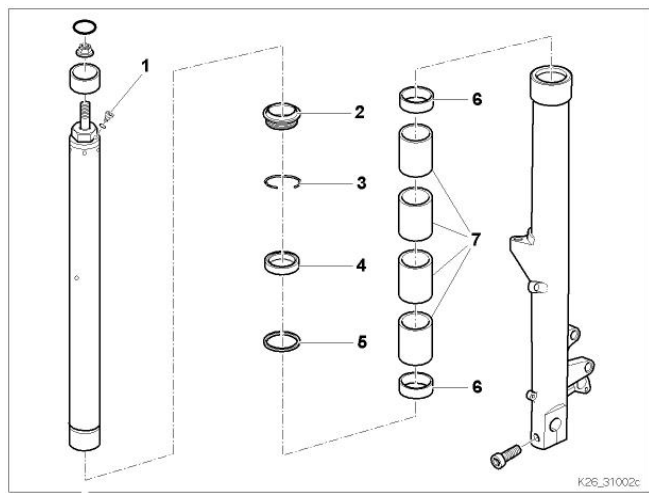
Nature: The slider tube will develop an irreparable leak if the threaded fastener in the quick-release axle bore of the slider tube is slackened. This fastener secures the displacer - it is not an oil drain plug.

Avoidance: Do not slacken the securing screw in the quick-release axle bore of the slider tube.

- To drain the oil turn the slider tube over and catch the escaping oil.
- Remove sealing boot (2) with inside puller (No. 00 8 561), adapter (No. 00 8 564), pull rod (No. 13 5 251) and impact weight (No. 13 5 253).




- Remove circlip (3).
- Remove shaft sealing ring (4) with inside puller (No. 00 8 561), adapter (No. 00 8 564), pull rod (No. 13 5 251) and impact weight (No. 13 5 253).
- Remove the shaft sealing ring.
- Remove washer (5).
- Remove bushing (6) and tubular spacer (7).



(-) Assembling fork leg

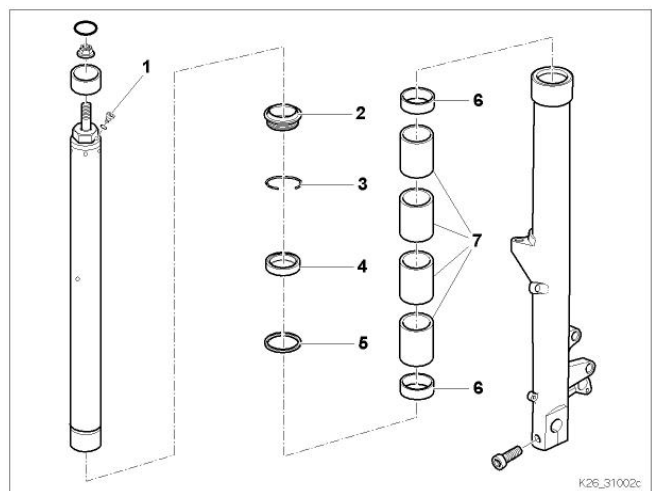
- Insert bushing (6), tubular spacer (7) and bushing (6).
- Pour the correct quantity of oil into the slider tube.

 Technical data		
Capacity, fork oil per fork leg	0.62 l	
Consumables/lubricants		
Hydraulic fluid		

- Install the fixed fork tube.
- Provisionally install vent screw (1).
- Install washer (5).
- Push lightly oiled shaft sealing ring (4) onto the slider tube until seated, and press in with threaded bush (No. 31 5 611), reducing adapter with tabs (No. 31 5 613) and sleeve (No. 31 5 614), allowing the weight of the tool to press in the shaft sealing ring.



KLT_31012c



K26_31002c

- Install circlip (3) and sealing boot (2).



Note

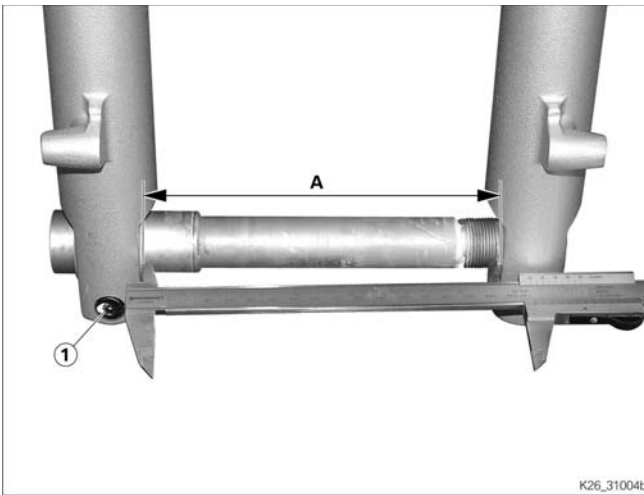
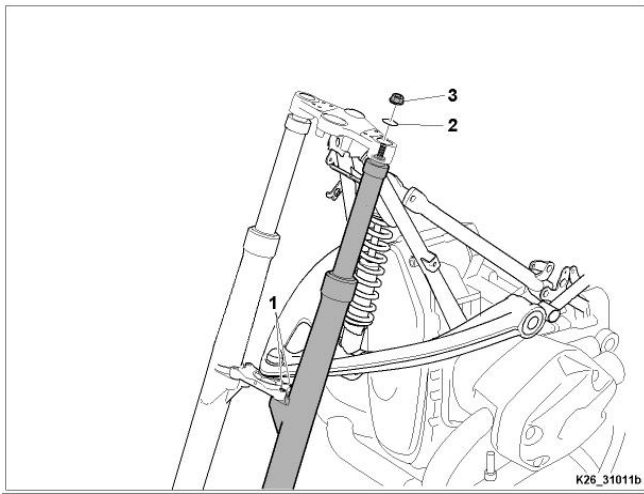
After installation, the fork leg has to be vented.

(-) Venting fork leg

- From below, push the fork leg as far as it will go into the fork bridge.
- Tighten the screws in the bottom fork bridge until hand-tight.
- Remove the plug and dispose of the sealing ring in the approved, environmentally friendly manner.
- Loosely install the plug, fitted with a new sealing ring.
- Push the fixed fork tube as far as it will go into the upper fork bridge and tighten the plug.

(-) Installing left fork leg

- Working from below, introduce the fork leg into the top fork bridge.
- Tighten new screws (1) in the bottom fork bridge until hand-tight.
- Tighten new nut (3) until hand-tight to hold the fixed fork tube in the top fork bridge.



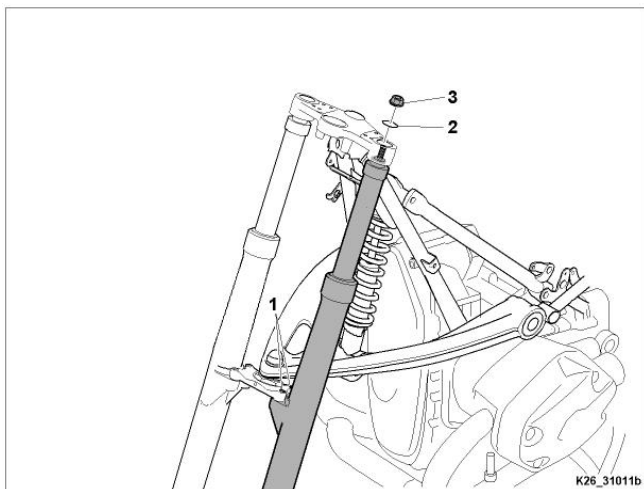
► **Assembly instructions, telescopic forks**

- Release axle clamping screw (1).
- Preassemble fork legs and quick-release axle and adjust to size (A).

Technical data		
Adjustment dimension of fork slider tubes with respect to each other		170 _{-0.5} ^{+0.5} mm

- Tighten axle clamping screw (1).

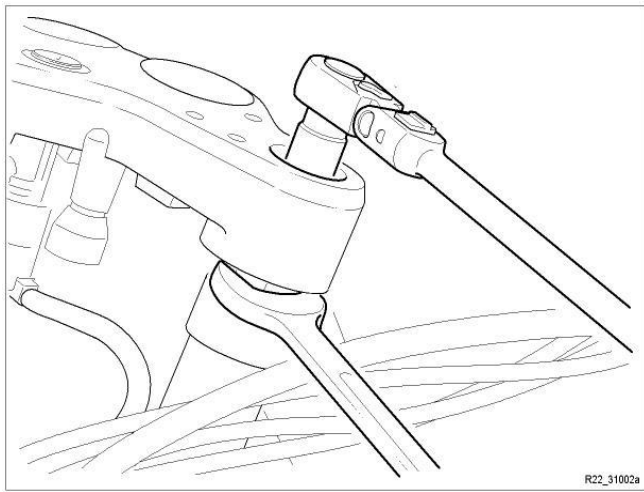
Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	




- Tighten screws (1) in the bottom fork bridge.

Tightening torques		
Fork bridge, bottom to slider tubes, M8 x 35, Replace screws Micro-encapsulated	25 Nm	

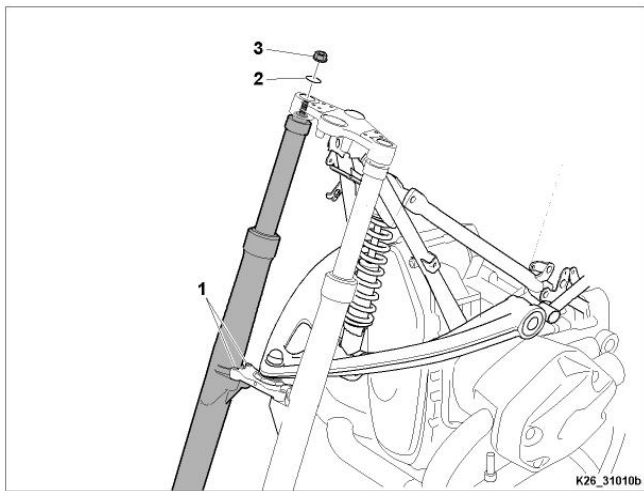
- Tighten the fixed-tube fastener using a new nut, while holding the fixed fork tube at the hexagon underneath



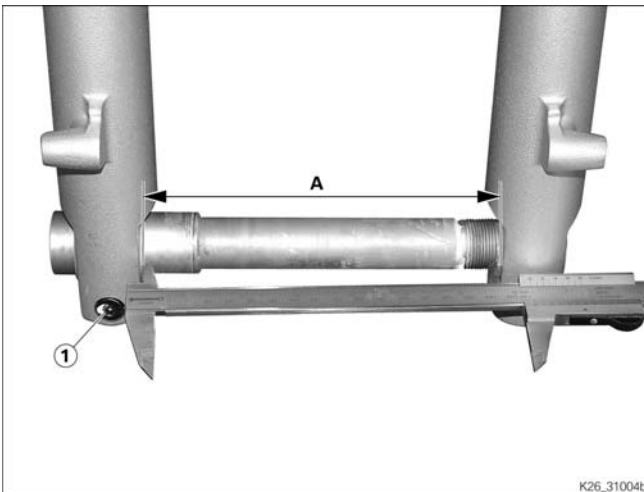
the fork bridge.

 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut	40 Nm	
Mechanical thread lock		

(-) Installing right fork leg




- Working from below, introduce the fork leg into the top fork bridge.
- Tighten new screws (1) in the bottom fork bridge until hand-tight.
- Tighten new nut (3) until hand-tight to hold the fixed fork tube in the top fork bridge.




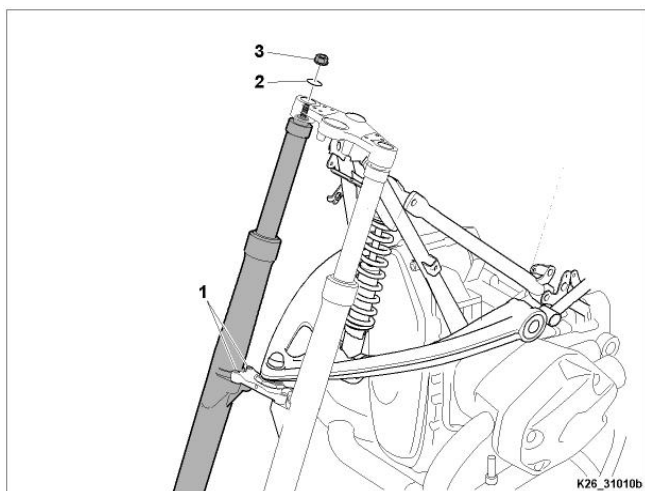
► Assembly instructions, telescopic forks

- Release axle clamping screw (1).
- Preassemble fork legs and quick-release axle and adjust to size (A).


 Technical data			
Adjustment dimension of fork slider tubes with respect to each other		170 ^{+0.5} _{-0.5} mm	

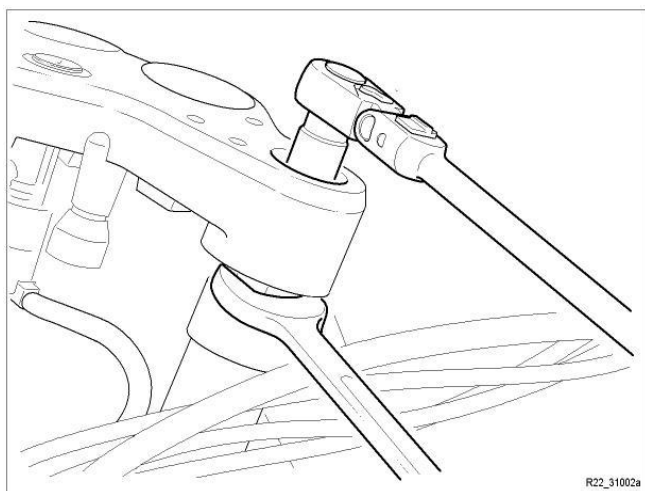
- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	




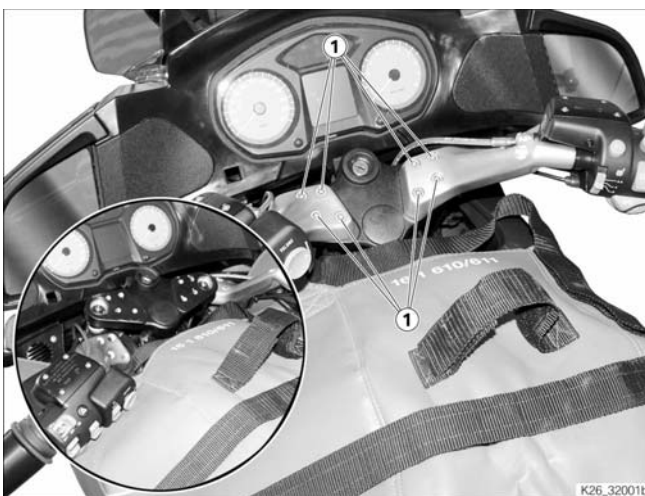
- Tighten screws (1) in the bottom fork bridge.

 Tightening torques		
Fork bridge, bottom to slider tubes, M8 x 35, Replace screws Micro-encapsulated	25 Nm	




- Tighten the fixed-tube fastener using a new nut, while holding the fixed fork tube at the hexagon underneath the fork bridge.

 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	



(-) Securing stub handlebars

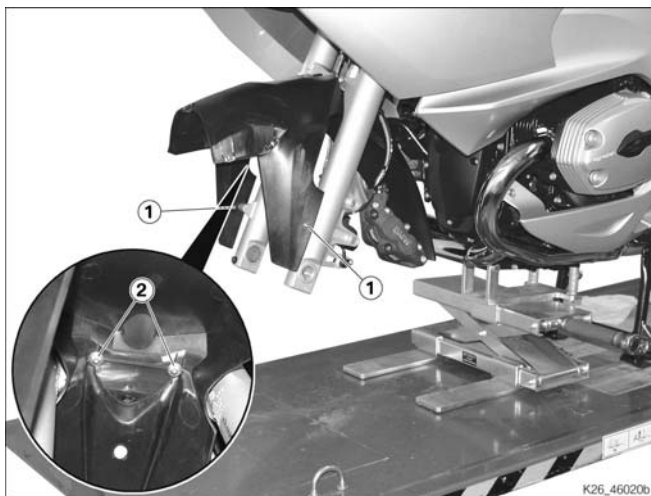
- Position the stub handlebars on the top fork bridge, noting the seals.
- Install screws (1).

 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	

(-) Install rear section of front mudguard


- Fit the rear section of the front mudguard at a slight angle and opposite direction of travel.
- Align rear section of front mudguard and secure with new screws (2).

 Tightening torques		
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Front mudguard, rear, to slider tube bridge, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	
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- Install new screws (1) on left and right.

 Tightening torques		
Front mudguard, rear section, to axle clamp, left/right, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

(-) Installing the front wheel

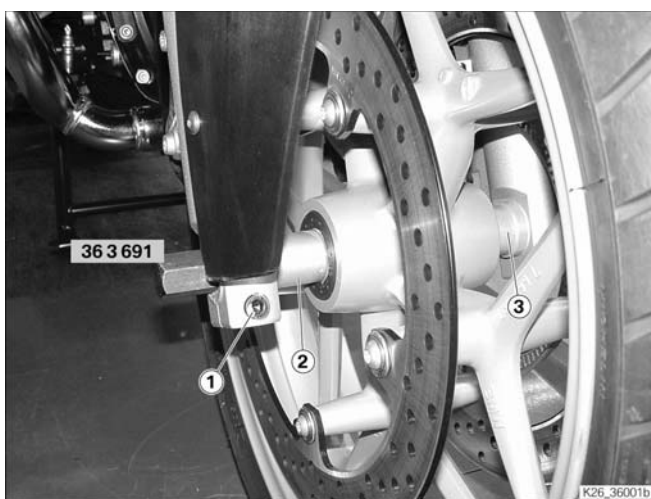
- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note


Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Clean quick-release axle (2) and grease it with lubricant.




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

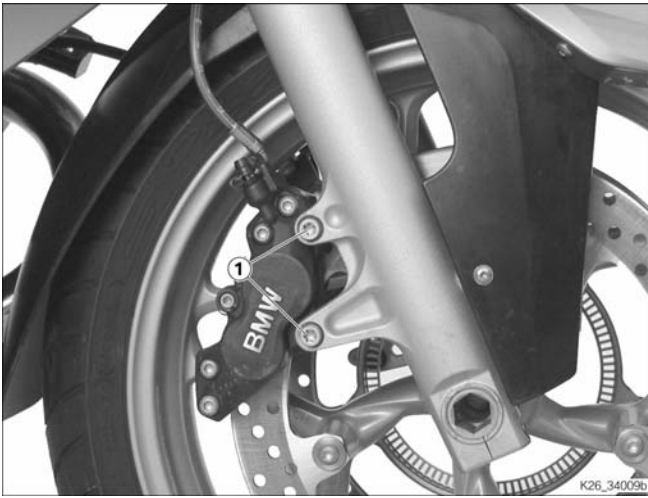
- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	


- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Securing right brake caliper



- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing front ABS sensor

- Install ABS sensor (1).




 Tightening torques		
Speed sensor to fork leg, M5 x 10	4 Nm	

- Clip the ABS sensor cable into holder (2).

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider	30 Nm	



tube, M8 x 32 - 10.9		
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Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

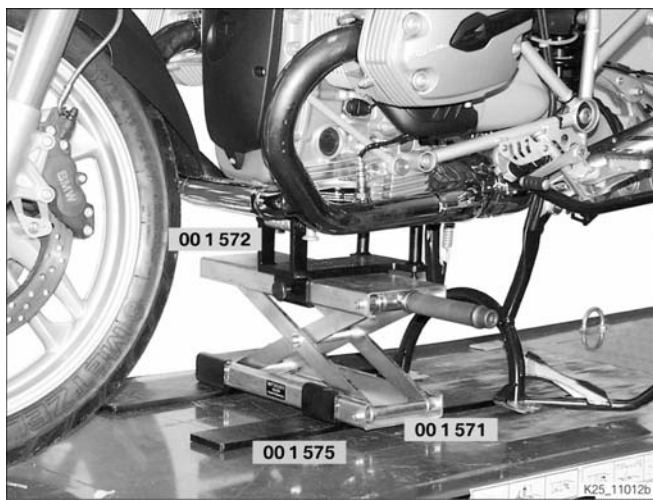
(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

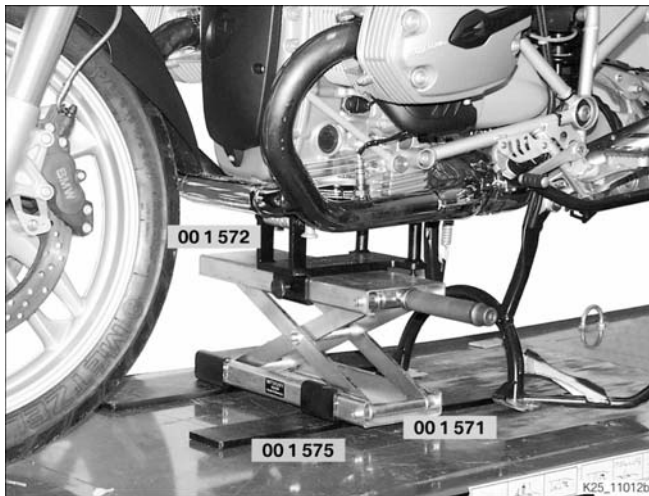


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



31 42 350 Replacing fork legs



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing left brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front ABS sensor

- Remove ABS sensor (1).
- Unclip the ABS sensor cable from holder (2).



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

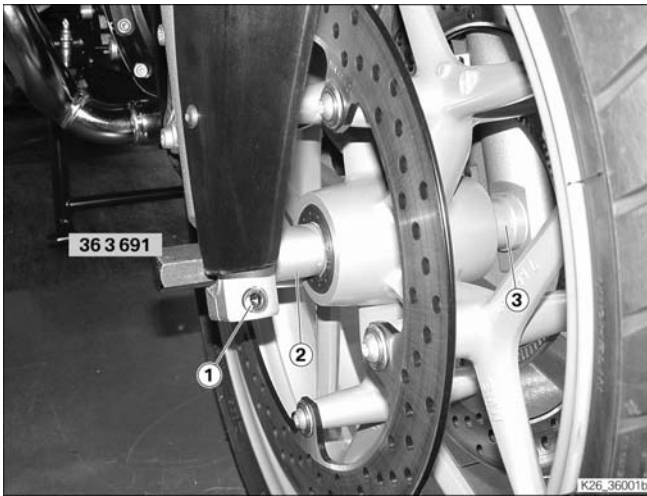
(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691).
- Roll the front wheel forward to remove.



Note

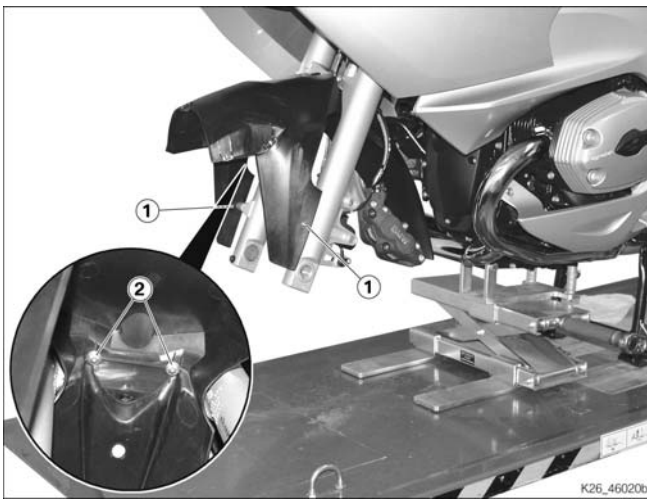
Do not damage the ABS sensor when rolling the front



wheel in or out between the forks.

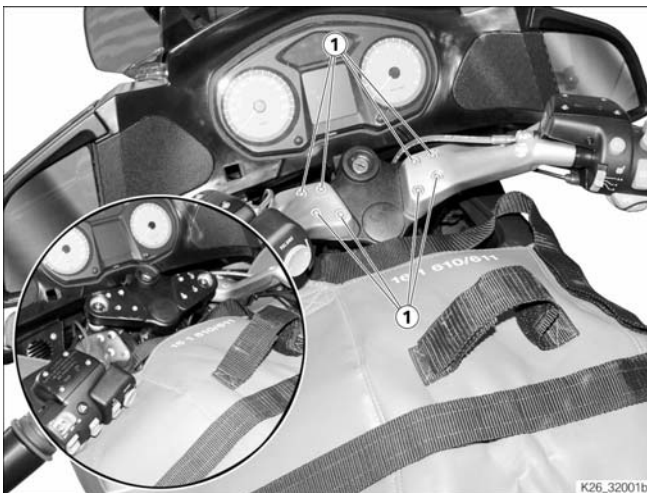
- Remove spacing bushing (3) from the wheel hub.

(-) Removing rear section of front mudguard



- Remove screws (1) on left and right.
- Remove screws (2).
- Lightly twist the rear section of the front mudguard and carefully pull in forward direction to remove.
- Detach rear section of front mudguard.

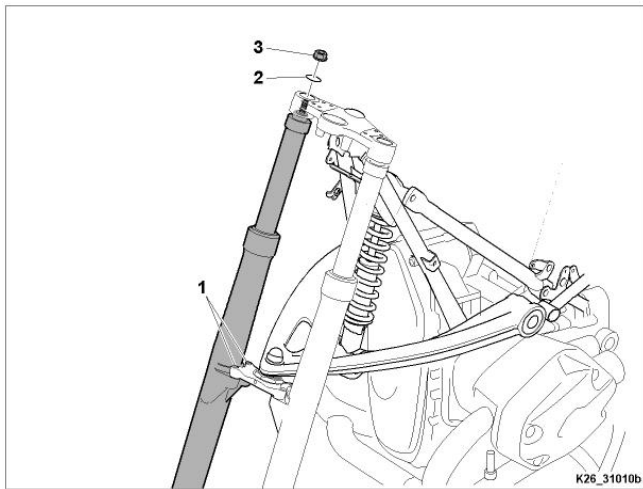
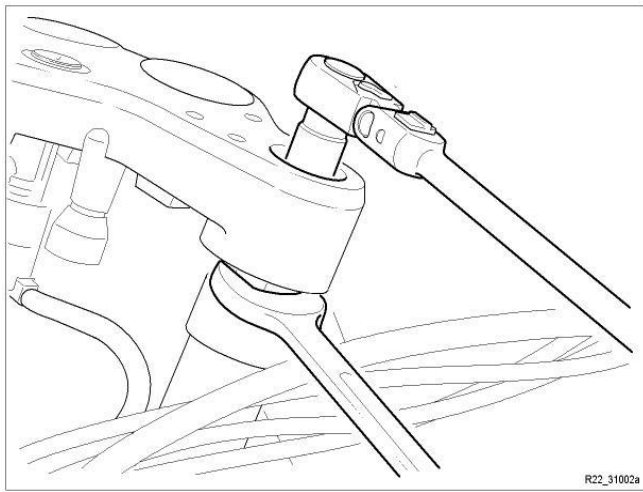
(-) Releasing stub handlebars



- Cover the fuel tank with fuel-tank protective cloth (No. 16 1 611) .
- Remove screws (1) from the stub handlebars.
- Lay the stub handlebars back out of the way.

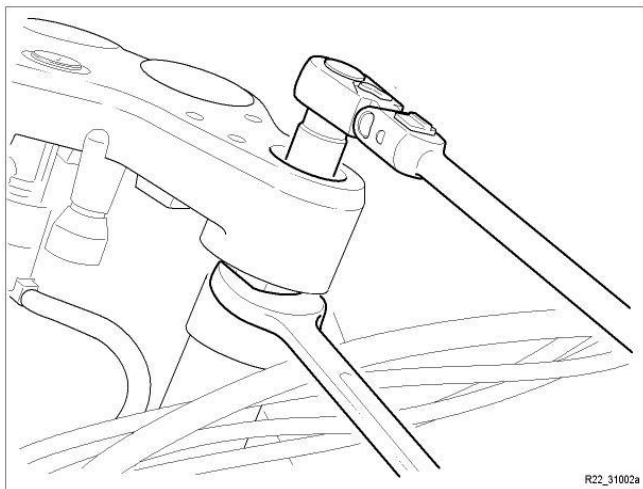
(-) Removing right fork leg

- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



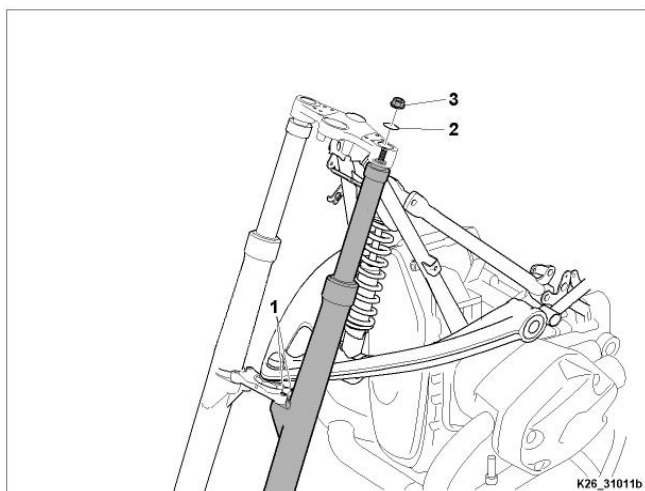
- Remove nut (3) with sealing ring (2).
- Support the fork leg from below.
- Remove screws (1).
- Pull the fork leg down and clear of the top fork bridge.
- Remove the fork leg.

(-) Removing left fork leg



- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.

- Remove nut (3) with sealing ring (2).
- Support the fork leg from below.
- Remove screws (1).
- Pull the fork leg down and clear of the top fork bridge.
- Remove the fork leg.

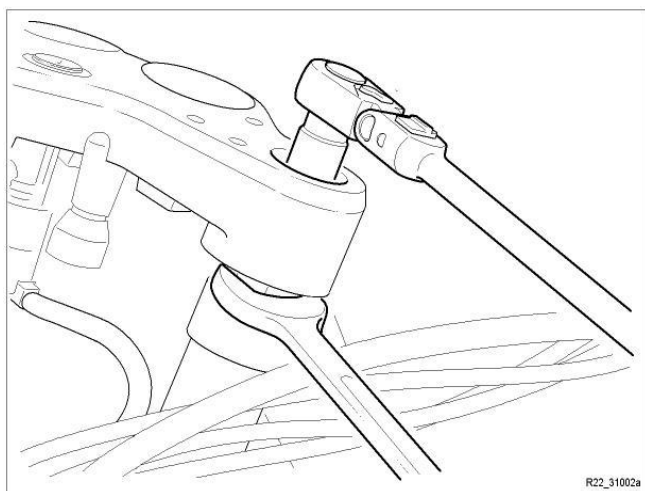



(-) Venting fork leg

- From below, push the fork leg as far as it will go into the fork bridge.
- Tighten the screws in the bottom fork bridge until hand-tight.
- Remove the plug and dispose of the sealing ring in the approved, environmentally friendly manner.
- Loosely install the plug, fitted with a new sealing ring.
- Push the fixed fork tube as far as it will go into the upper fork bridge and tighten the plug.

(-) Installing both fork legs


- Working from below, introduce both fork legs into the top fork bridge.
- Tighten the fixed tubes using new nuts, while holding the fixed fork tube at the hexagon underneath the fork bridge.

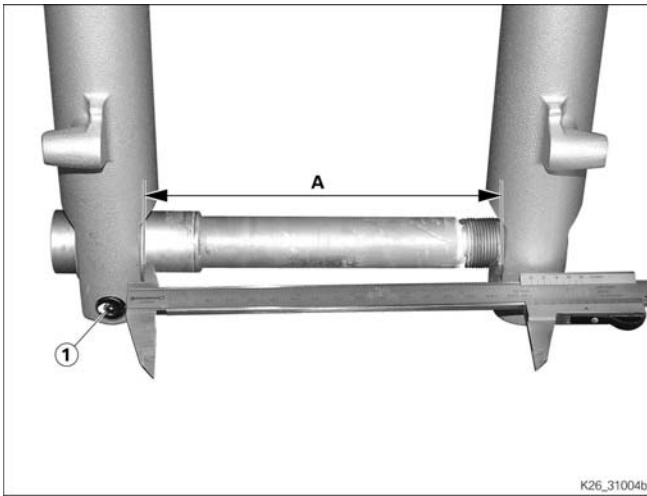


 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut	40 Nm	
Mechanical thread lock		

► Assembly instructions, telescopic forks


- Release axle clamping screw (1).
- Preassemble fork legs and quick-release axle and adjust to size (A).

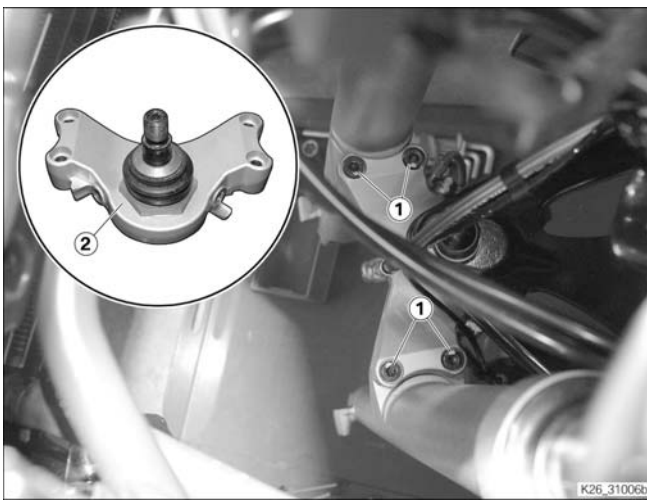
 Technical data		
Adjustment dimension of fork slider tubes with		170 _{-0.5} ^{+0.5} mm




respect to each other			
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- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

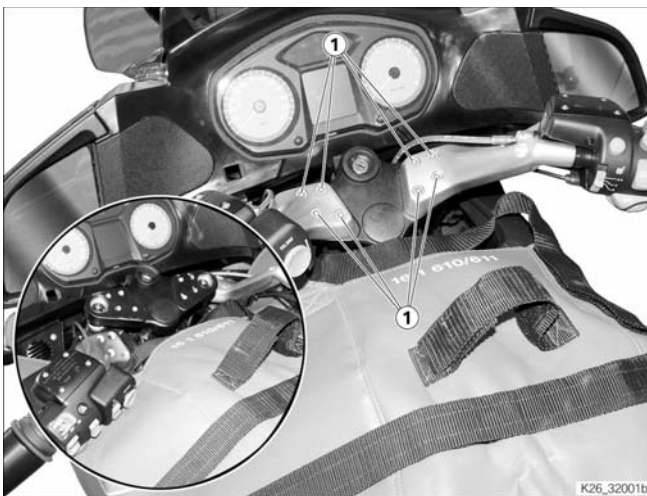



- Tighten new screws (1) in the bottom fork bridge.(2).

 Tightening torques		
Fork bridge, bottom to slider tubes, M8 x 35, Replace screws Micro-encapsulated	25 Nm	

(-) Securing stub handlebars

- Position the stub handlebars on the top fork bridge, noting the seals.
- Install screws (1).

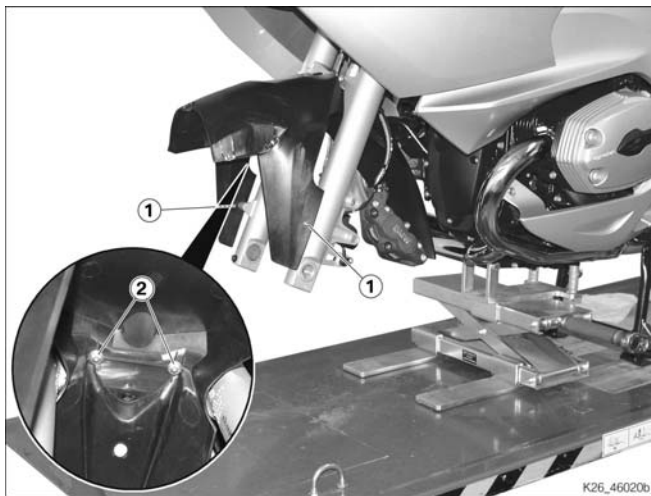



 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	

(-) Install rear section of front mudguard


- Fit the rear section of the front mudguard at a slight angle and opposite direction of travel.
- Align rear section of front mudguard and secure with new screws (2).

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 Tightening torques		
Front mudguard, rear, to slider tube bridge, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

- Install new screws (1) on left and right.

 Tightening torques		
Front mudguard, rear section, to axle clamp, left/right, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

(-) Installing the front wheel

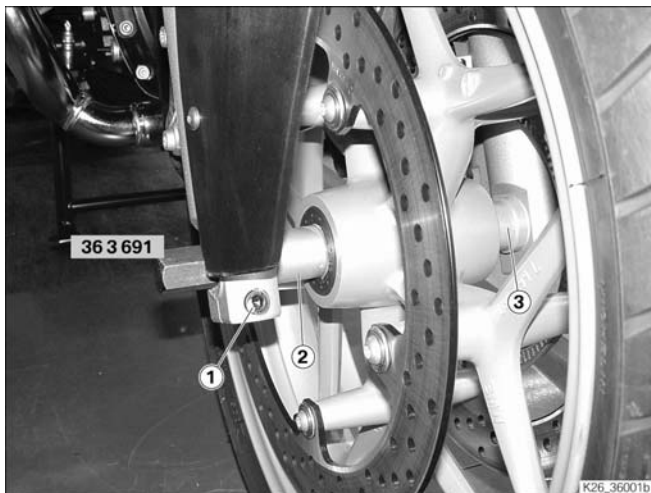
- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note


Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Clean quick-release axle (2) and grease it with lubricant.




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

- Tighten axle clamping screw (1).


 Tightening torques		

Quick-release axle clamp screws, M8 x 35	19 Nm	
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(-) Securing right brake caliper

- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing front ABS sensor

- Install ABS sensor (1).



 Tightening torques		
Speed sensor to fork leg, M5 x 10	4 Nm	

- Clip the ABS sensor cable into holder (2).

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).



Tightening torques

Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	
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Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

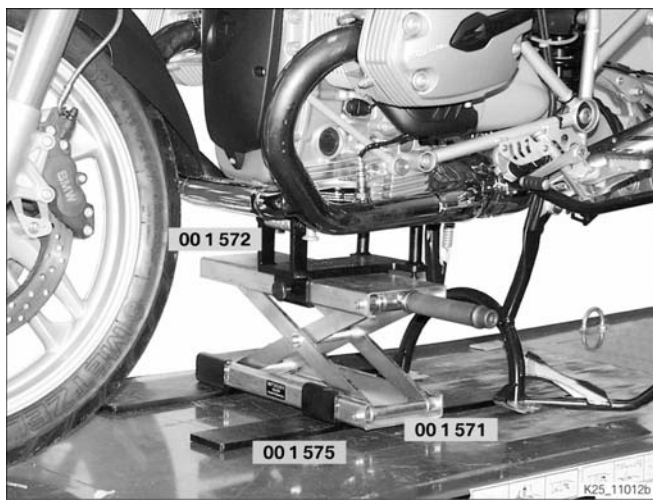
(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

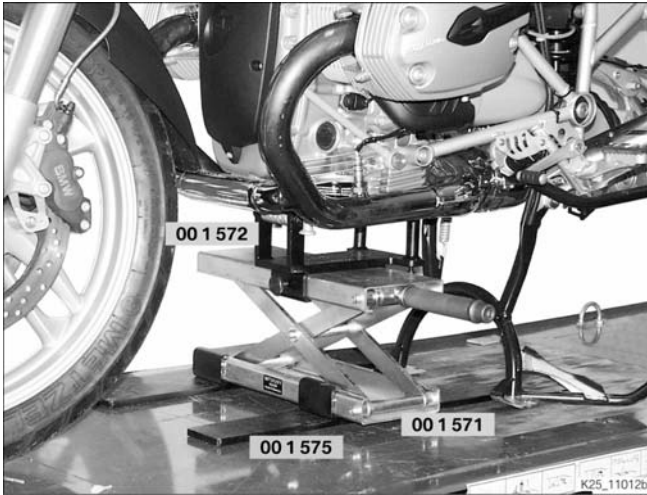


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 **31 42 410 Replacing leading link**



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

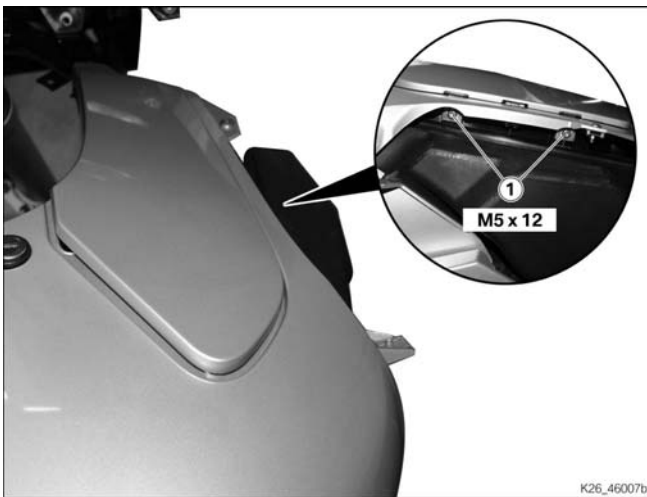
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing left brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing right brake caliper



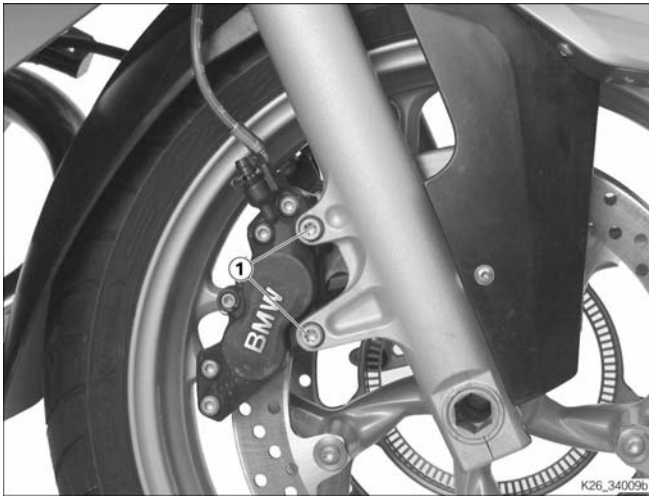
Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

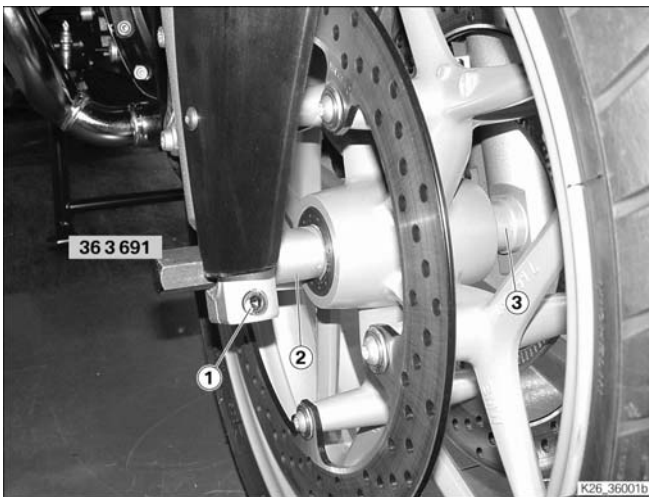
Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691) .
- Roll the front wheel forward to remove.



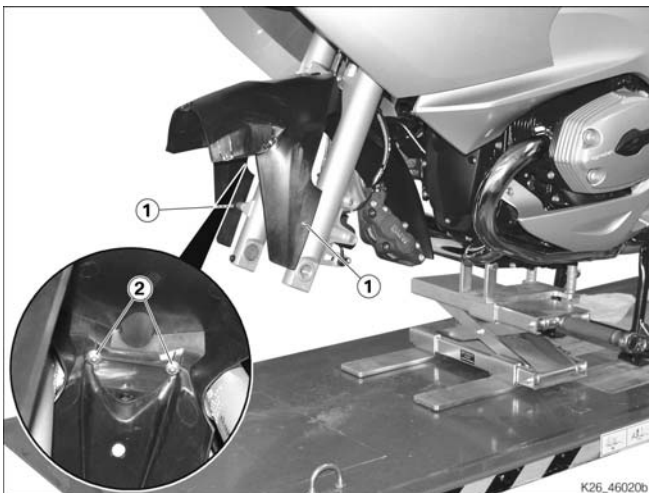
Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

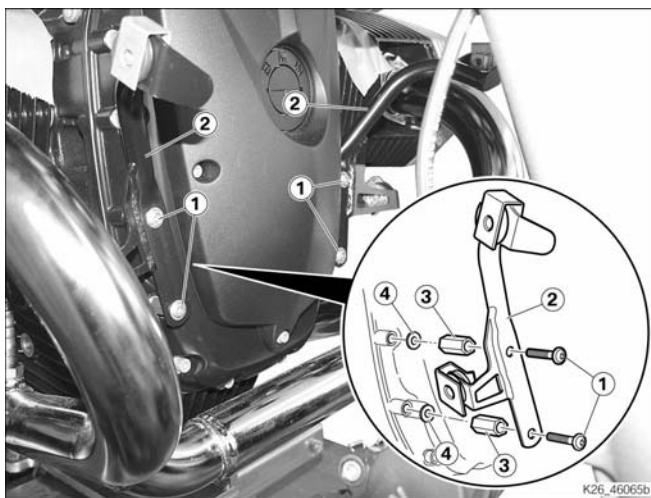
(-) Removing rear section of front mudguard

- Remove screws (1) on left and right.
- Remove screws (2).
- Lightly twist the rear section of the front mudguard and carefully pull in forward direction to remove.
- Detach rear section of front mudguard.



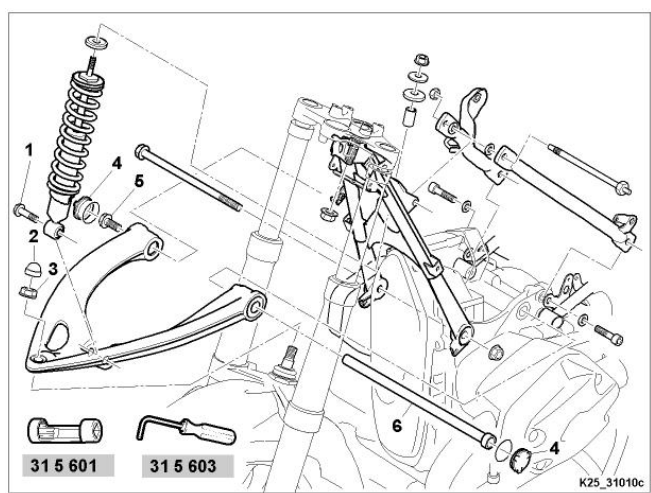
(-) Removing left and right fairing bracket


- Remove screws (1).
- Remove fairing bracket (2) with sleeves (3) and washers (4).



(-) Removing leading link

- Loop a strap over the quick-release axle and the top fork bridge and tighten the strap.
- Remove screw (1) from spring strut at bottom.
- Remove cap (2).
- Heat nut (3) and remove, using socket wrench insert (No. 31 5 601) and socket-head adapter (No. 31 5 603) .

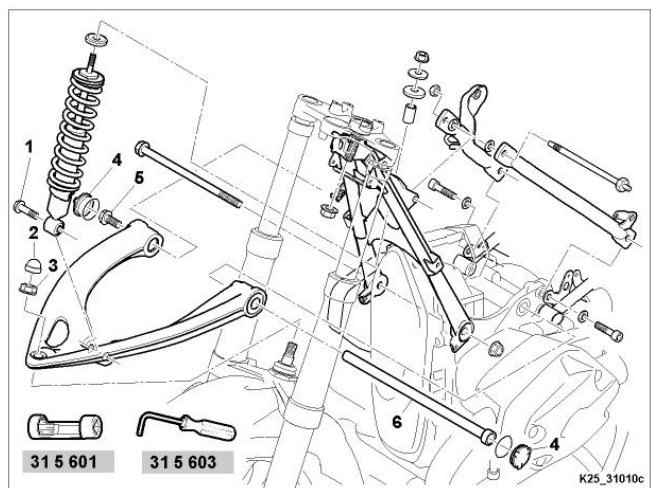



 Technical data			
Release temperature, bottom ball joint		120 °C	

- Remove caps (4).
- Mask off the cooling ribs on left and right underneath the leading link.
- Remove screw (5) and pull out shaft (6).
- Pull the telescopic fork forward and carefully pull the leading link forward to remove, noting the oil pipe.

(-) Installing leading link


- Clean the threads.
- Pull the telescopic fork forward and carefully slip the leading link back to install, noting the oil pipe.
- Push in shaft (6).
- Install screw (5).




 Tightening torques		
Leading link to engine	Initial torque, 45 Nm	
	Final torque, 72 Nm	

- Install caps (4).

Install new nut (3), using socket wrench insert (No. 31 5 601) and Allen screw adapter (No. 31 5 603).

 Tightening torques		
Ball joint to leading link, M14 x 1.5, Replace nut Micro-encapsulated	130 Nm	

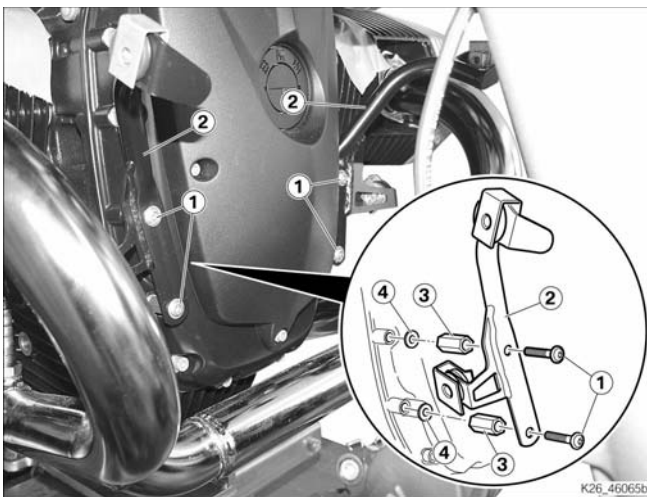
- Install cap (2).
- Remove the masking tape from the cooling ribs on left and right.
- Grease screw (1) and install it in the spring strut at the bottom.

 Tightening torques		
Spring strut, front, to leading link, M10 x 50 10.9 Micro-encapsulated , Optimoly TA	40 Nm	

- Remove the strap from the quick-release axle and top fork bridge.


(-) Installing fairing bracket on left and right

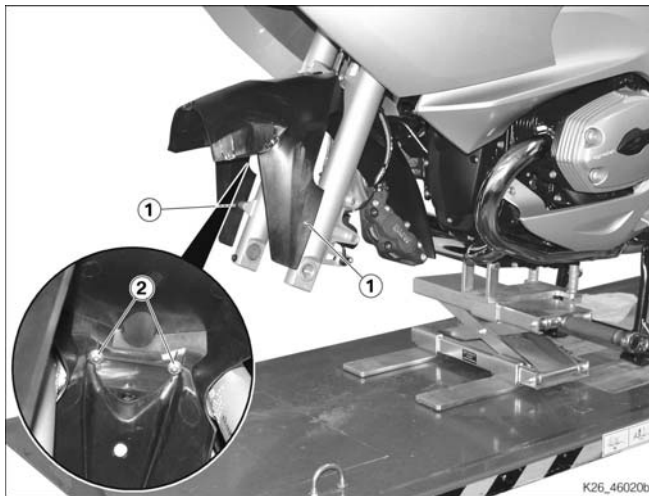
- Hold fairing bracket (2) with sleeves (3) and washers (4) in position.
- Install screws (1).




(-) Install rear section of front mudguard

- Fit the rear section of the front mudguard at a slight angle and opposite direction of travel.
- Align rear section of front mudguard and secure with new screws (2).

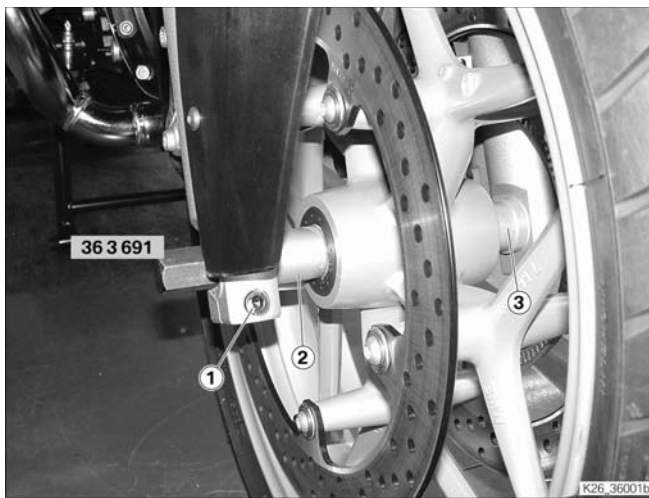
 Tightening torques		
Front mudguard, rear, to slider tube bridge, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	



- Install new screws (1) on left and right.

 Tightening torques		
Front mudguard, rear section, to axle clamp, left/right, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

(-) Installing the front wheel




- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.


- Clean quick-release axle (2) and grease it with lubricant.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

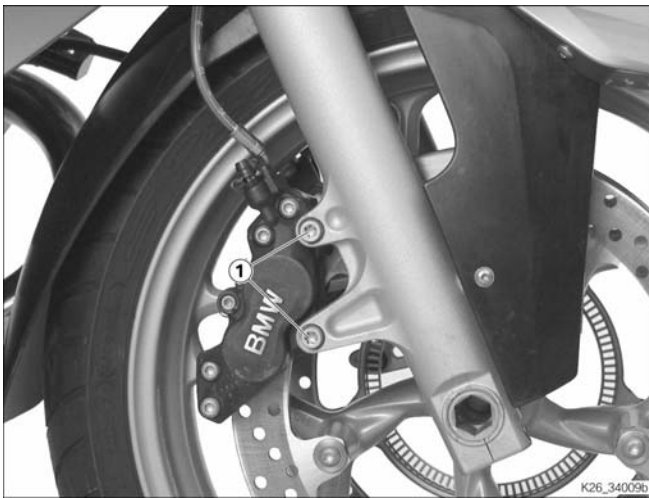
- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	


- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Securing right brake caliper



- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.



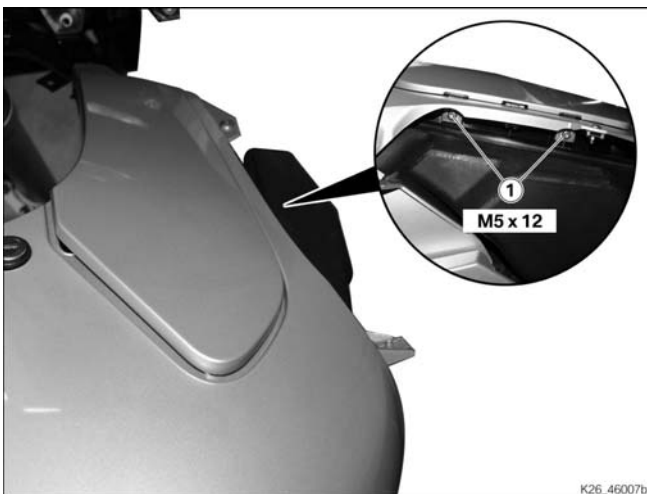
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).

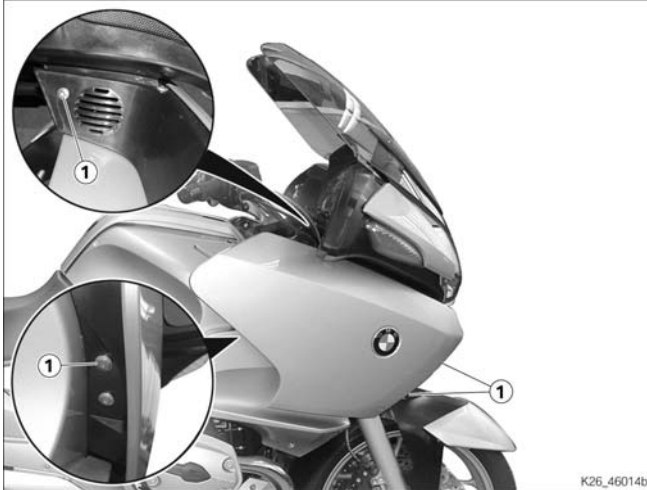


(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

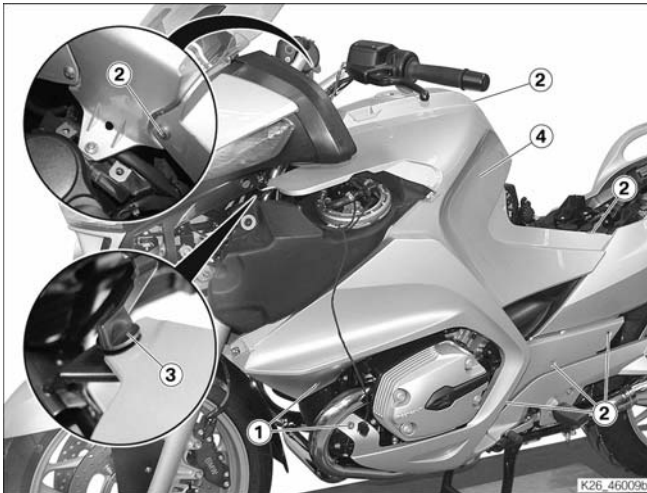


(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

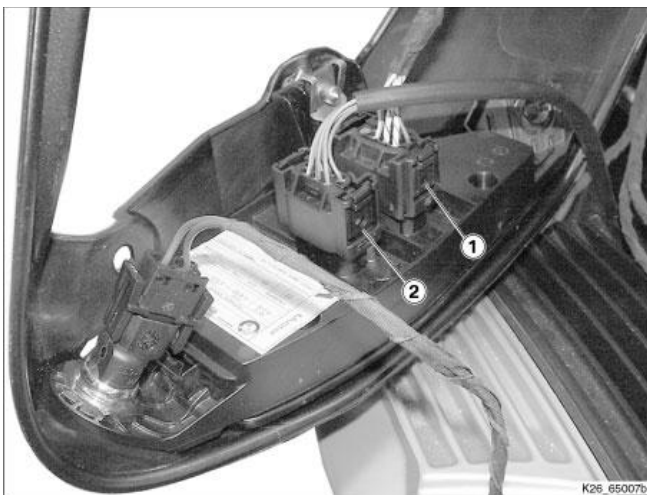
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



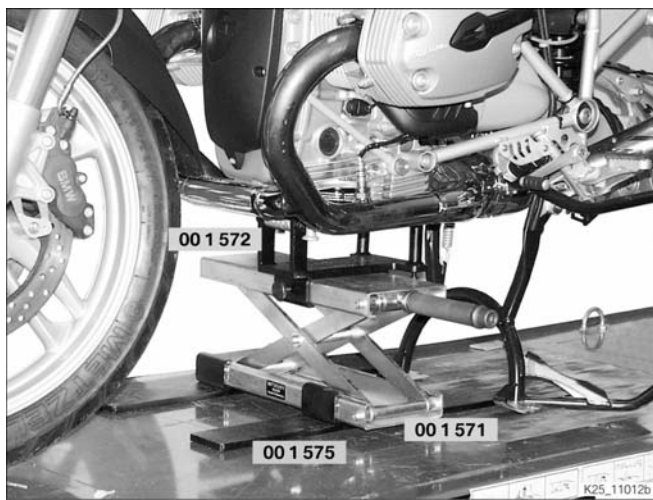
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

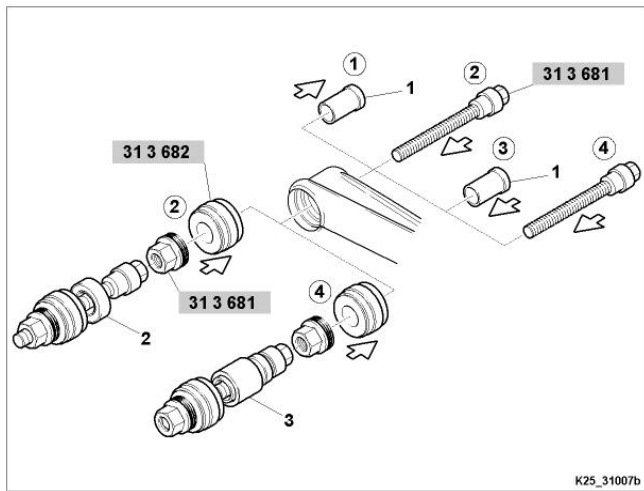


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .

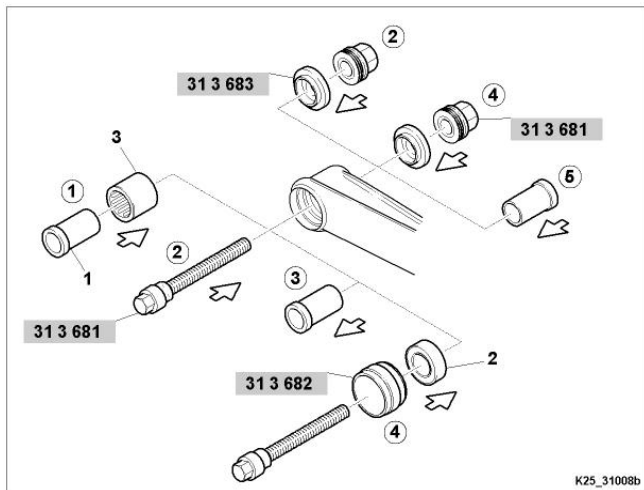


31 42 850 Replacing bearings of leading link (leading link removed)



(-) Removing bearing for leading link

- Remove sleeve (1).
- Insert spindle (No. 31 3 681) .
- Install support (No. 31 3 682) with thrust nut (No. 31 3 681) and remove **ball bearing**(2).
- Install sleeve (1) with spindle (No. 31 3 681) .
- Install support (No. 31 3 682) with thrust nut (No. 31 3 681) and remove **needle roller bearing**(3).

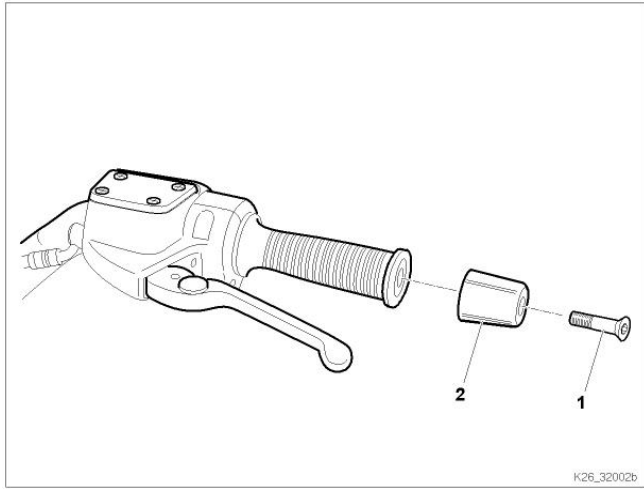


(-) Installing bearing for leading link

- Install spindle (No. 31 3 681) with sleeve (1) in needle roller bearing (3).
- Seat washer (No. 31 3 683) with thrust nut (No. 31 3 681) on the spindle and install **needle roller bearing** (3) until seated.
- Remove sleeve (1) and spindle (No. 31 3 681) .
- Install spindle (No. 31 3 681) with support (No. 31 3 682) and ball thrust bearing (2).
- Seat washer (No. 31 3 683) with thrust nut (No. 31 3 681) on the spindle and install **ball bearing**(3) until seated.
- Install sleeve (1).

 **32 71 165 Replacing both halves of handlebar**

(-) Removing handlebar weight

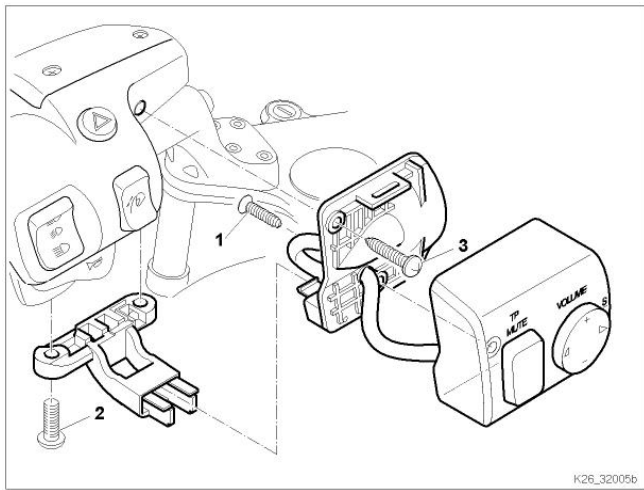


- Remove screws (1).
- Remove handlebar weight (2).

(-) Removing left grip

Variant, Heated handlebar grips and Radio with CD player or ESA

► Removing front remote control unit for radio



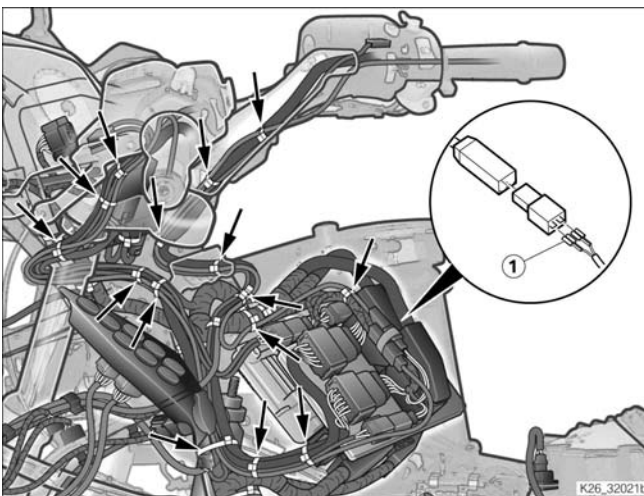
- Release screw (1) on the handlebar-mounted remote-control unit.
- Remove the housing cover of the handlebar-mounted remote control unit.
- Release screws (2) and screw (3) and remove the housing of the handlebar-mounted remote-control unit.

Variant, Heated handlebar grips

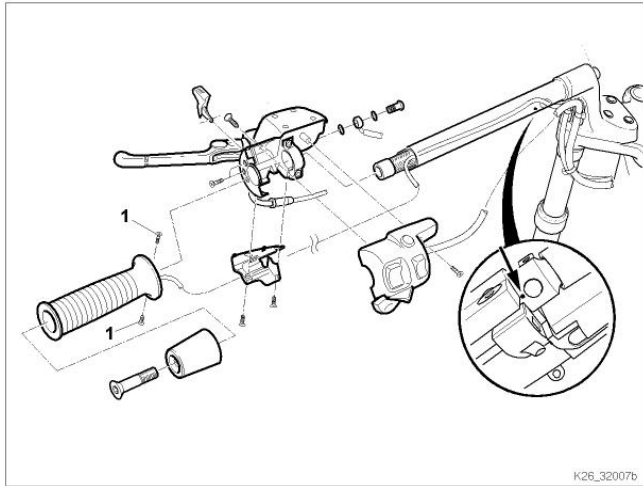
 **Attention**

Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.



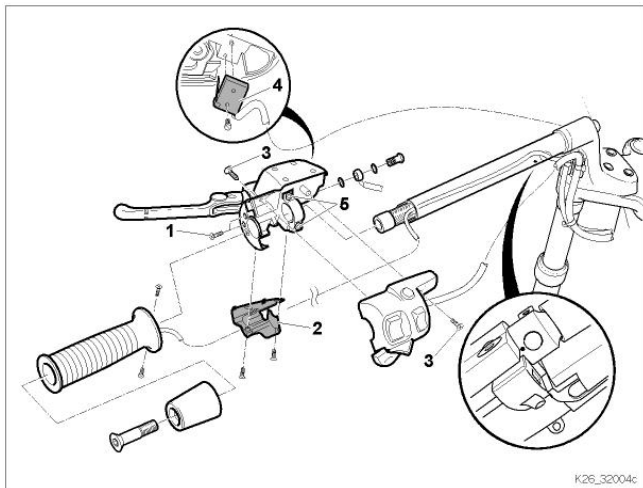
- Open cable ties (arrows).
- Disconnect the plug.
- Release cable shoe (1) from the plug.
- Pass the cable of the heated handlebar grip up until it



is clear.

- Remove screws (1).
- Remove the grip.

(-) Removing clutch lever fitting



- Release screws (1) and pull back the cover.
- Remove bottom plastic cover (2) of the clutch lever fitting.
- Remove screws (3) for the multifunction switch.
- Disengage the multifunction switch.

Attention

Nature: Air in the brake or clutch system will cause malfunctions.

Avoidance: Lay down the brake/clutch-fluid reservoir or put it aside in such a way that no air can make its way from the reservoir into the piping system.

- Slacken screws (5) securing the clutch lever fitting and lay the fitting aside.

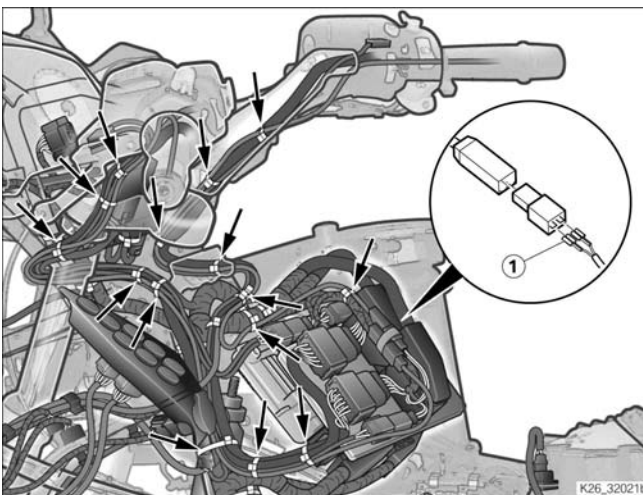
(-) Removing throttle twistgrip

Variant, Heated handlebar grips

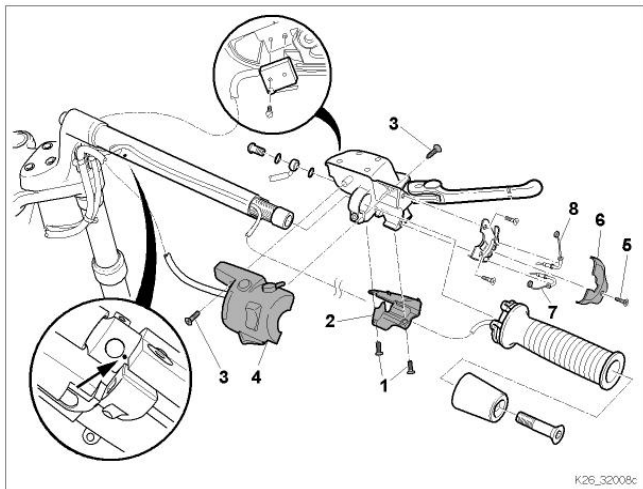
Attention

Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

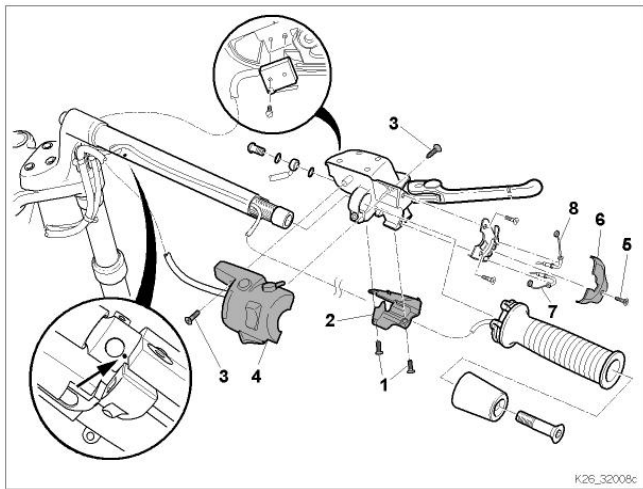
Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.



- Open cable ties (arrows).
- Disconnect the plug.
- Release cable shoe (1) from the plug.
- Pass the cable up.
- Remove screws (1).
- Remove bottom plastic cover (2) of the handbrake lever fitting.
-

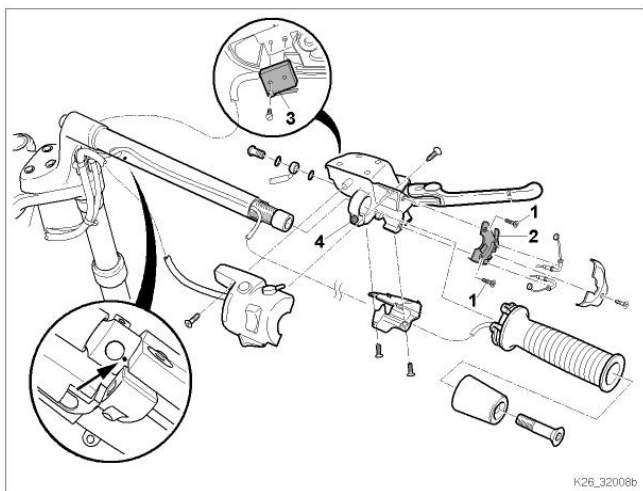


- Slacken screws (3) and remove multifunction switch (4).
- Remove screw (5) and remove cover (6) from the throttle twistgrip.
- Disengage Bowden cable (7) from the throttle twistgrip.
- Turn the throttle twistgrip back as far as it will go and pull it off.



Variant, cruise control

- Remove screws (1).
- Remove bottom plastic cover (2) of the handbrake lever fitting.
- Slacken screws (3) and remove multifunction switch (4).
- Remove screw (5) and remove cover (6) from the throttle twistgrip.
- Disengage Bowden cable (7) from the throttle twistgrip.
- Disengage Bowden cable (8) from the throttle twistgrip.
- Turn the throttle twistgrip back as far as it will go and pull it off.



(-) Removing handbrake fitting

- Remove screws (1) and remove Bowden-cable guide (2).
- Slacken screws (4) securing the handbrake fitting.

⚠ Attention

Nature: Air in the brake or clutch system will cause malfunctions.

Avoidance: Lay down the brake/clutch-fluid reservoir or put it aside in such a way that no air can make its way from the reservoir into the piping system.

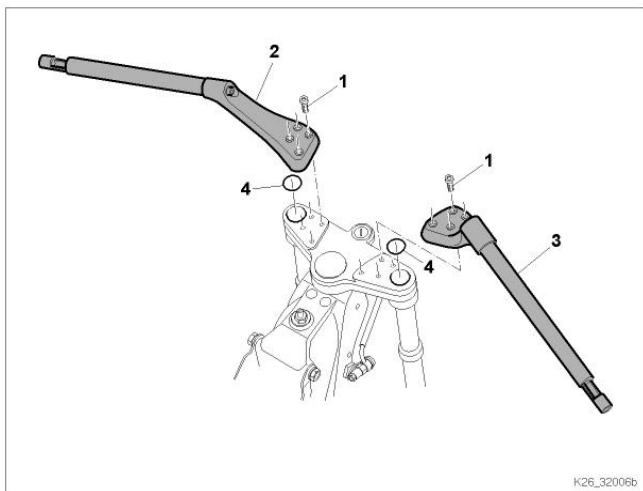
- Pull off the handbrake fitting and lay it aside.

(-) Removing stub handlebars

⚠ Warning

Nature: Disassembly would damage the handlebar halves, which means that they could not subsequently be reinstalled.

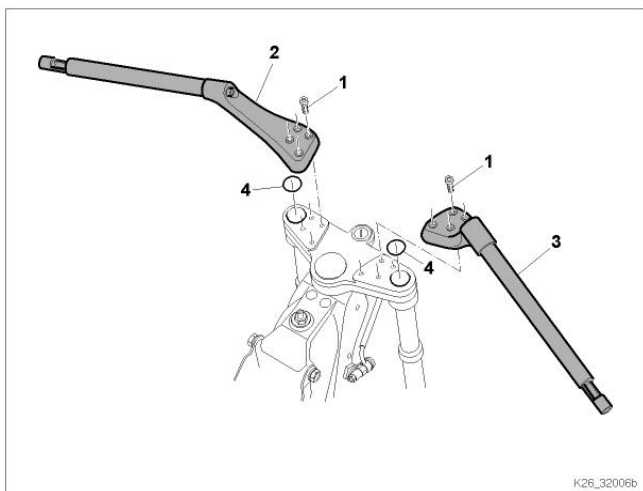
Avoidance: Do not disassemble the handlebar halves.




Replace the entire component in the event of damage.

- Remove screws (1).
- Remove stub handlebars (2) and (3) with sealing rings (4).

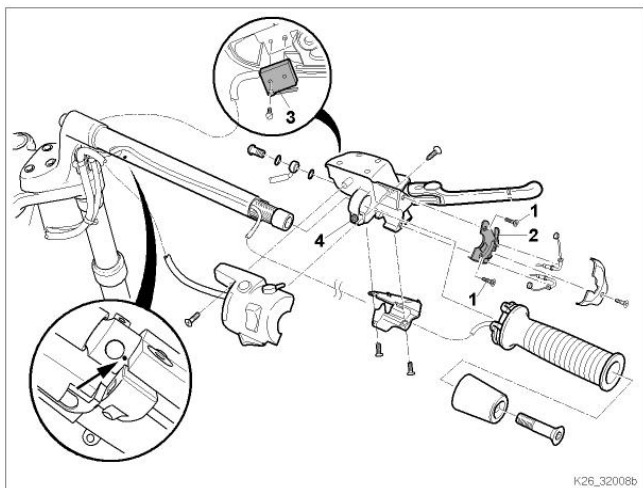
(-) Installing both stub handlebars



- Check sealing rings (4) for damage; replace sealing rings if necessary.
- Position stub handlebars (2) and (3) on the top fork bridge, noting sealing rings (4).
- Install screws (1).

 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	

(-) Installing handbrake fitting



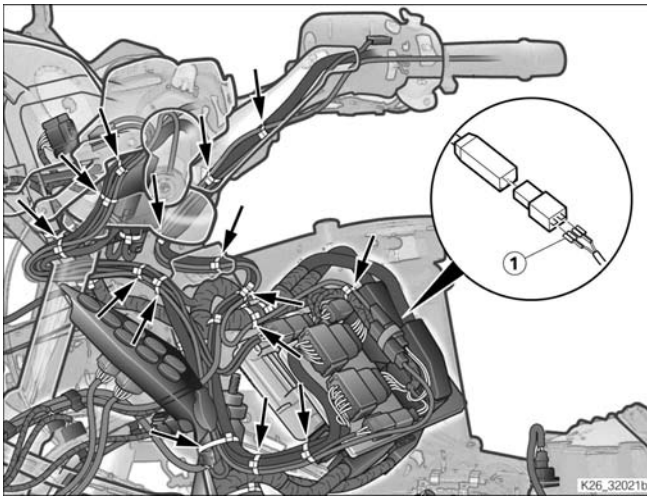
- Align the gap of the clamping block on the handbrake lever fitting with the punch mark (arrow) on the handlebar.
- Install the handbrake fitting and secure it with screws (4).
- Place Bowden-cable guide (2) in position and secure it with screws (1).

(-) Installing throttle twistgrip

Variant, Heated handlebar grips

 **Attention**

Nature: There is a risk of damaging the electric cable of the heated grip in the



disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.

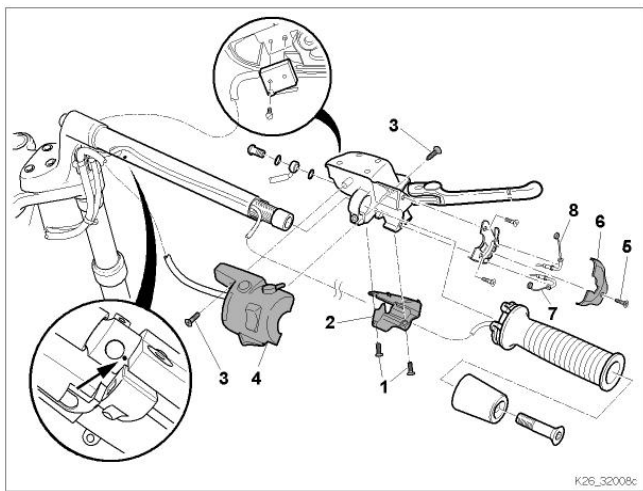
- Pass the heated handlebar grip cable through the stub handlebar.



Note

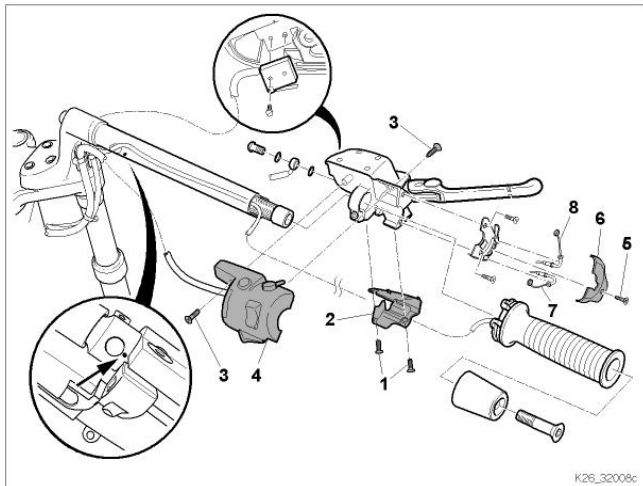
When electrical items of equipment and electrical accessories are installed on a motorcycle with Central Vehicle Electronics (ZFE) for the first time, the (BMW Motorrad Diagnosesystems) has to be used to register the new components with the ZFE.

- Latch the plug to cable shoe (1).
- Connect the plug and secure it with cable ties (arrows).
- Turn the throttle twistgrip to the full-throttle position and push it onto the stub handlebar, making sure that the lug of the Bowden-cable guide engages the throttle twistgrip.
- Engage Bowden cable (7) on the throttle twistgrip.
- Install cover (6) and tighten screw (5) to secure.
- Install multifunction switch (4) and secure it with screws (3).
- Install bottom plastic cover (2) of the handbrake lever fitting.
- Install screws (1).



Variant, cruise control

- Turn the throttle twistgrip to the full-throttle position and push it onto the stub handlebar, making sure that the lug of the Bowden-cable guide engages the throttle twistgrip.
- Engage Bowden cable (8) on the throttle twistgrip.
- Engage Bowden cable (7) on the throttle twistgrip.
- Install cover (6) and tighten screw (5) to secure.
- Install multifunction switch (4) and secure it with screws (3).
- Install bottom plastic cover (2) of the handbrake lever fitting.
- Install screws (1).



(-) Checking freedom of movement of throttle cable and checking for kinks and chafing




Note

The throttle cable must be correctly adjusted in order for the electronic engine management system to function

correctly.

Test

- Check the throttle cable for kinks and chafing.
- » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
- » The throttle twistgrip returns to the closed position by itself.
- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
- » Slight play perceptible.

 Technical data			
Test criterion, throttle cable		Results of all test steps satisfied	

Result: Test criterion not satisfied.


Measure:

- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)

(-) Adjusting throttle cable

- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.




 Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten lock nut.

Test

- Check the play at the throttle twistgrip.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar)	4 - 5 mm	Variant, cruise control

	fitting)		
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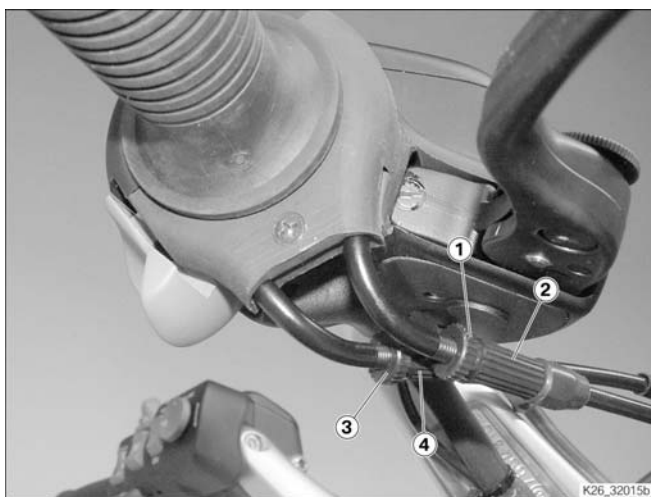
Result: Play at throttle twistgrip is not OK.

Measure:

- Repeat the procedure.

Variant, cruise control

- Completely slacken off lock nut (3).
- Fully tighten adjusting screw (4).
- Adjust Bowden cables.
- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.



Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten locknut (1).
- Completely slacken off lock nut (3).
- With the throttle twistgrip in the idle position, set the gap between locknut (3) and adjusting screw (4) as per specification by turning the adjusting screw.

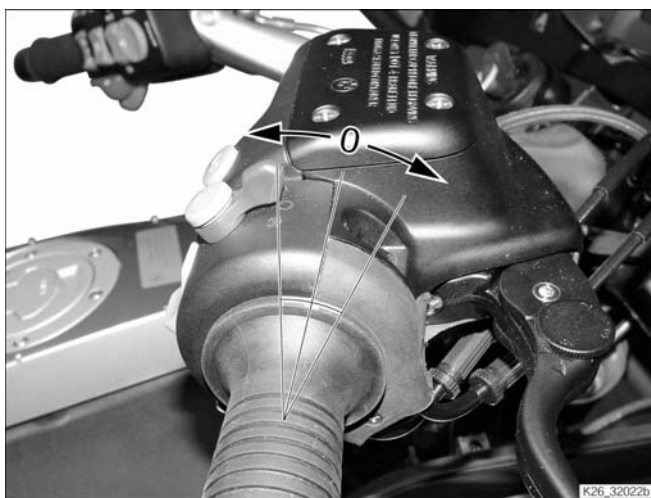
Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten locknut (3).

Variant, cruise control

Test

- Turn the throttle twistgrip forward past its zero position.



Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play is correct at the throttle twistgrip and the microswitch in the throttle-cable divider trips with an audible click.

Measure:

- Setting is OK.


Result: Insufficient play or microswitch does not trip.

Measure:

- Adjust throttle-closer cable or check microswitch.

Test

- Turn the throttle twistgrip back from its zero position.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play at the throttle twistgrip is correct.

Measure:

- Setting is OK.

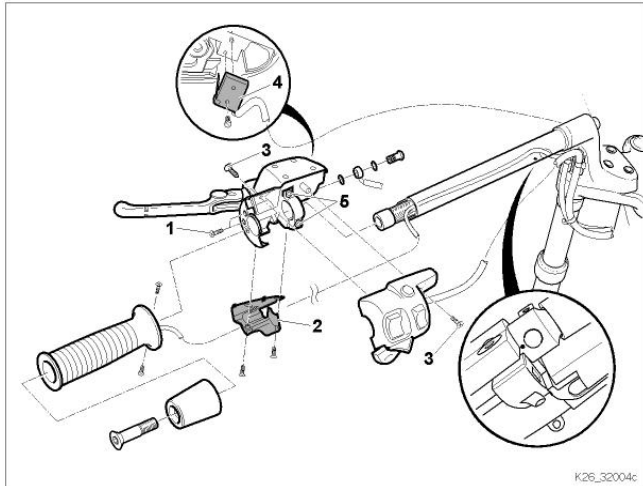
Result: Insufficient play.

Measure:

- Adjust the throttle-opener cable.

(-) Installing clutch lever fitting

- Align the gap of the clamping block on the clutch lever fitting with the punch mark (arrow) on the handlebar.
- Install the clutch lever fitting with screws (5).
- Insert the multifunction switch and secure it with screws (3).
- Install bottom plastic cover (2) of the clutch lever fitting.
- Install the cover and secure it with screws (1).



(-) Installing left grip

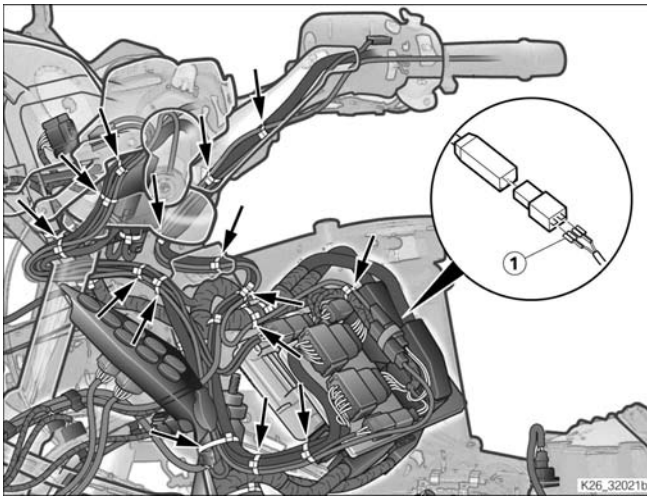
Variant, Heated handlebar grips



Attention

Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.



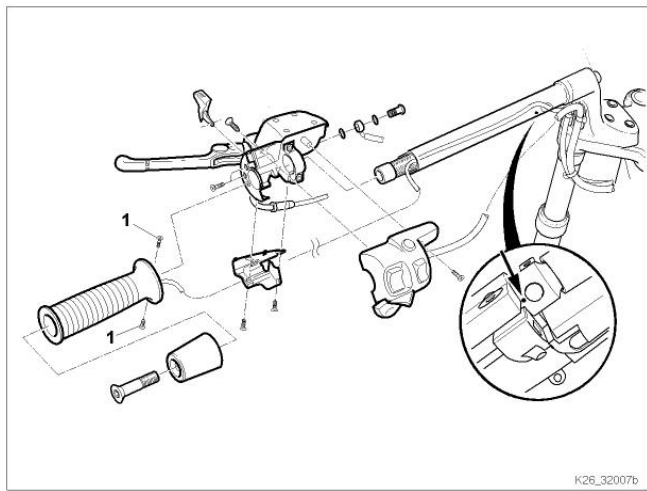
- Pass the heated handlebar grip cable through the stub handlebar.
- Push the grip onto the stub handlebar, making sure that the cable is not pinched.



Note

When electrical items of equipment and electrical accessories are installed on a motorcycle with Central Vehicle Electronics (ZFE) for the first time, the (BMW Motorrad Diagnosesystems) has to be used to register the new components with the ZFE.

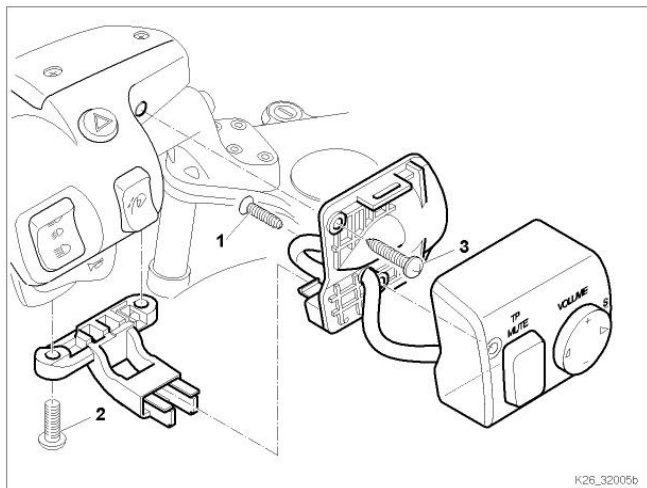
- Latch the plug to cable shoe (1).
- Connect the plug and secure it with cable ties (arrows).
- Push the grip onto the stub handlebar.
- Install screws (1).



Variant, Heated handlebar grips and Radio with CD player or ESA

► **Installing front remote control unit for radio**

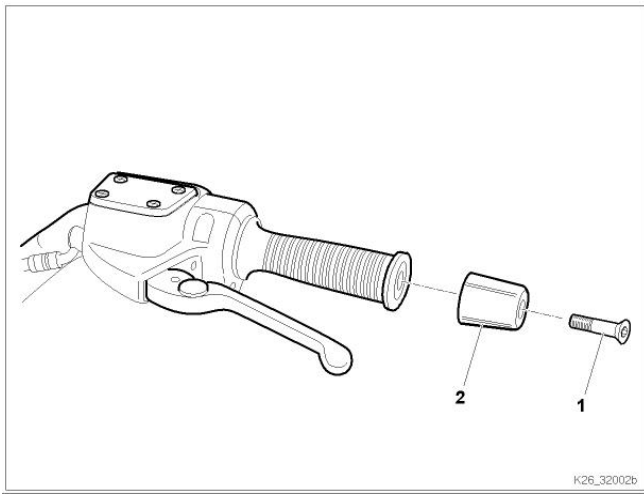
- Place the housing of the handlebar-mounted remote-control unit in position and secure it with screw (3) and screws (2).
- Engage the housing cover of the handlebar-mounted remote control unit.
- Secure the housing of the handlebar-mounted remote-control unit with screw (1).



(-) Installing handlebar weight

- Hold handlebar weight (2) in position and secure it with screw (1).

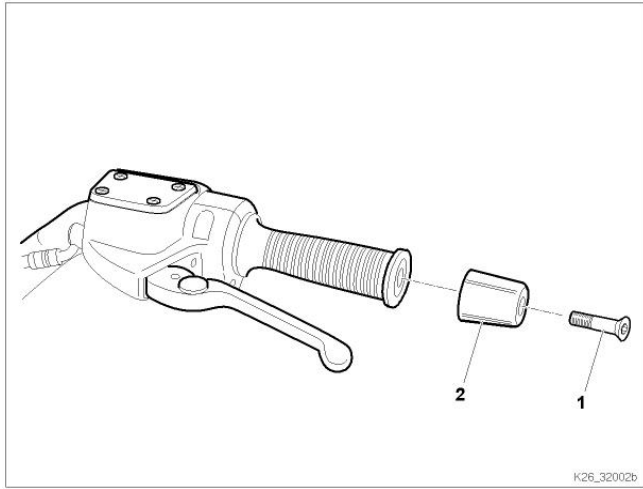




Tightening torques

Handlebar weight to handlebar, M8 x 30	19 Nm	
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 **32 72 001 Replacing throttle twistgrip**



(-) Removing handlebar weight

- Remove screws (1).
- Remove handlebar weight (2).

Variant, Heated handlebar grips

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).



- Pull the seat to the rear to remove.

Variant, Heated handlebar grips

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

Variant, Heated handlebar grips

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



K26_65007b

- Remove trim panel.

Variant, Heated handlebar grips

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

Variant, Heated handlebar grips

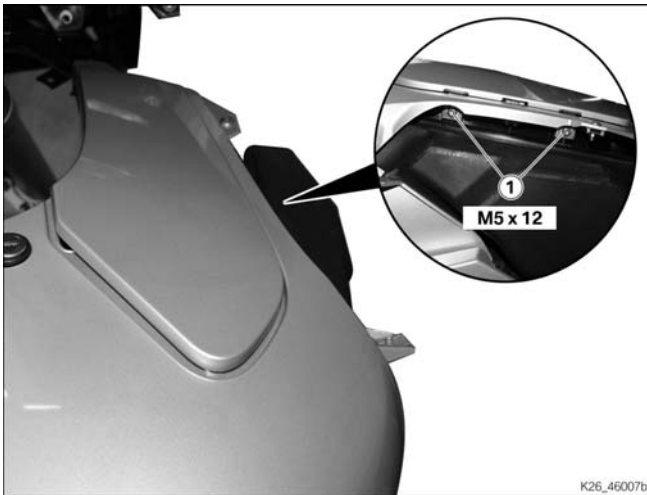
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



Variant, Heated handlebar grips
(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.

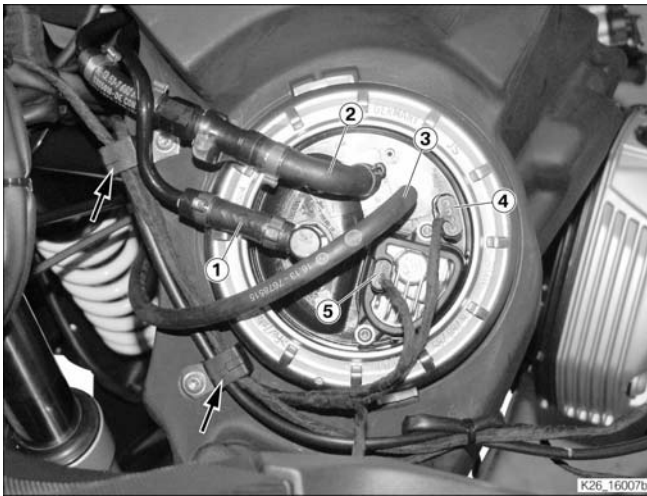


Variant, Heated handlebar grips
(-) Removing entire right side tank cover

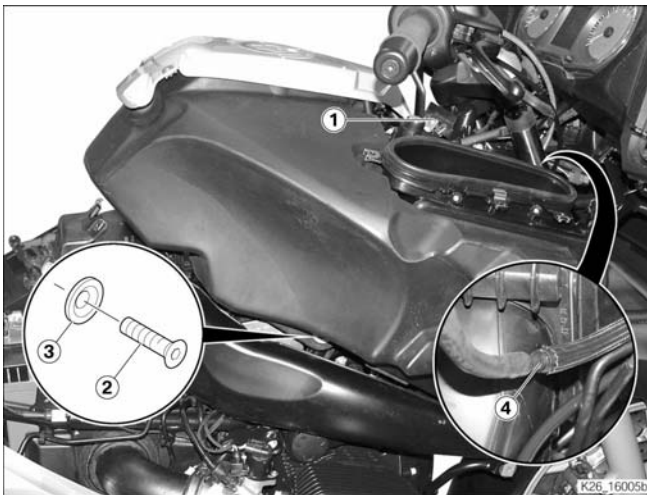
- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



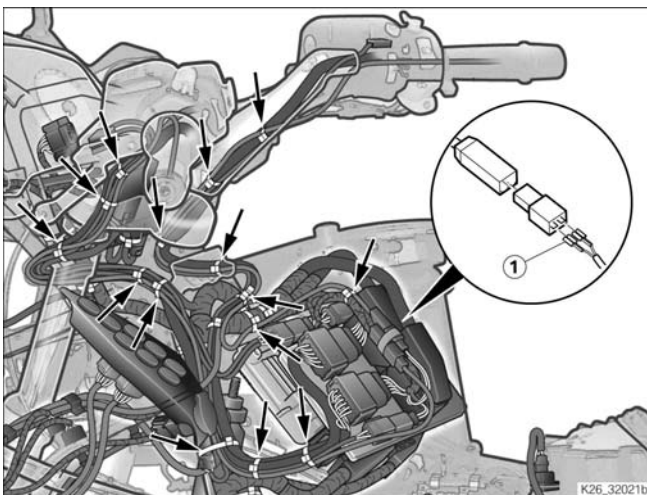
Variant, Heated handlebar grips
(-) Removing fuel tank



- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing throttle twistgrip

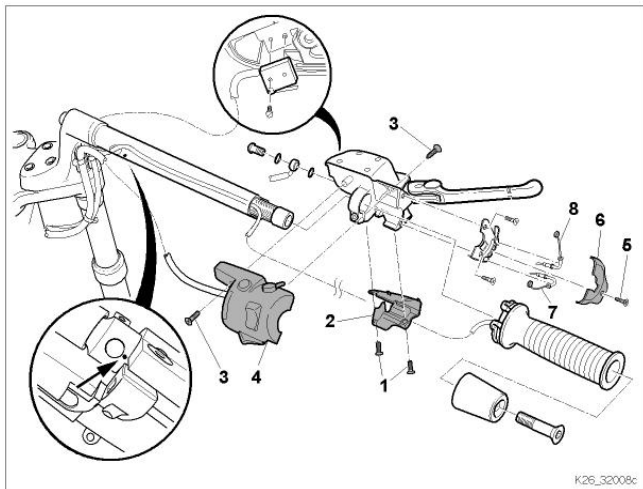
Variant, Heated handlebar grips

⚠ Attention

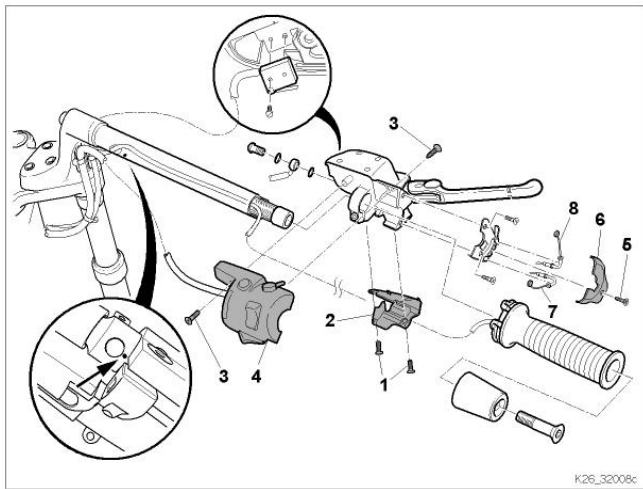
Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.

- Open cable ties (arrows).
- Disconnect the plug.
- Release cable shoe (1) from the plug.
- Pass the cable up.
- Remove screws (1).
- Remove bottom plastic cover (2) of the handbrake lever fitting.
- Slacken screws (3) and remove multifunction switch (4).
- Remove screw (5) and remove cover (6) from the throttle twistgrip.

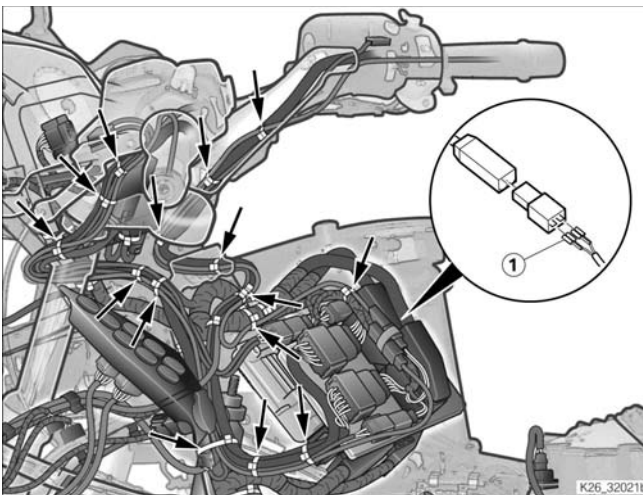


- Disengage Bowden cable (7) from the throttle twistgrip.
- Turn the throttle twistgrip back as far as it will go and pull it off.



Variant, cruise control

- Remove screws (1).
- Remove bottom plastic cover (2) of the handbrake lever fitting.
- Slacken screws (3) and remove multifunction switch (4).
- Remove screw (5) and remove cover (6) from the throttle twistgrip.
- Disengage Bowden cable (7) from the throttle twistgrip.
- Disengage Bowden cable (8) from the throttle twistgrip.
- Turn the throttle twistgrip back as far as it will go and pull it off.



(-) Installing throttle twistgrip

Variant, Heated handlebar grips

⚠ Attention

Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.

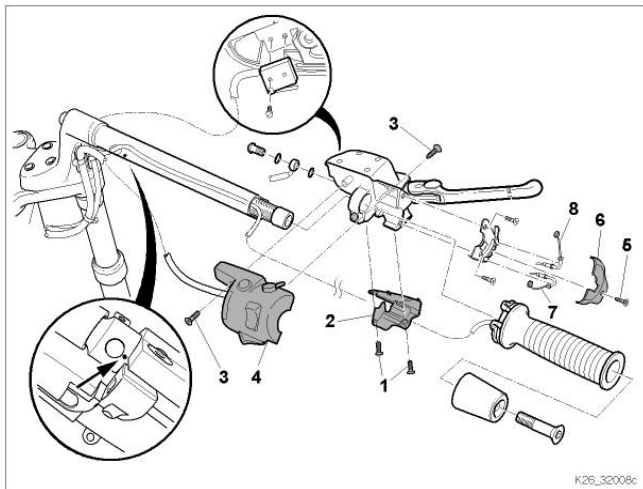
- Pass the heated handlebar grip cable through the stub handlebar.



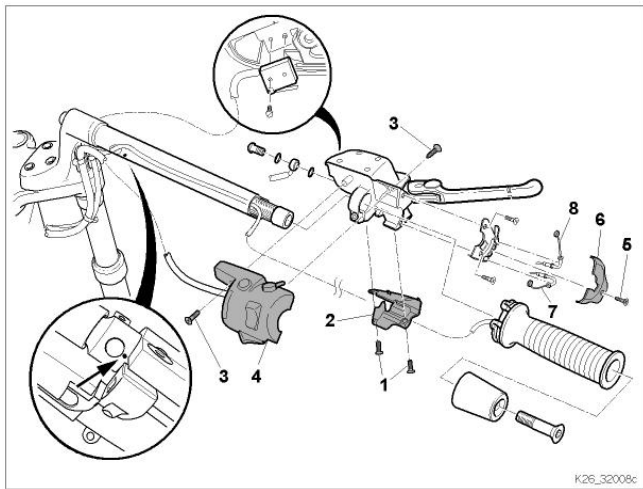
Note

When electrical items of equipment and electrical accessories are installed on a motorcycle with Central Vehicle Electronics (ZFE) for the first time, the (BMW Motorrad Diagnosesystems) has to be used to register the new components with the ZFE.

- Latch the plug to cable shoe (1).
- Connect the plug and secure it with cable ties (arrows).



- Turn the throttle twistgrip to the full-throttle position and push it onto the stub handlebar, making sure that the lug of the Bowden-cable guide engages the throttle twistgrip.
- Engage Bowden cable (7) on the throttle twistgrip.
- Install cover (6) and tighten screw (5) to secure.
- Install multifunction switch (4) and secure it with screws (3).
- Install bottom plastic cover (2) of the handbrake lever fitting.
- Install screws (1).



Variant, cruise control

- Turn the throttle twistgrip to the full-throttle position and push it onto the stub handlebar, making sure that the lug of the Bowden-cable guide engages the throttle twistgrip.
- Engage Bowden cable (8) on the throttle twistgrip.
- Engage Bowden cable (7) on the throttle twistgrip.
- Install cover (6) and tighten screw (5) to secure.
- Install multifunction switch (4) and secure it with screws (3).
- Install bottom plastic cover (2) of the handbrake lever fitting.
- Install screws (1).

(-) Checking freedom of movement of throttle cable and checking for kinks and chafing



Note

The throttle cable must be correctly adjusted in order for the electronic engine management system to function correctly.

Test

- Check the throttle cable for kinks and chafing.
 - » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
 - » The throttle twistgrip returns to the closed position by itself.
- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
 - » Slight play perceptible.



Technical data

Test criterion,		Results of all	
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throttle cable		test steps satisfied	
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Result: Test criterion not satisfied.


Measure:

- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)

(-) Adjusting throttle cable




- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.

 Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten lock nut.

Test

- Check the play at the throttle twistgrip.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control


Result: Play at throttle twistgrip is not OK.

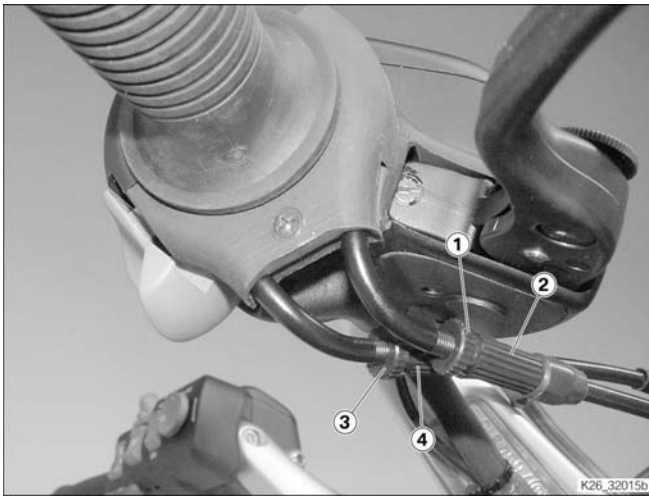
Measure:

- Repeat the procedure.

Variant, cruise control


- Completely slacken off lock nut (3).
- Fully tighten adjusting screw (4).
- Adjust Bowden cables.
- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.

 Technical data			



Setting for throttle-cable play		4 - 5 mm	
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- Tighten locknut (1).
- Completely slacken off lock nut (3).
- With the throttle twistgrip in the idle position, set the gap between locknut (3) and adjusting screw (4) as per specification by turning the adjusting screw.

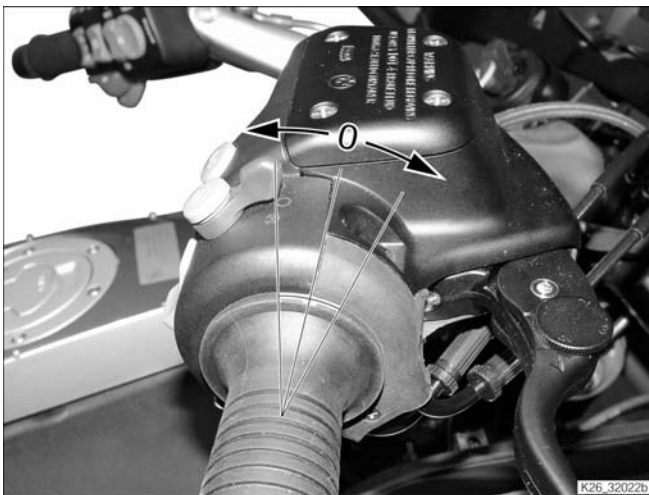
 Technical data			
Setting for throttle-cable play		4 - 5 mm	


- Tighten locknut (3).

Variant, cruise control

Test

- Turn the throttle twistgrip forward past its zero position.



 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play is correct at the throttle twistgrip and the microswitch in the throttle-cable divider trips with an audible click.

Measure:

- Setting is OK.


Result: Insufficient play or microswitch does not trip.

Measure:

- Adjust throttle-closer cable or check microswitch.

Test

- Turn the throttle twistgrip back from its zero position.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition	4 - 5 mm	Variant, cruise control

	to handlebar fitting)		
--	-----------------------	--	--

Result: Play at the throttle twistgrip is correct.

Measure:

- Setting is OK.

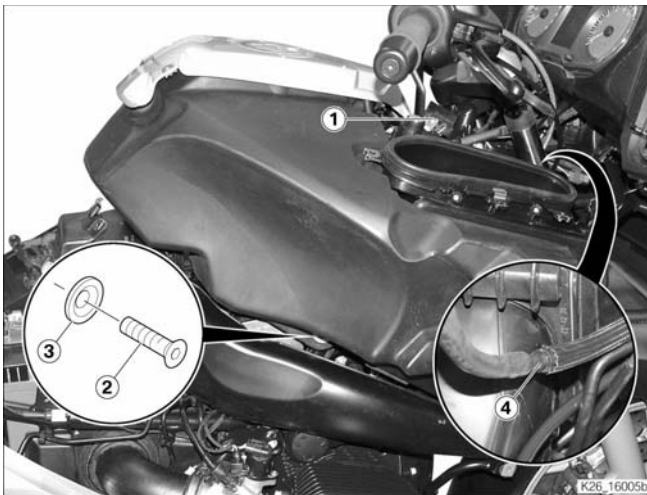
Result: Insufficient play.

Measure:

- Adjust the throttle-opener cable.

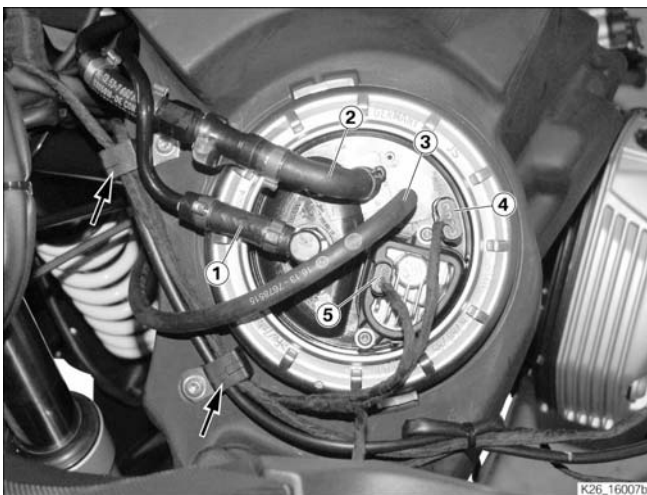
Variant, Heated handlebar grips

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male

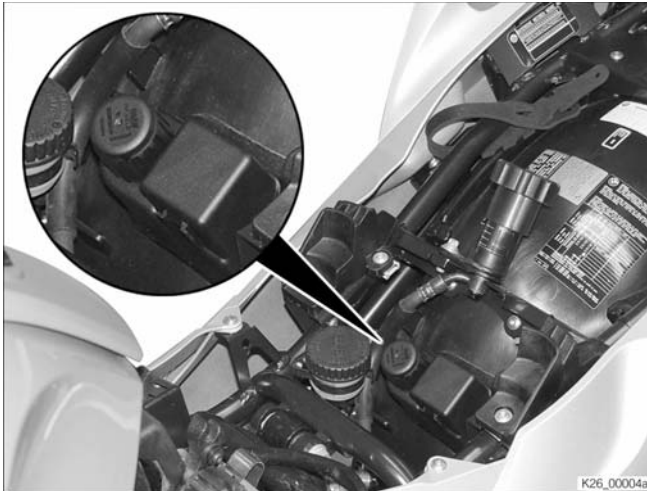
adapter into the female coupling until it engages with an audible click.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

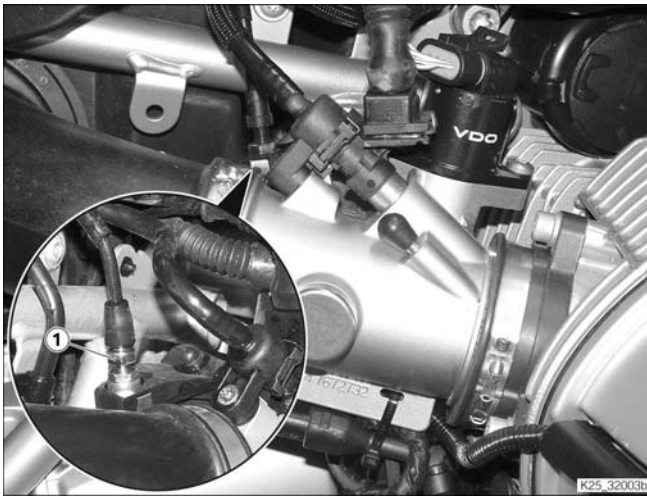
Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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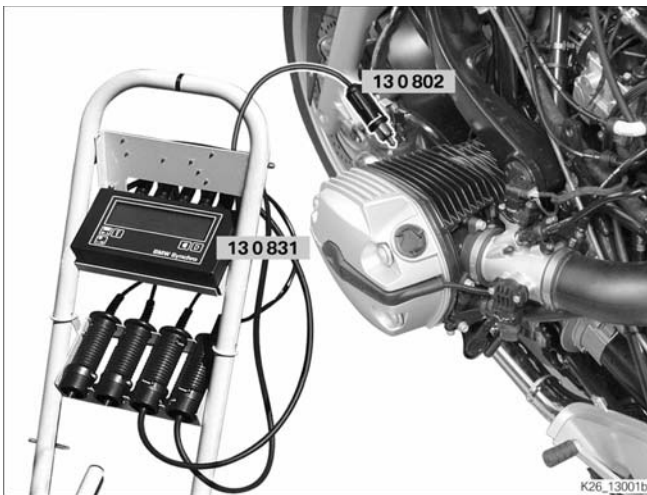
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

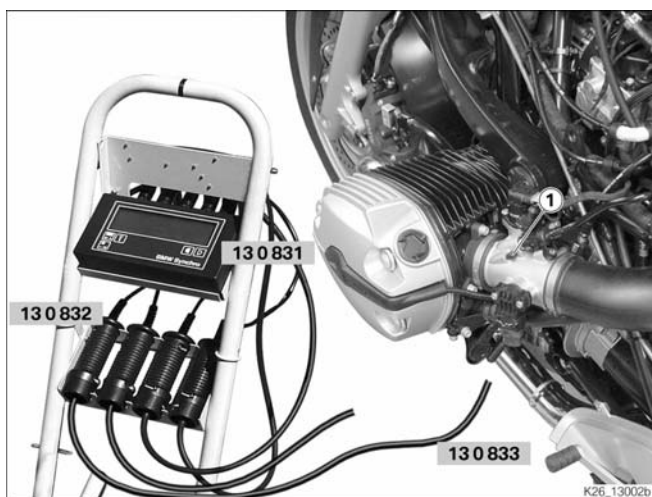


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



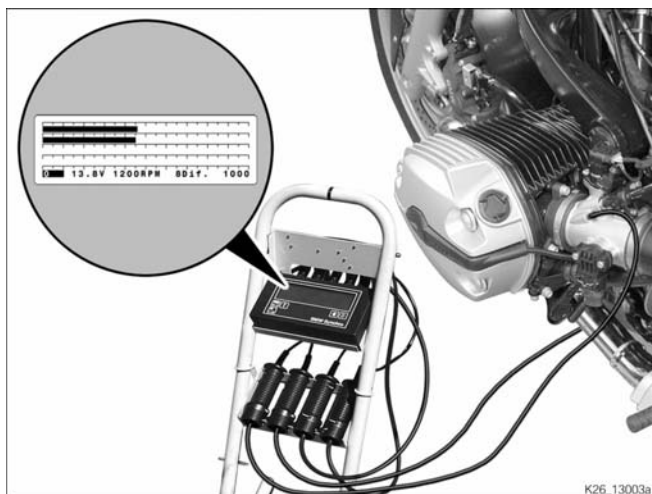
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

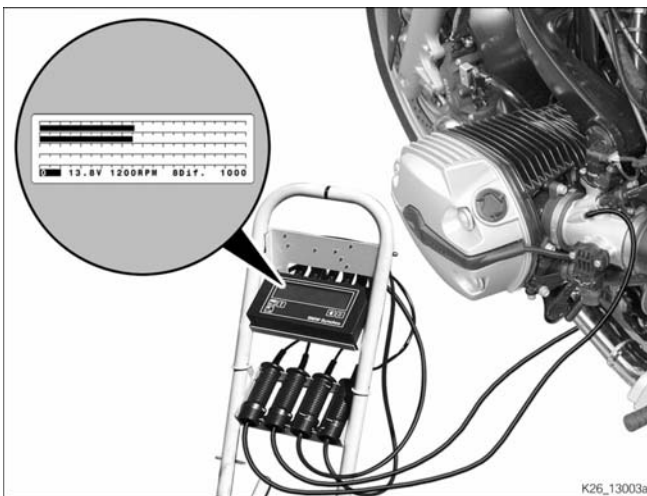
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmetered air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

Variant, Heated handlebar grips

(-) Installing entire right side tank cover

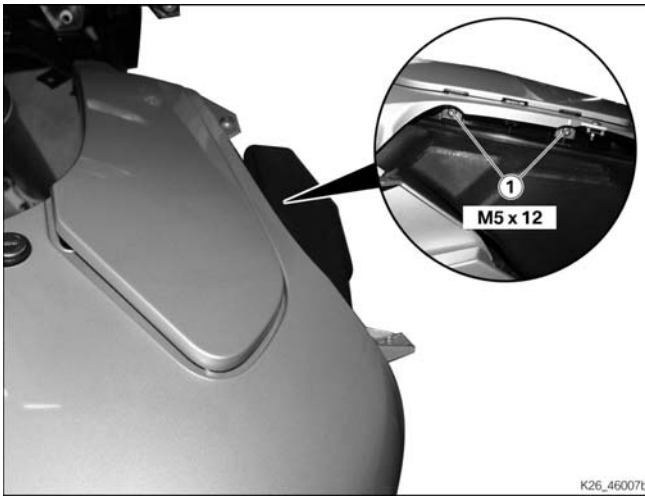
- Fit tank cover.
- Install screws (2).
- Install screws (1).



Variant, Heated handlebar grips

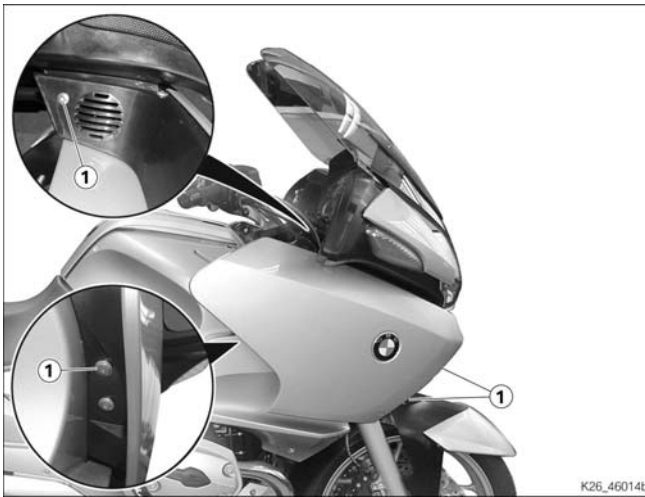
(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



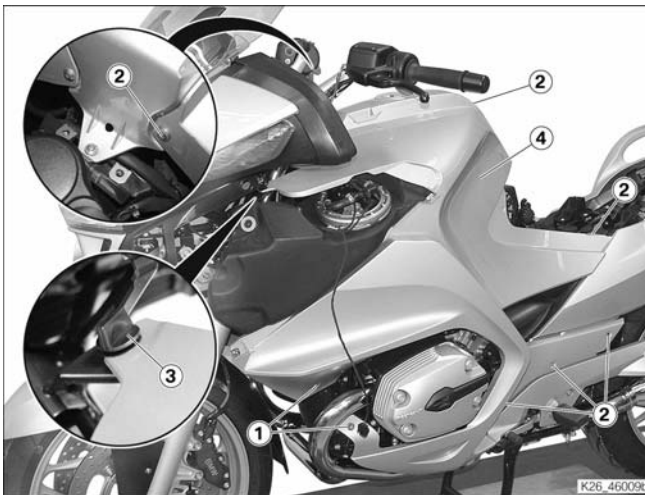
Variant, Heated handlebar grips
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



Variant, Heated handlebar grips
(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



Variant, Heated handlebar grips
(-) Installing left-hand trim panel



Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).

Variant, Heated handlebar grips

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



Variant, Heated handlebar grips

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



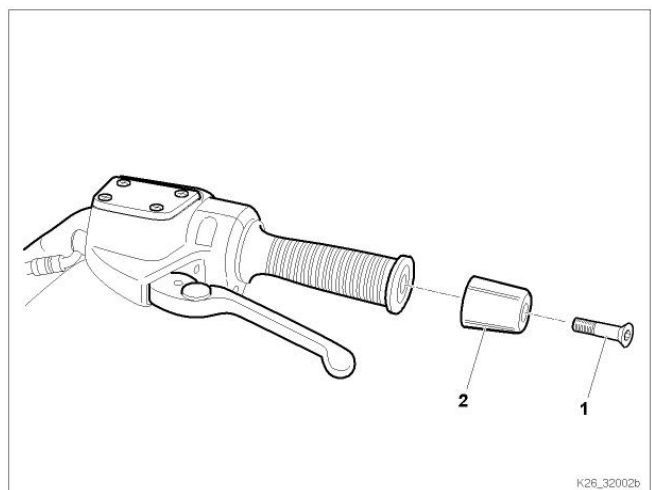
Variant, Seat heating


- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



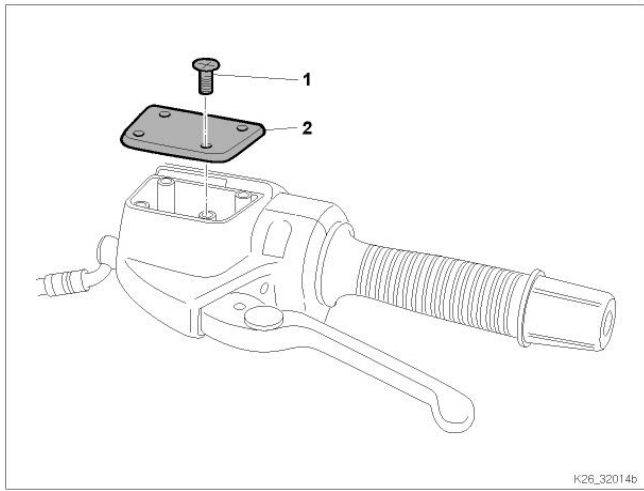
(-) Installing handlebar weight

- Hold handlebar weight (2) in position and secure it with screw (1).



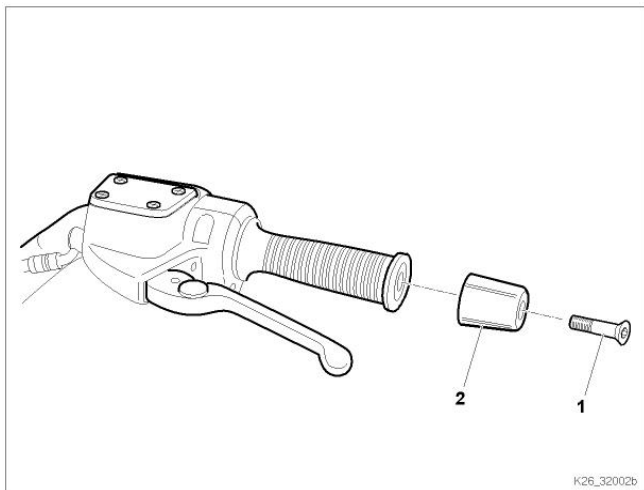
 Tightening torques		
Handlebar weight to handlebar, M8 x 30	19 Nm	

32 72 065 Replacing clutch handlebar fitting



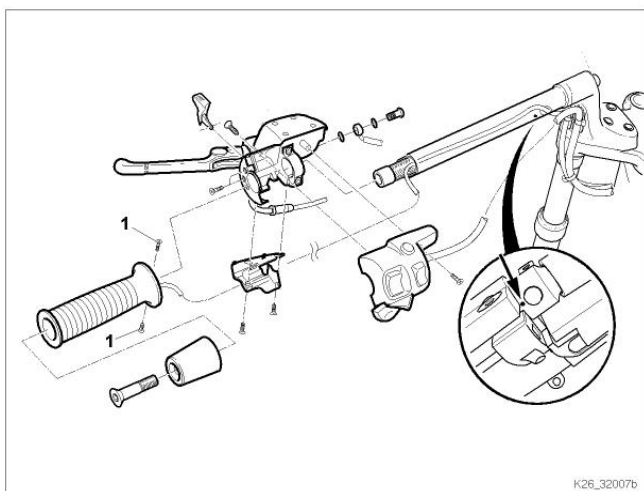
(-) Emptying clutch lever fitting

- Undo screws (1) and remove cover (2) from clutch fluid reservoir.
- Use syringe (No. 34 2 551) to draw the clutch fluid out of the clutch-fluid reservoir.



(-) Removing handlebar weight

- Remove screws (1).
- Remove handlebar weight (2).



(-) Removing clutch lever fitting

- Remove screws (1).



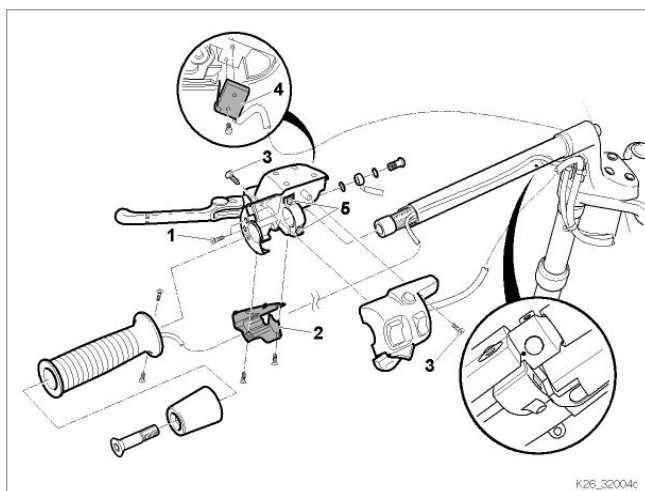
Attention

Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.

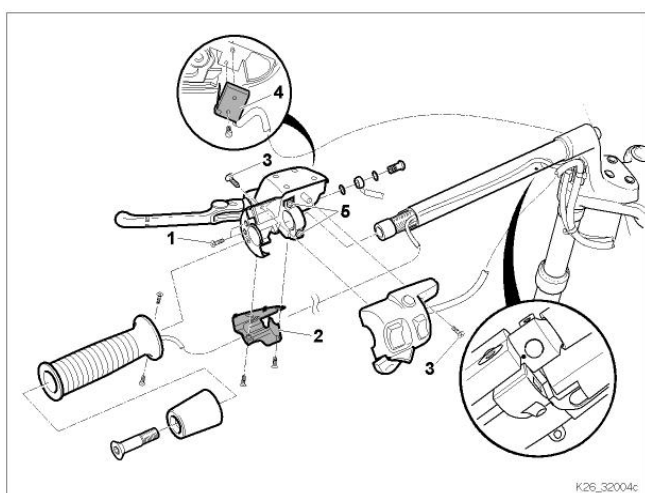
- Carefully pull back the grip; if necessary, open the cable tie at the handlebar to obtain more slack.

- Release screws (1) and pull back the cover.
- Remove bottom plastic cover (2) of the clutch lever fitting.



- Remove screws (3) for the multifunction switch.
- Disengage the multifunction switch.
- Remove clutch switch (4).
- Disconnect the clutch line from the fitting.
- Remove screws (5) securing the clutch lever fitting and remove the fitting.

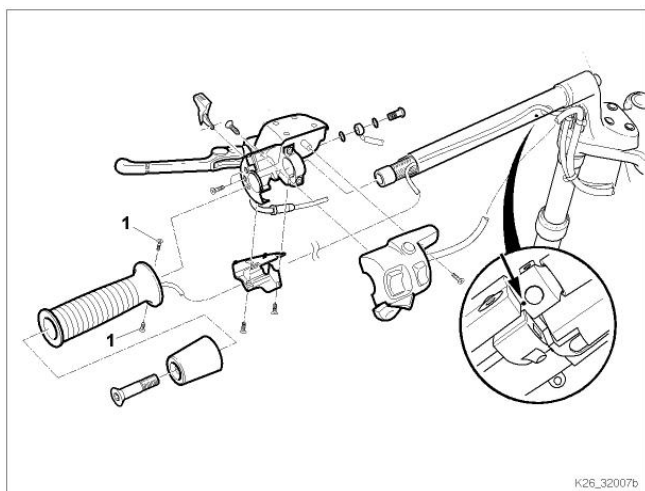
(-) Installing clutch lever fitting



- Align the gap of the clamping block on the clutch lever fitting with the punch mark (arrow) on the handlebar.
- Install the clutch lever fitting with screws (5).
- Fully hand-tighten the top screw, then tighten the bottom screw.
- Connect the clutch line to the fitting.

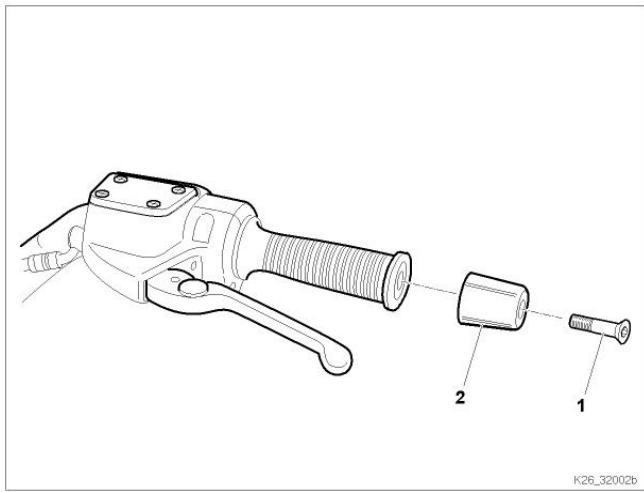
Tightening torques		
Banjo bolt, M10 x 1	18 Nm	

- Install clutch switch (4), noting the locating pin.
- Install the multifunction switch and secure it with screws (3).
- Install bottom plastic cover (2) of the clutch lever fitting.
- Install the cover and secure it with screws (1).
- Push the grip fully onto the handlebar.
- Install screws (1).



(-) Installing handlebar weight

- Hold handlebar weight (2) in position and secure it with screw (1).

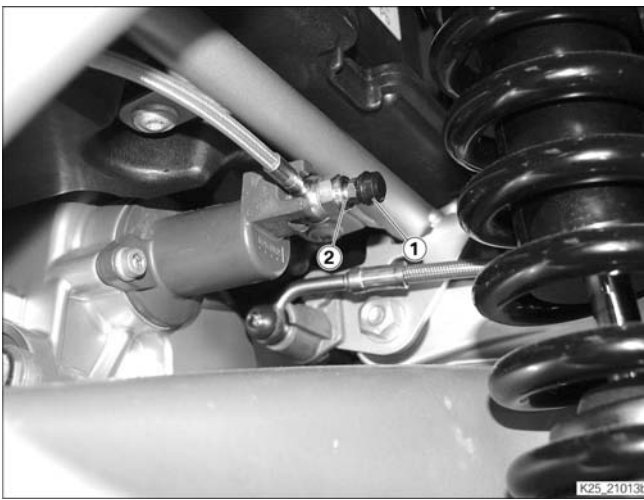


Tightening torques

Handlebar weight to handlebar, M8 x 30	19 Nm	
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(-) Filling clutch lever fitting

- Remove dust cap (1) from bleed screw (2).



- Fill syringe (No. 34 2 551) with the correct hydraulic fluid.



Consumables/lubricants

Vitamol V10	Hydraulic clutch systems	21 52 0 392 546
-------------	--------------------------	--------------------

- Connect syringe (No. 34 2 551) to bleed screw (1) and secure it with cable ties.
- Back off bleed screw (1).

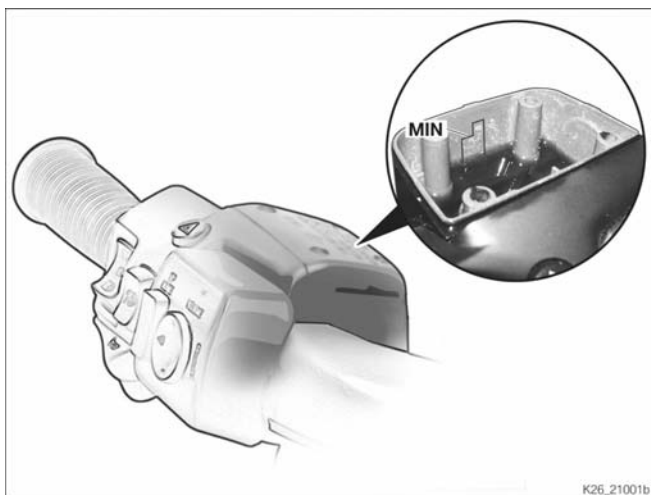


- Use syringe (No. 34 2 551) to inject hydraulic fluid into the system through bleed screw (1) until the fluid level in the reservoir is correct.



Technical data

Clutch fluid - fill level in		To lower mark on reservoir	
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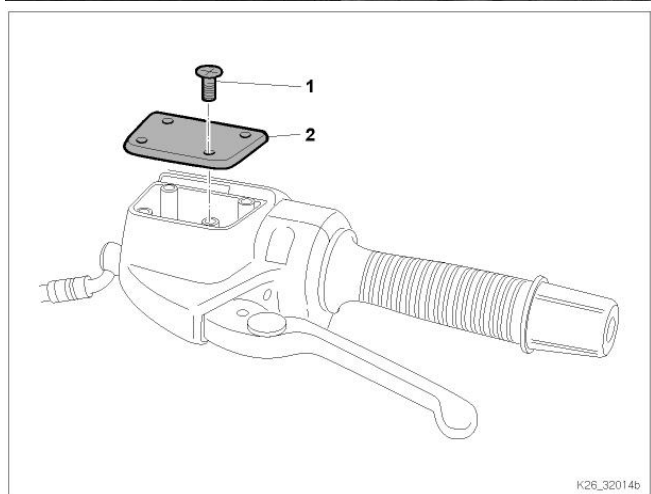
reservoir with new clutch liner.
 Motorcycle is supported on centre stand and reservoir is horizontal

Consumables/lubricants

Vitamol V10

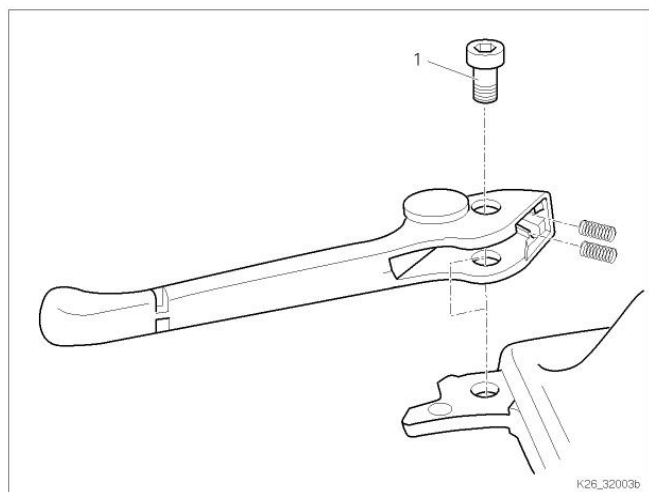


- Tighten bleed screw (2) and disconnect syringe (No. 34 2 551) from the bleed screw.
- Install dust cap (1).



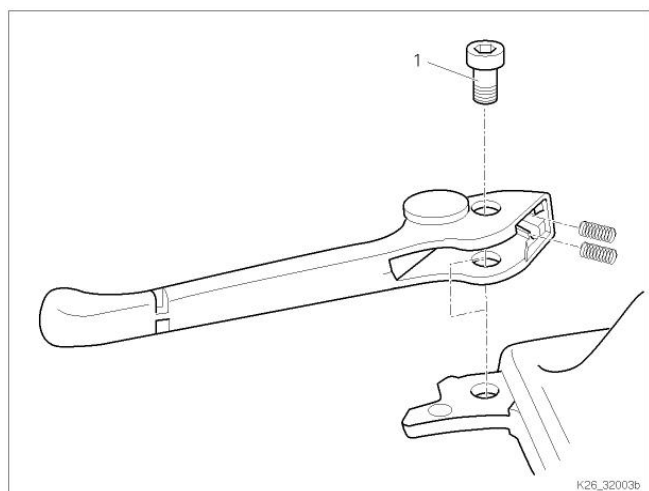
- Close clutch reservoir with cap (2).
- Install screws (1).

 **32 72 070 Replacing clutch lever**




(-) Removing handlebar lever

- Remove screw (1).
- Remove the handlebar lever, noting the springs.




(-) Installing handlebar lever

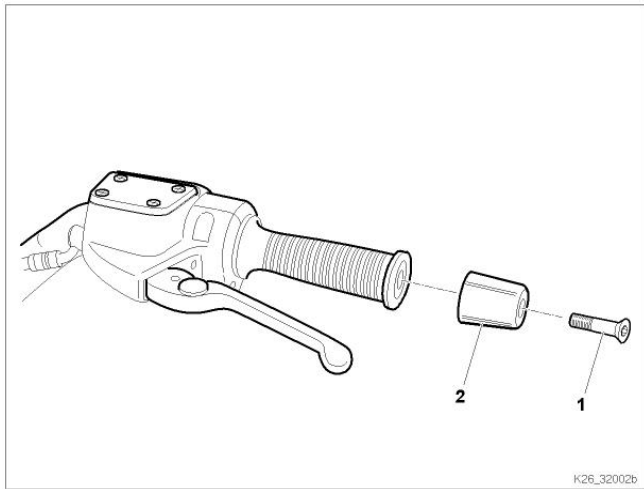
- Grease the mechanism of the adjuster knob.

 <p>Consumables/lubricants</p>		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

- Install the handlebar lever with springs.
- Install screw (1).

 <p>Tightening torques</p>		
Brake lever with adjustment element to brake fitting, Special screw M6	11 Nm	

 **32 72 097 Replacing left grip**



(-) Removing handlebar weight

- Remove screws (1).
- Remove handlebar weight (2).

Variant, Heated handlebar grips

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).



- Pull the seat to the rear to remove.

Variant, Heated handlebar grips

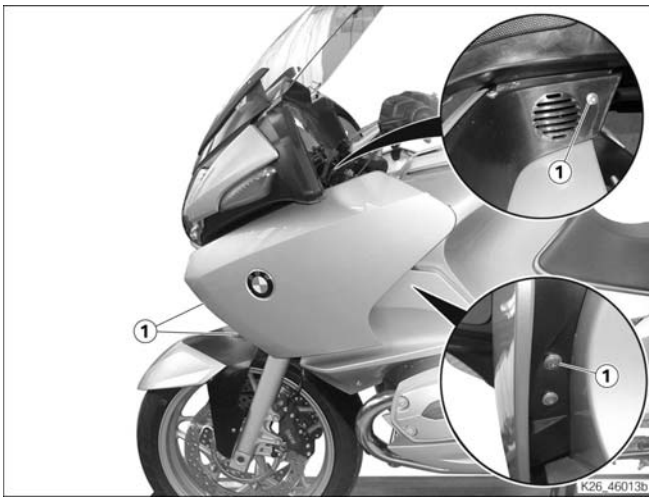
(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

Variant, Heated handlebar grips

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



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Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



K26_65007b

- Remove trim panel.

Variant, Heated handlebar grips

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

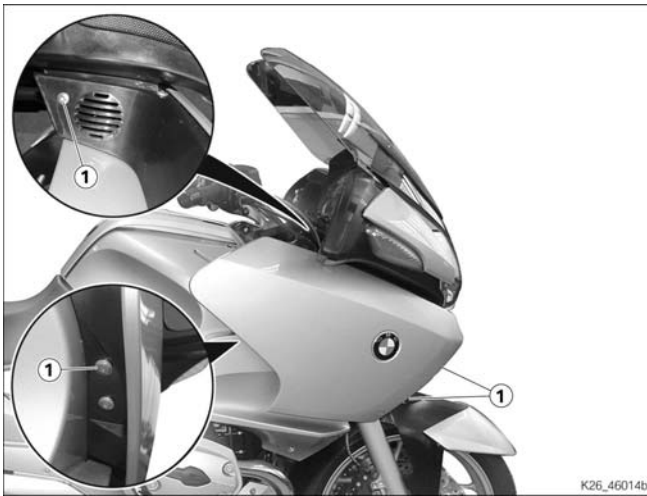


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Variant, Heated handlebar grips

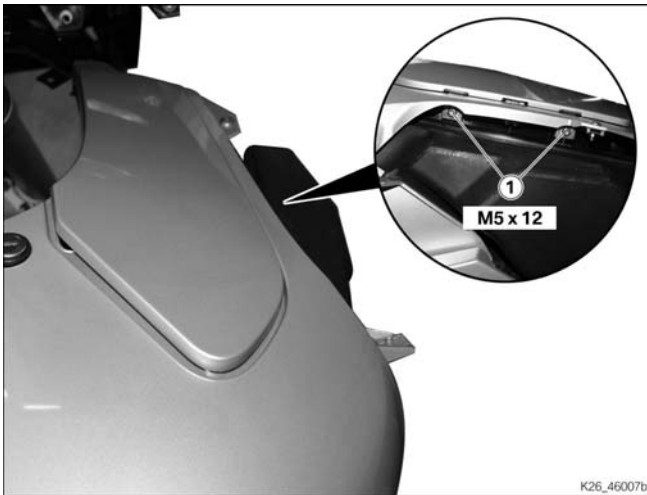
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



Variant, Heated handlebar grips
(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.

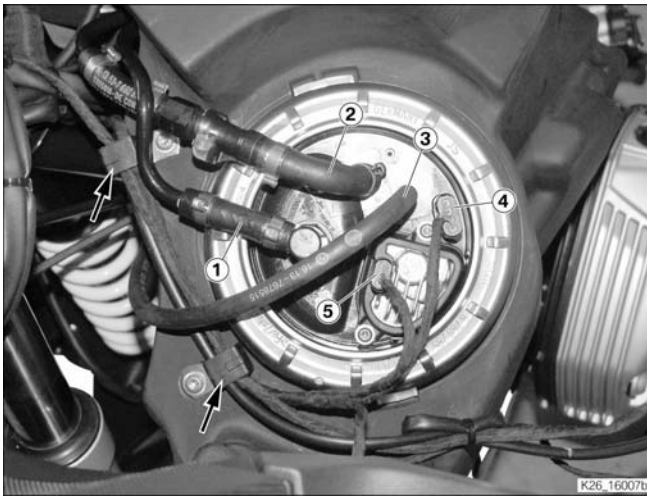


Variant, Heated handlebar grips
(-) Removing entire right side tank cover

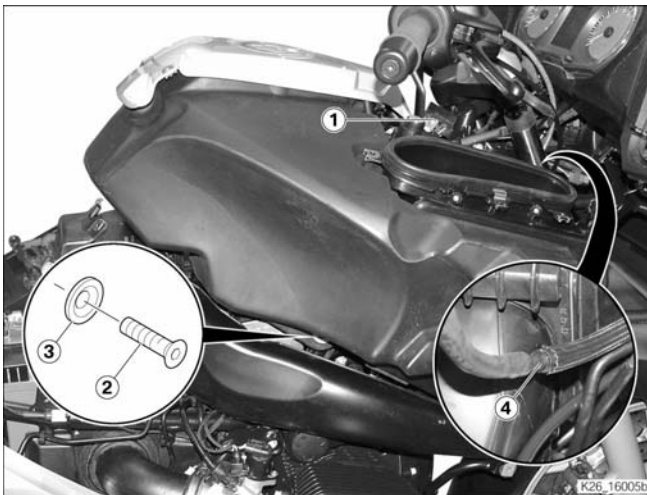
- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



Variant, Heated handlebar grips
(-) Removing fuel tank



- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



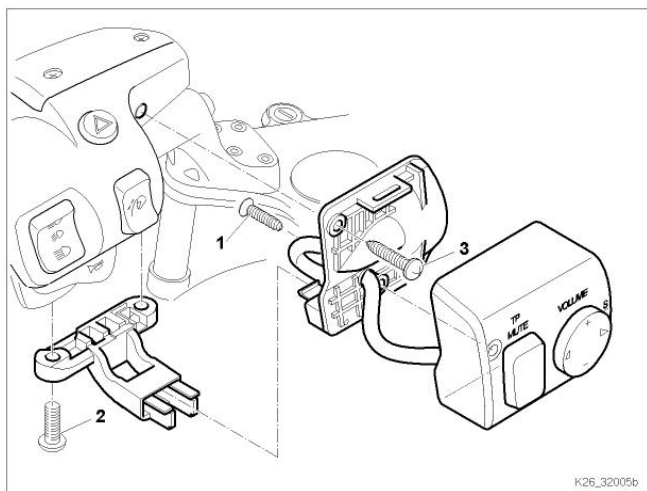
- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

(-) Removing left grip

Variant, Heated handlebar grips and Radio with CD player or ESA

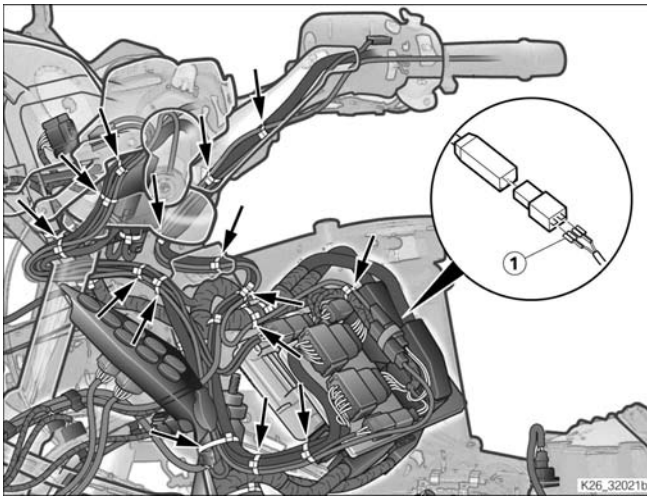
► Removing front remote control unit for radio

- Release screw (1) on the handlebar-mounted remote-control unit.
- Remove the housing cover of the handlebar-mounted remote control unit.
- Release screws (2) and screw (3) and remove the housing of the handlebar-mounted remote-control unit.



◀ Variant, Heated handlebar grips

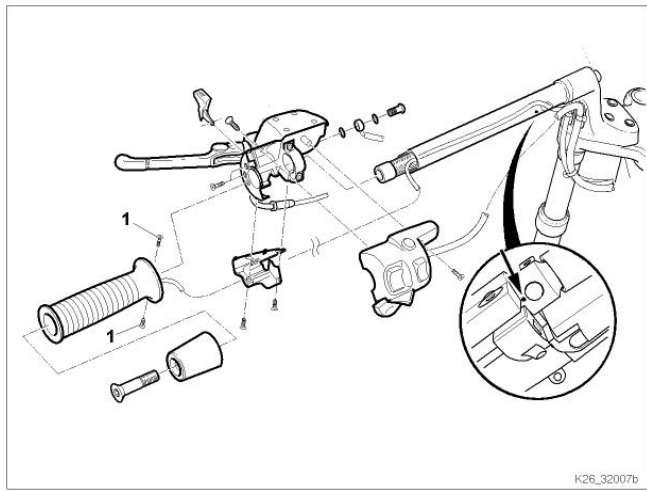
 Attention



Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.

- Open cable ties (arrows).
- Disconnect the plug.
- Release cable shoe (1) from the plug.
- Pass the cable of the heated handlebar grip up until it is clear.



- Remove screws (1).
- Remove the grip.

(-) Installing left grip

Variant, Heated handlebar grips



Attention

Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.

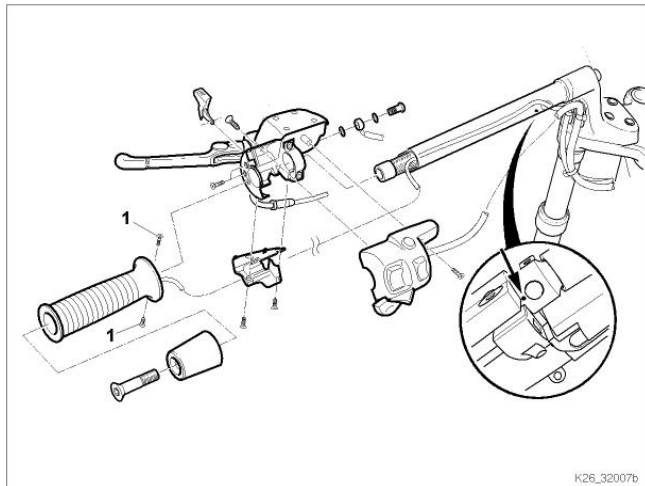
- Pass the heated handlebar grip cable through the stub handlebar.
- Push the grip onto the stub handlebar, making sure that the cable is not pinched.



Note

When electrical items of equipment and electrical accessories are installed on a motorcycle with Central Vehicle Electronics (ZFE) for the first time, the (BMW Motorrad Diagnosesystems) has to be used to register the new components with the ZFE.

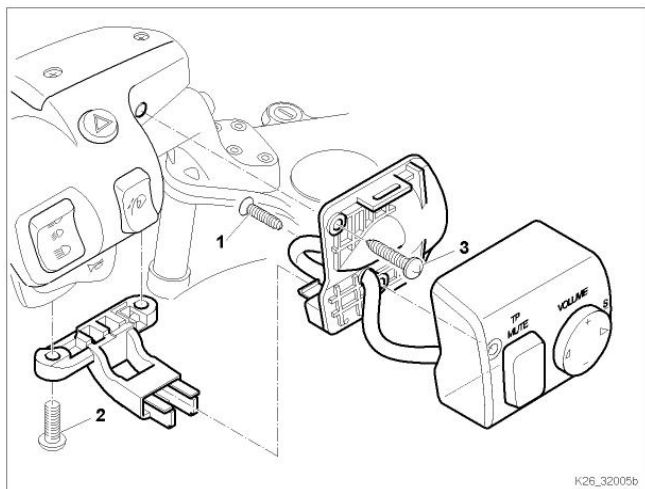
- Latch the plug to cable shoe (1).



- Connect the plug and secure it with cable ties (arrows).
- Push the grip onto the stub handlebar.
- Install screws (1).

Variant, Heated handlebar grips and Radio with CD player or ESA

► Installing front remote control unit for radio

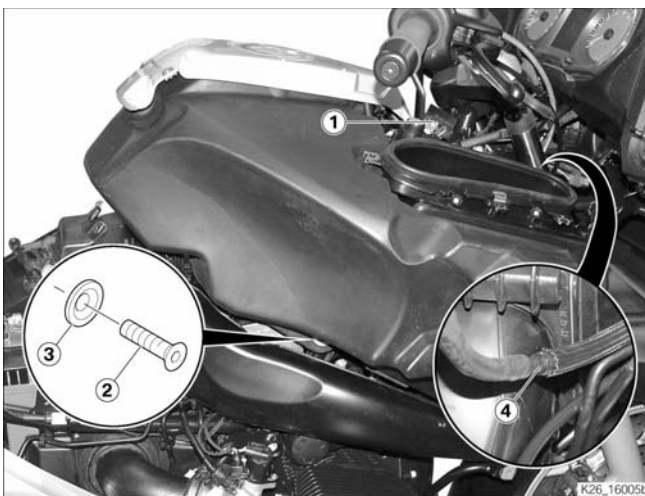


- Place the housing of the handlebar-mounted remote-control unit in position and secure it with screw (3) and screws (2).
- Engage the housing cover of the handlebar-mounted remote control unit.
- Secure the housing of the handlebar-mounted remote-control unit with screw (1).




Variant, Heated handlebar grips

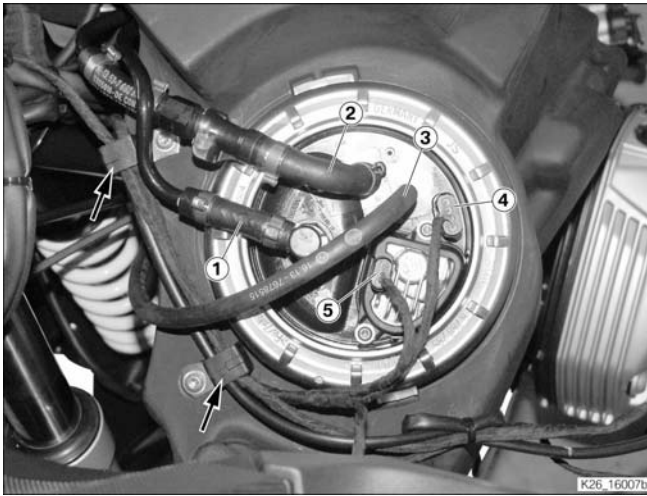
(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear,	16 Nm	

M8 x 40		
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- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

Variant, Heated handlebar grips

(-) Installing entire right side tank cover

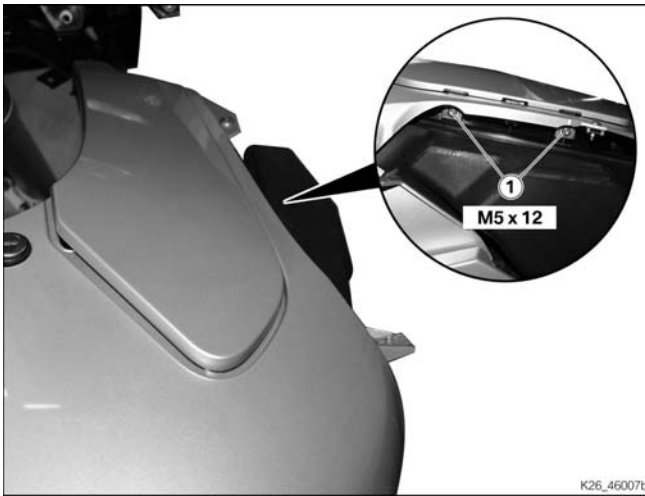


- Fit tank cover.
- Install screws (2).
- Install screws (1).

Variant, Heated handlebar grips

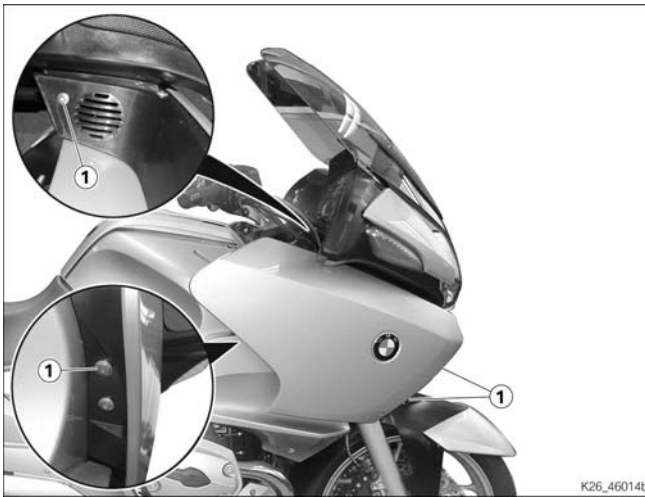
(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



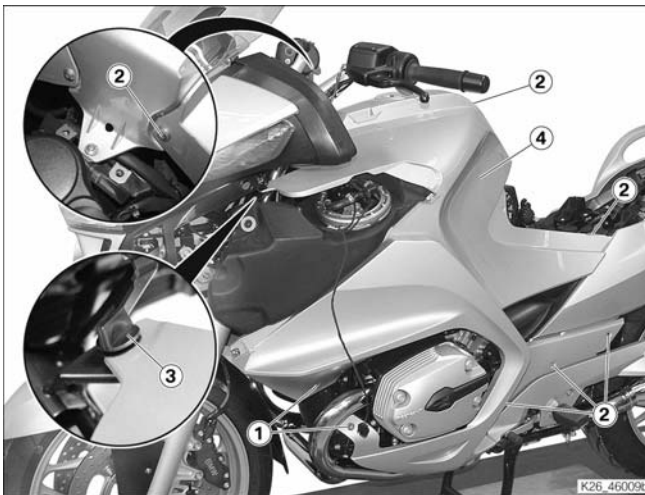
Variant, Heated handlebar grips
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



Variant, Heated handlebar grips
(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



Variant, Heated handlebar grips
(-) Installing left-hand trim panel



Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).

**Variant, Heated handlebar grips
(-) Installing tank rail**

- Fit tank rail.
- Install screws (1).



Variant, Heated handlebar grips

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



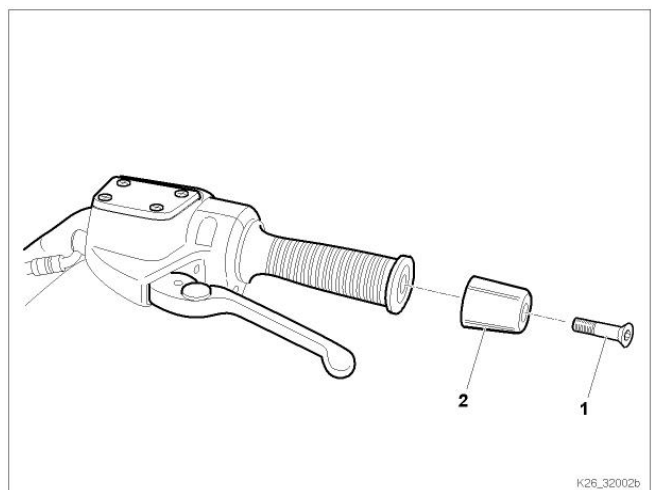
Variant, Seat heating


- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



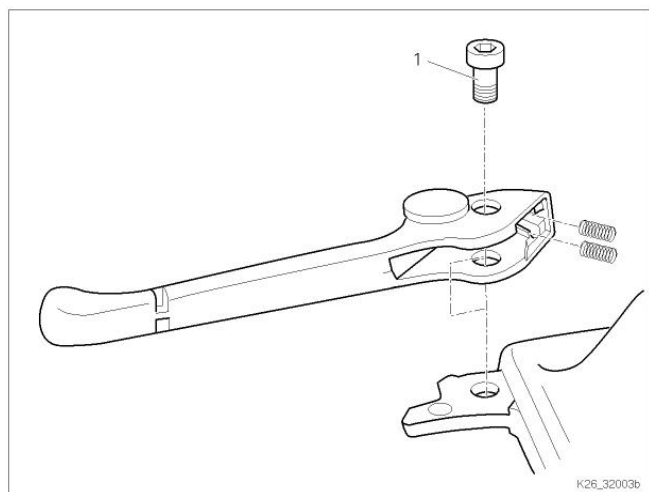
(-) Installing handlebar weight

- Hold handlebar weight (2) in position and secure it with screw (1).



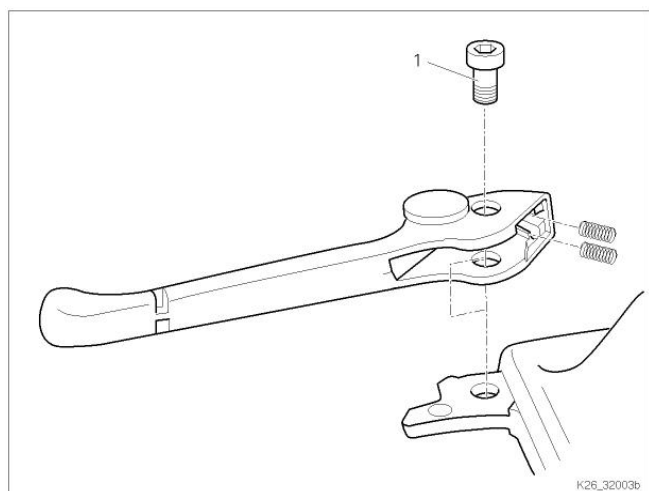
 Tightening torques		
Handlebar weight to handlebar, M8 x 30	19 Nm	

 **32 72 119 Replacing front brake lever**




(-) Removing handlebar lever

- Remove screw (1).
- Remove the handlebar lever, noting the springs.




(-) Installing handlebar lever

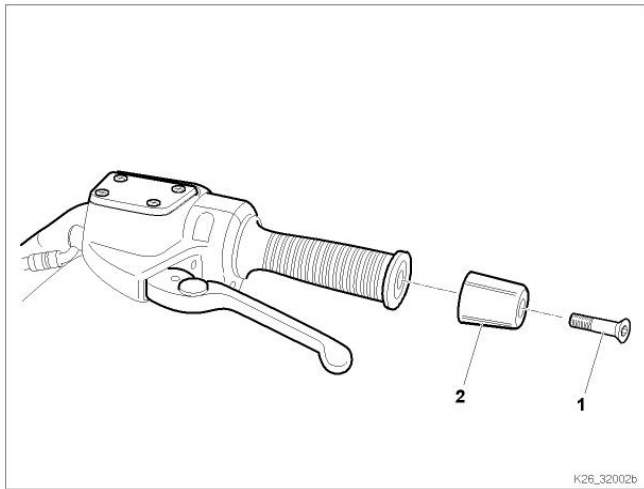
- Grease the mechanism of the adjuster knob.

 <p>Consumables/lubricants</p>		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

- Install the handlebar lever with springs.
- Install screw (1).

 <p>Tightening torques</p>		
Brake lever with adjustment element to brake fitting, Special screw M6	11 Nm	

 **32 72 120 Replacing handbrake fitting**



(-) Removing handlebar weight

- Remove screws (1).
- Remove handlebar weight (2).



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



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K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

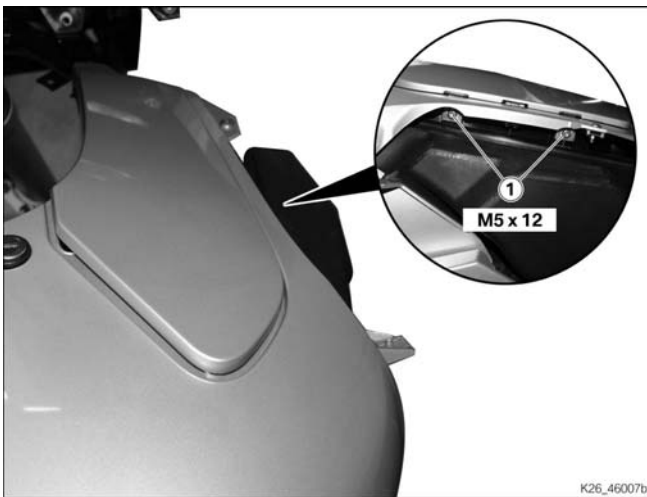
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



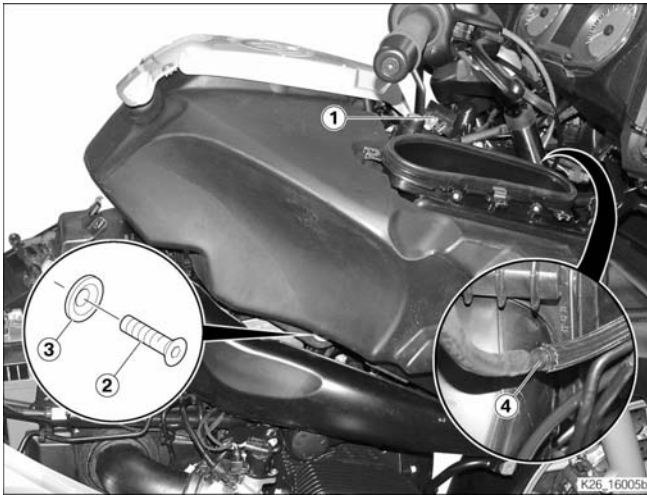
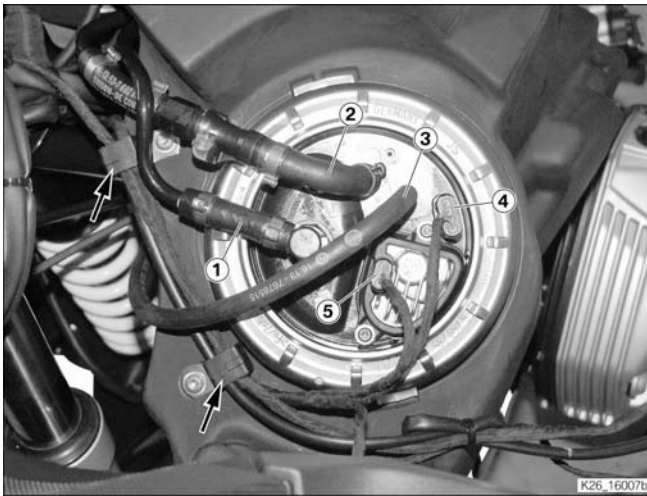
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

(-) Draining front control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

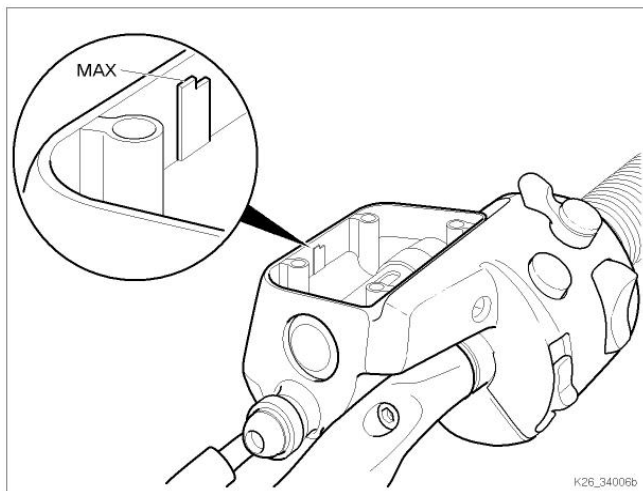
Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Turn the handlebars to a position in which the brake fluid reservoir is horizontal.

! Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

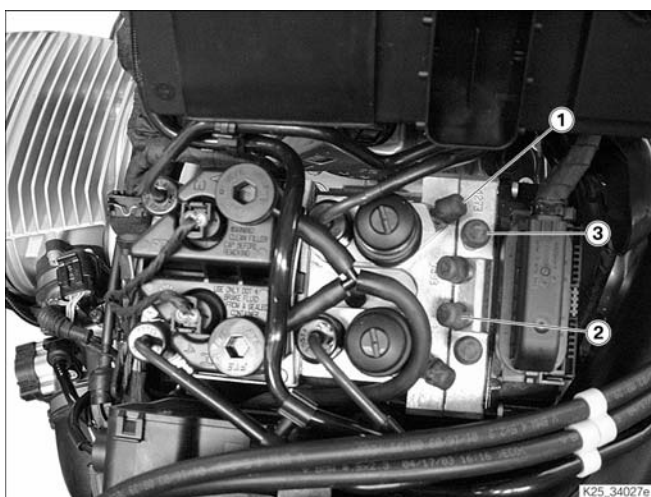
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Open the reservoir.
- Remove front reservoir cap with diaphragm, and draw off the old brake fluid.
- Set the cap on the brake fluid reservoir, but do not tighten it.

! Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.



- Connect the brake bleeding device to bleed screw (1) on the front metering cylinder.
- Draw off the brake fluid from the circuits in the correct sequence, using ring spanner (No. 34 2 532) :



Note

The pressure modulator has to be fully drained if it is to be removed/replaced. It is sufficient to drain the control circuit for all other tasks.

- front metering cylinder (1)
- front integral circuit (2)
- front control circuit (3).

(-) Removing throttle twistgrip

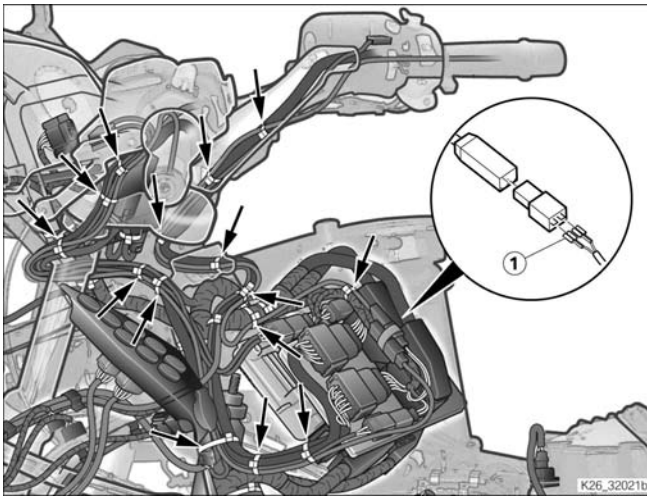
Variant, Heated handlebar grips

! Attention

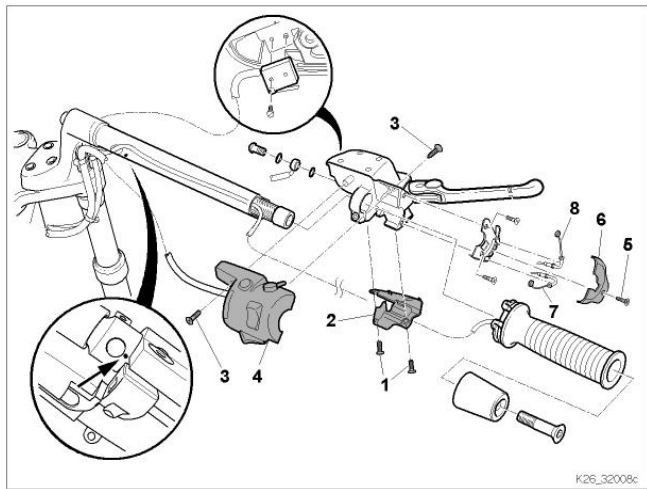
Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.

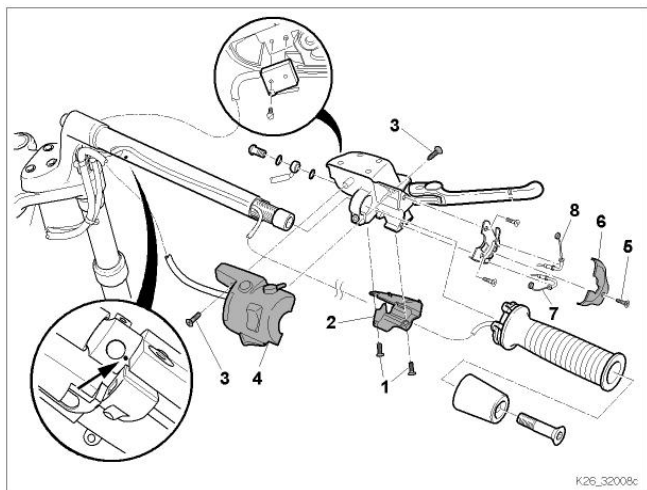
- Open cable ties (arrows).
- Disconnect the plug.
- Release cable shoe (1) from the plug.



- Pass the cable up.



- Remove screws (1).
- Remove bottom plastic cover (2) of the handbrake lever fitting.
- Slacken screws (3) and remove multifunction switch (4).
- Remove screw (5) and remove cover (6) from the throttle twistgrip.
- Disengage Bowden cable (7) from the throttle twistgrip.
- Turn the throttle twistgrip back as far as it will go and pull it off.

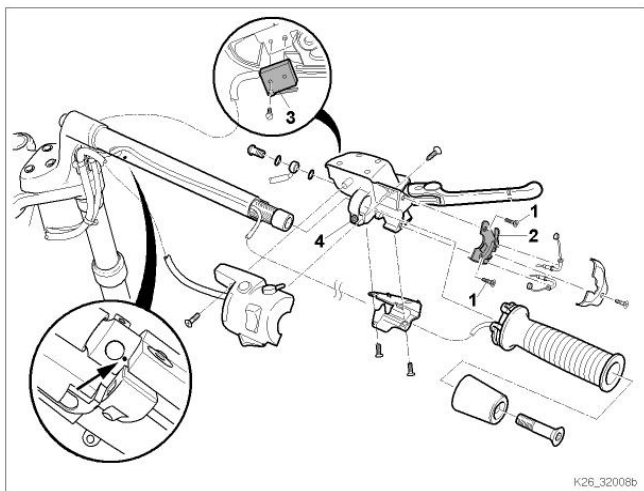


Variant, cruise control

- Remove screws (1).
- Remove bottom plastic cover (2) of the handbrake lever fitting.
- Slacken screws (3) and remove multifunction switch (4).
- Remove screw (5) and remove cover (6) from the throttle twistgrip.
- Disengage Bowden cable (7) from the throttle twistgrip.
- Disengage Bowden cable (8) from the throttle twistgrip.
- Turn the throttle twistgrip back as far as it will go and pull it off.

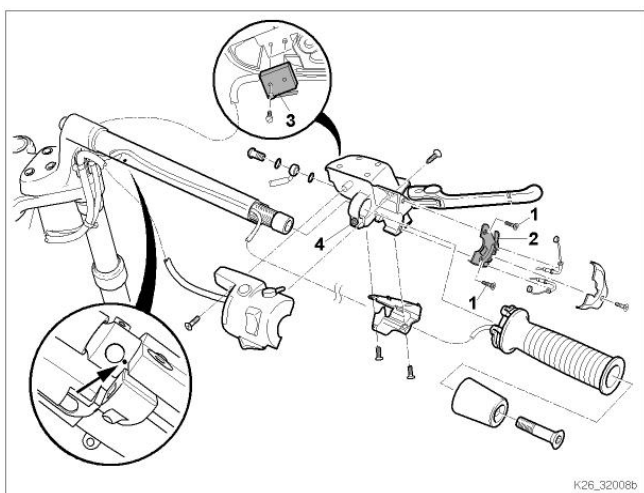
(-) Removing handbrake fitting

- Remove screws (1) and remove Bowden-cable guide (2).
- Remove brake-light switch (3).
- Disconnect the brake line from the fitting.
- Slacken screw (4) of the handlebar fitting and pull off the fitting.



(-) Installing handbrake fitting

- Align the gap of the clamping block on the handbrake lever fitting with the punch mark (arrow) on the handlebar.
- Install the handbrake lever fitting with screws (4).
- Connect the brake line to the fitting.



Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

- Install brake-light switch (3), noting the locating pin.
- Place Bowden-cable guide (2) in position and secure it with screws (1).

(-) Installing throttle twistgrip

Variant, Heated handlebar grips

⚠ Attention

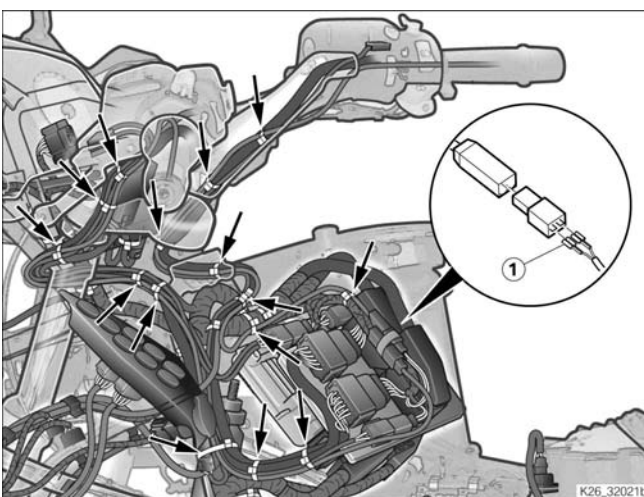
Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

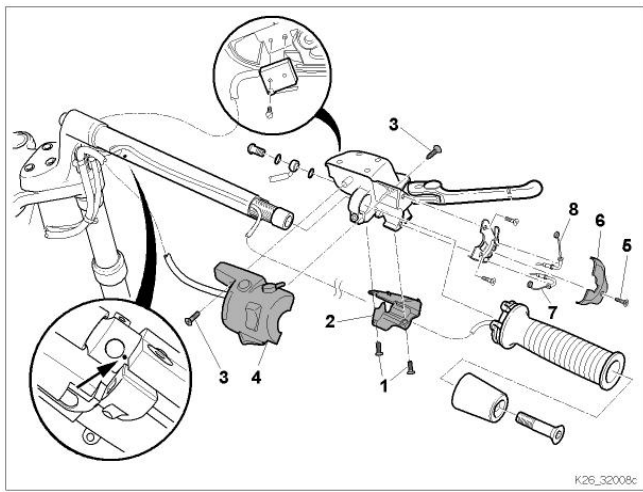
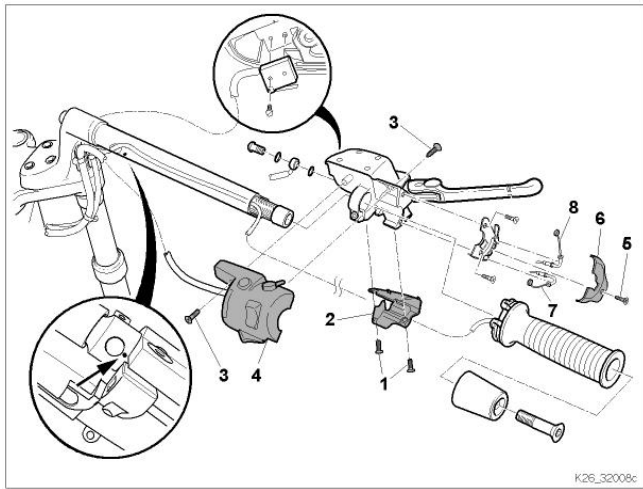
Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.

- Pass the heated handlebar grip cable through the stub handlebar.

📄 Note

When electrical items of equipment and electrical accessories are installed on a motorcycle with Central Vehicle Electronics (ZFE) for the first time, the (BMW Motorrad Diagnosesystems) has to be used to register the new components with the ZFE.





- Latch the plug to cable shoe (1).
- Connect the plug and secure it with cable ties (arrows).
- Turn the throttle twistgrip to the full-throttle position and push it onto the stub handlebar, making sure that the lug of the Bowden-cable guide engages the throttle twistgrip.
- Engage Bowden cable (7) on the throttle twistgrip.
- Install cover (6) and tighten screw (5) to secure.
- Install multifunction switch (4) and secure it with screws (3).
- Install bottom plastic cover (2) of the handbrake lever fitting.
- Install screws (1).

Variant, cruise control

- Turn the throttle twistgrip to the full-throttle position and push it onto the stub handlebar, making sure that the lug of the Bowden-cable guide engages the throttle twistgrip.
- Engage Bowden cable (8) on the throttle twistgrip.
- Engage Bowden cable (7) on the throttle twistgrip.
- Install cover (6) and tighten screw (5) to secure.
- Install multifunction switch (4) and secure it with screws (3).
- Install bottom plastic cover (2) of the handbrake lever fitting.
- Install screws (1).

(-) Filling front control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

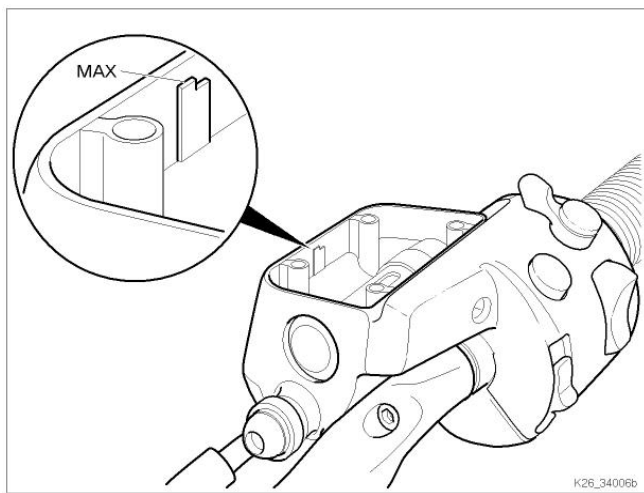
Avoidance: Use only new brake fluid from freshly opened containers.




Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



- Top up the brake fluid level to the (MAX) mark.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.

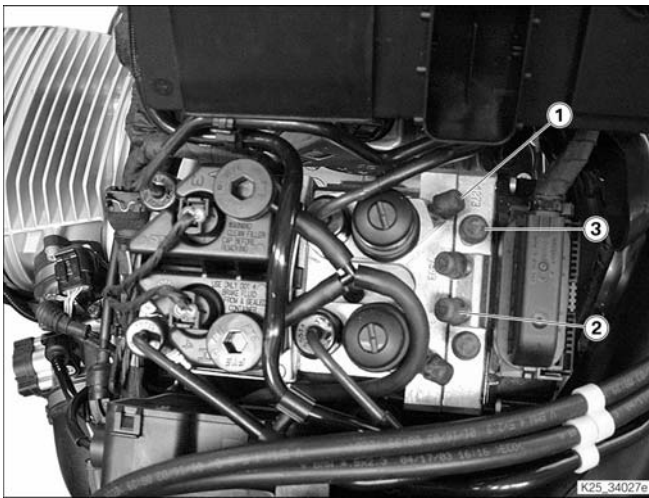
- Set the handbrake lever to the position for maximum span.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the



pressure modulator.

- Connect the brake bleeding device to bleed screw (1) of the front metering cylinder, but **do not switch on**.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

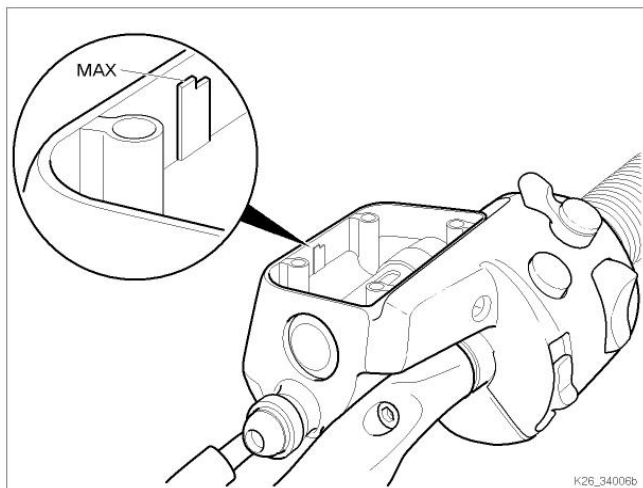
- In the following sequence, bleed:
 - front metering cylinder (1)
 - front integral circuit (2)
 - front control circuit (3) and
 - front metering cylinder (1) again in accordance with instructions for bleeding and using special ring spanner (No. 34 2 532)

► Instructions for bleeding

1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
2. Open the bleed screw.
3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
4. Slowly release the brake lever.
5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



- Fit the protective caps on the bleed screws.
- Top up the brake fluid to the (MAX) mark.
- Wipe the rim of the reservoir, the diaphragm and the cover to remove brake fluid, and carefully re-assemble the components.



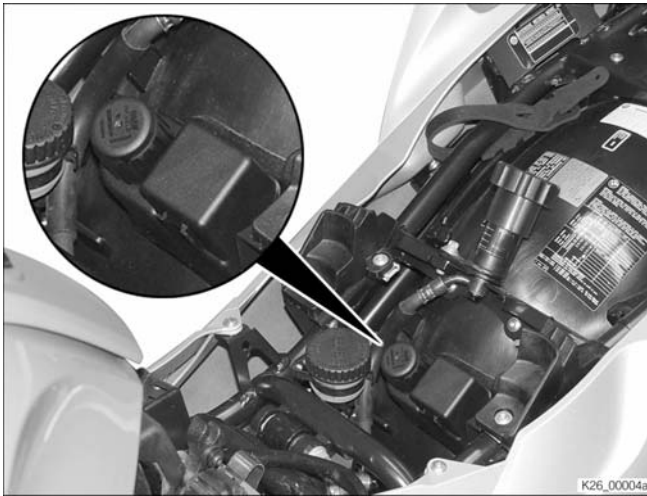
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group

Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



Warning


Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

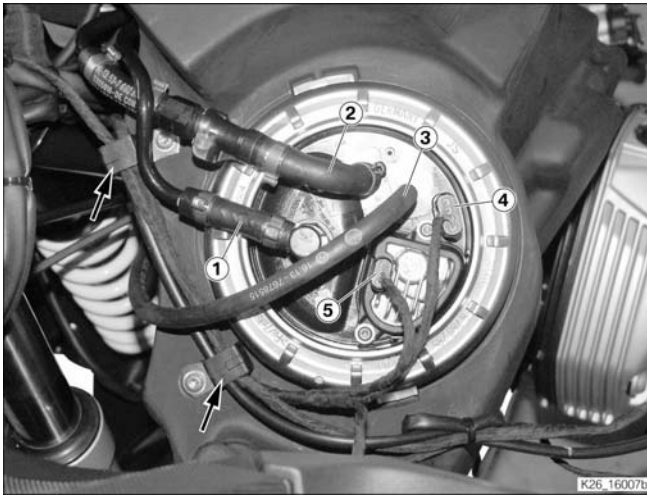
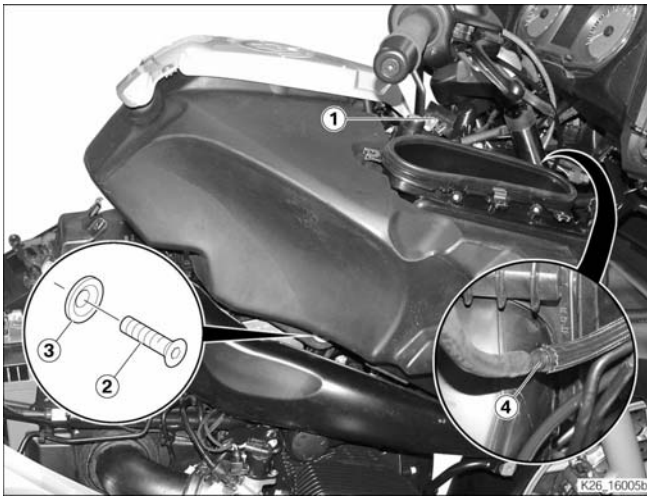
Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		



Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).

- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.

📄 Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.

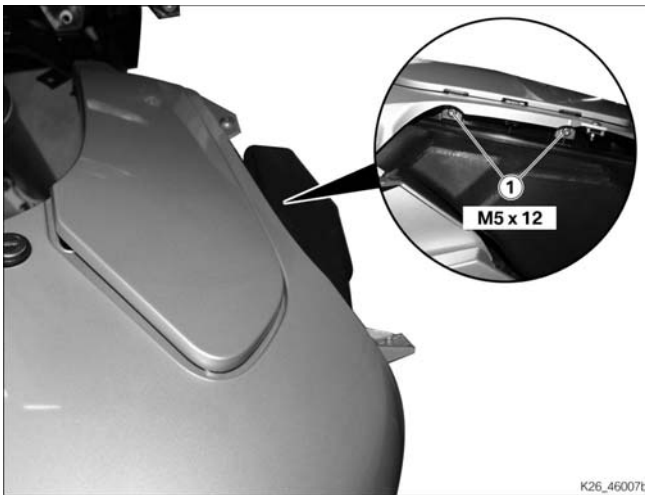
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



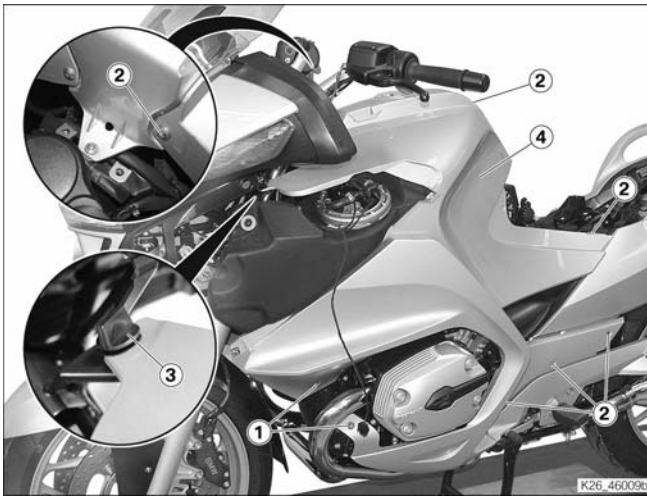
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

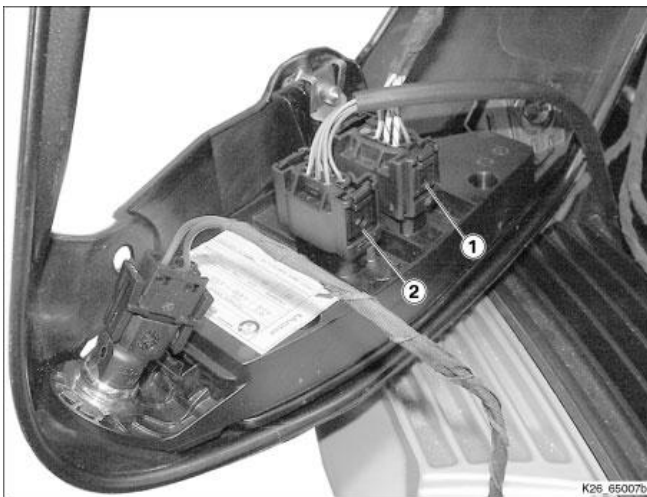
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

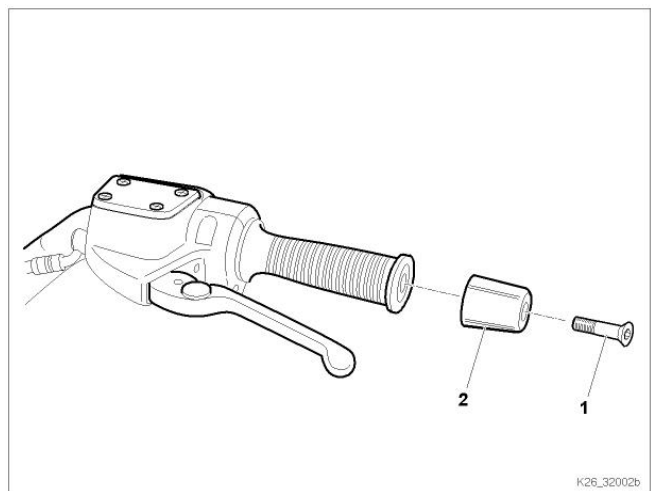



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

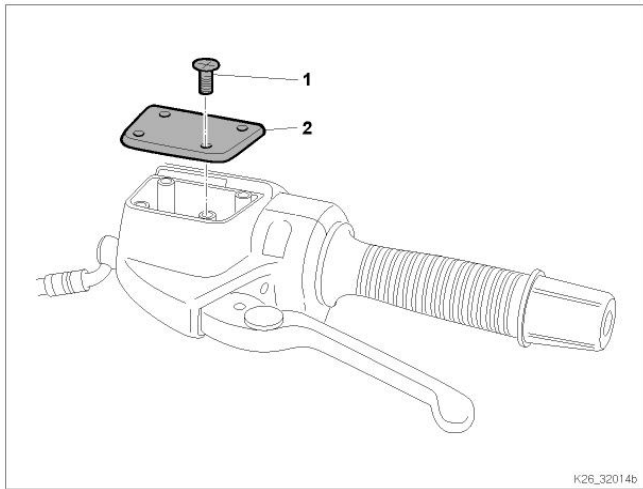
(-) Installing handlebar weight

- Hold handlebar weight (2) in position and secure it with screw (1).



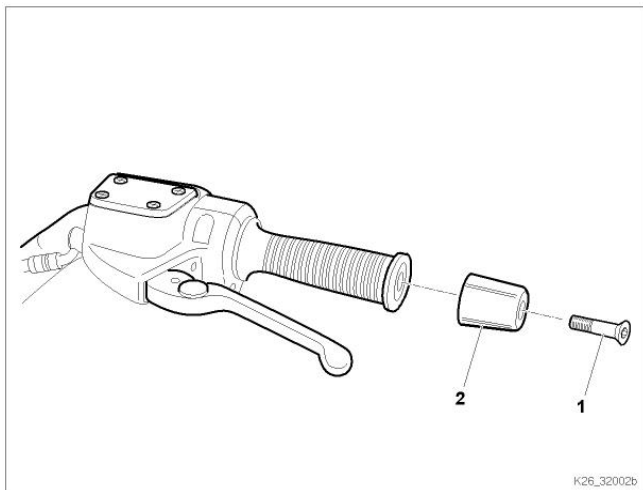
 Tightening torques		
Handlebar weight to handlebar, M8 x 30	19 Nm	

32 72 626 Replacing clutch handlebar fitting



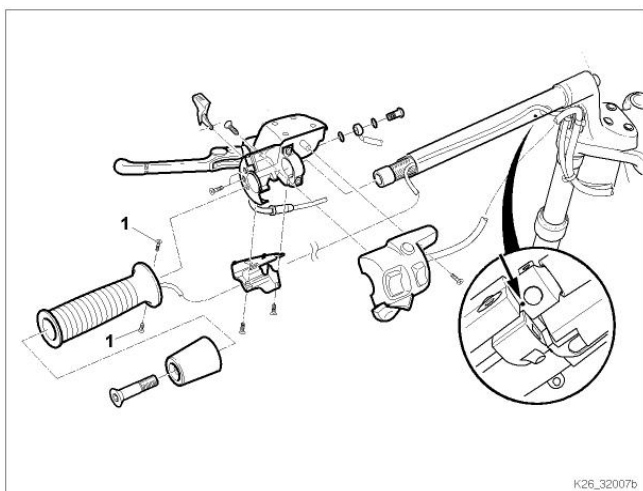
(-) Emptying clutch lever fitting

- Undo screws (1) and remove cover (2) from clutch fluid reservoir.
- Use syringe (No. 34 2 551) to draw the clutch fluid out of the clutch-fluid reservoir.



(-) Removing handlebar weight

- Remove screws (1).
- Remove handlebar weight (2).



(-) Removing clutch lever fitting

- Remove screws (1).



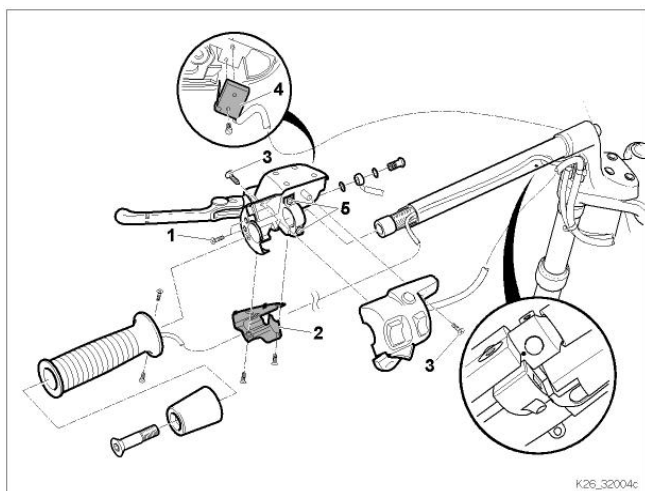
Attention

Nature: There is a risk of damaging the electric cable of the heated grip in the disassembly and assembly processes.

Avoidance: Take care not to strain the electric cable of the heated grip and do not damage the insulation.

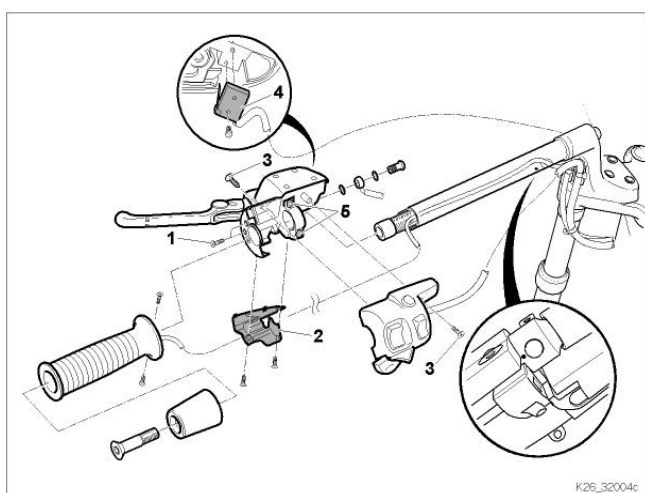
- Carefully pull back the grip; if necessary, open the cable tie at the handlebar to obtain more slack.

- Release screws (1) and pull back the cover.
- Remove bottom plastic cover (2) of the clutch lever fitting.



- Remove screws (3) for the multifunction switch.
- Disengage the multifunction switch.
- Remove clutch switch (4).
- Disconnect the clutch line from the fitting.
- Remove screws (5) securing the clutch lever fitting and remove the fitting.

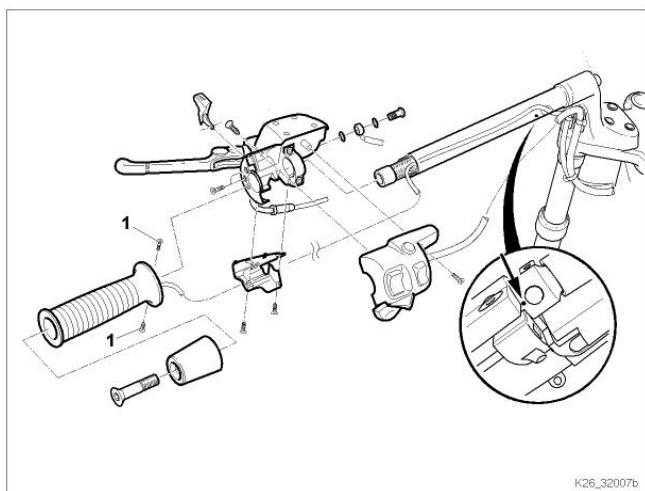
(-) Installing clutch lever fitting



- Align the gap of the clamping block on the clutch lever fitting with the punch mark (arrow) on the handlebar.
- Install the clutch lever fitting with screws (5).
- Fully hand-tighten the top screw, then tighten the bottom screw.
- Connect the clutch line to the fitting.

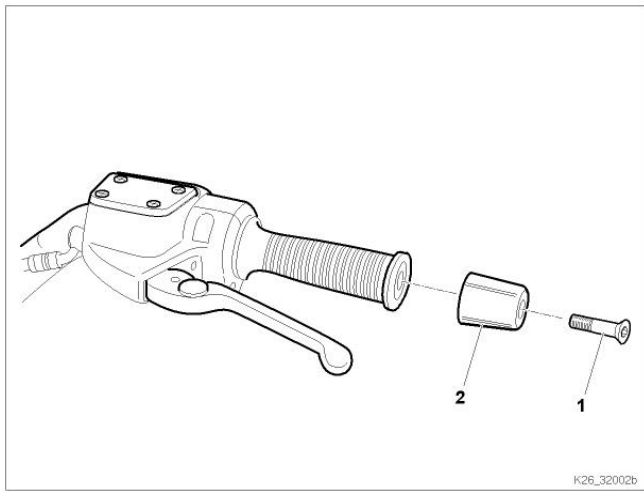
Tightening torques		
Banjo bolt, M10 x 1	18 Nm	

- Install clutch switch (4), noting the locating pin.
- Install the multifunction switch and secure it with screws (3).
- Install bottom plastic cover (2) of the clutch lever fitting.
- Install the cover and secure it with screws (1).
- Push the grip fully onto the handlebar.
- Install screws (1).



(-) Installing handlebar weight

- Hold handlebar weight (2) in position and secure it with screw (1).

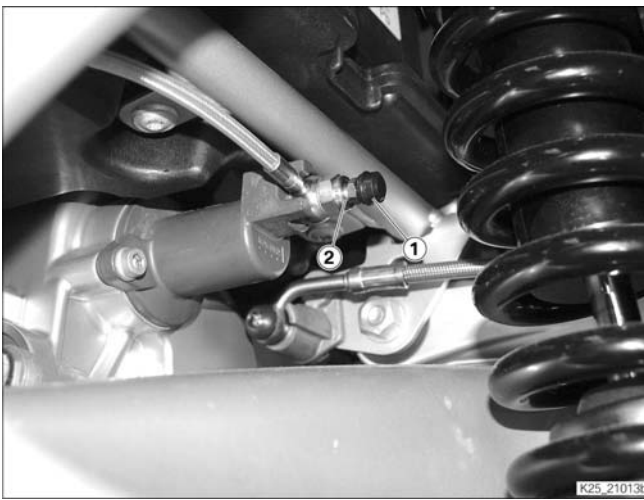


Tightening torques

Handlebar weight to handlebar, M8 x 30	19 Nm	
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(-) Filling clutch lever fitting

- Remove dust cap (1) from bleed screw (2).



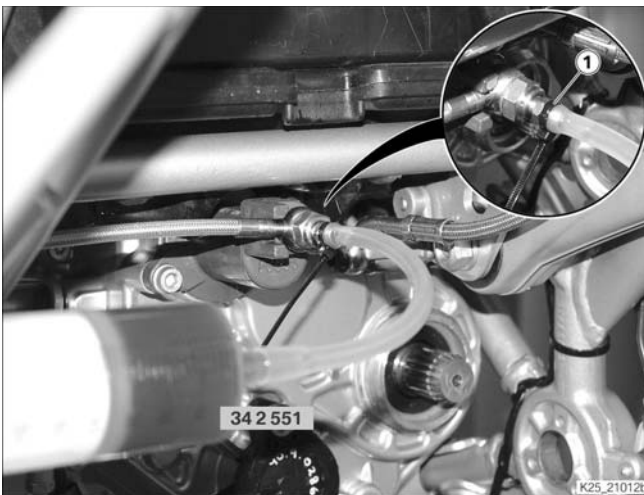
- Fill syringe (No. 34 2 551) with the correct hydraulic fluid.



Consumables/lubricants

Vitamol V10	Hydraulic clutch systems	21 52 0 392 546
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- Connect syringe (No. 34 2 551) to bleed screw (1) and secure it with cable ties.
- Back off bleed screw (1).

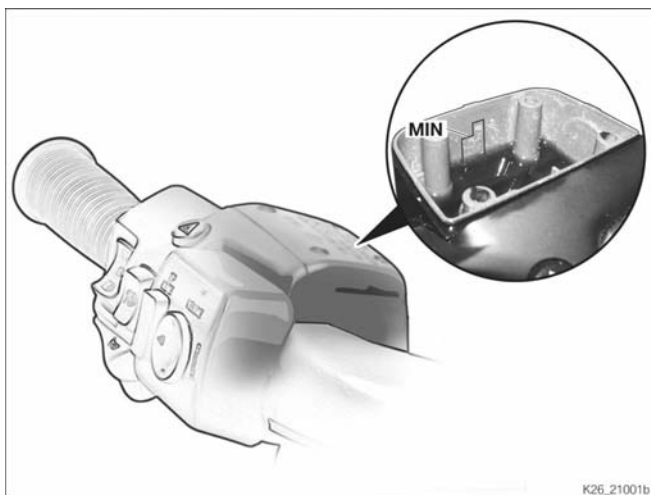


- Use syringe (No. 34 2 551) to inject hydraulic fluid into the system through bleed screw (1) until the fluid level in the reservoir is correct.



Technical data

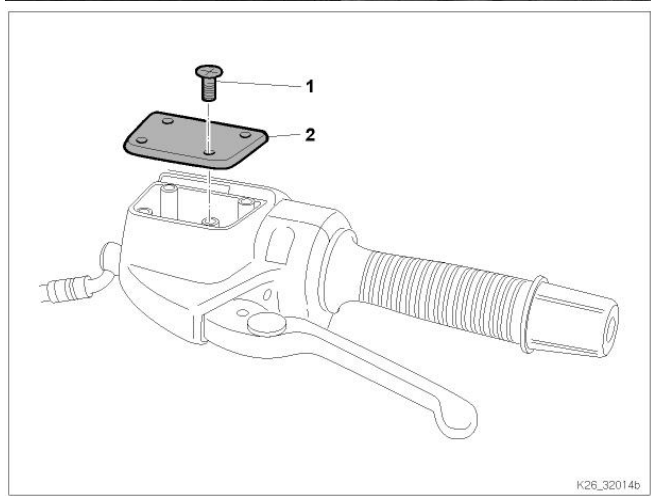
Clutch fluid - fill level in		To lower mark on reservoir	
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K26_21001b



K25_21012b



H26_32014b

reservoir with new clutch liner.
Motorcycle is supported on centre stand and reservoir is horizontal

Consumables/lubricants

Vitamol V10

- Tighten bleed screw (2) and disconnect syringe (No. 34 2 551) from the bleed screw.
- Install dust cap (1).

- Close clutch reservoir with cap (2).
- Install screws (1).

 **32 73 060 Replacing throttle-cable divider**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

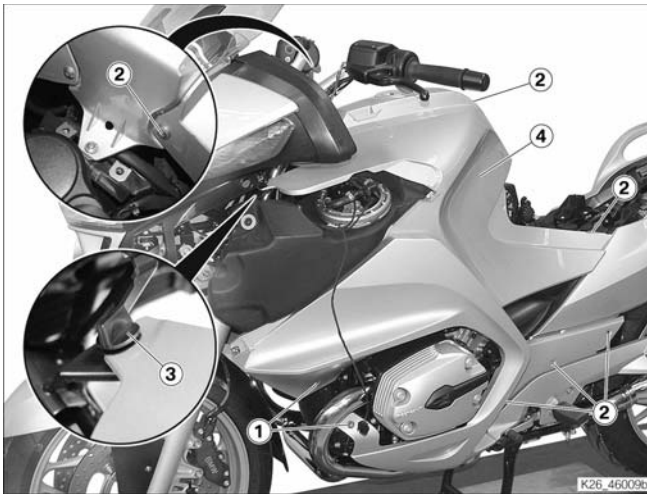


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

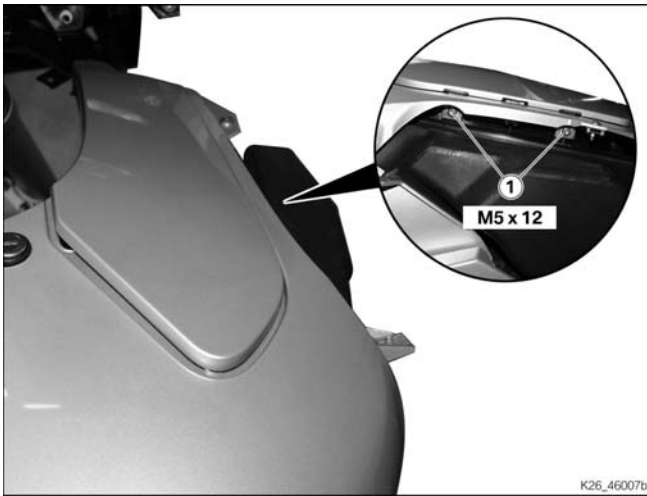
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



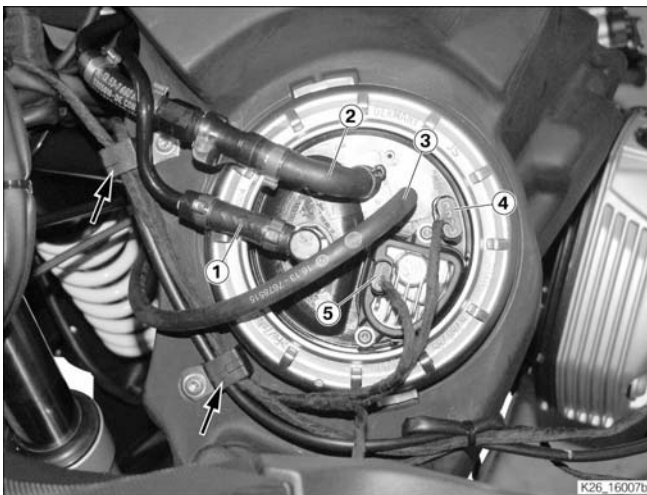
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

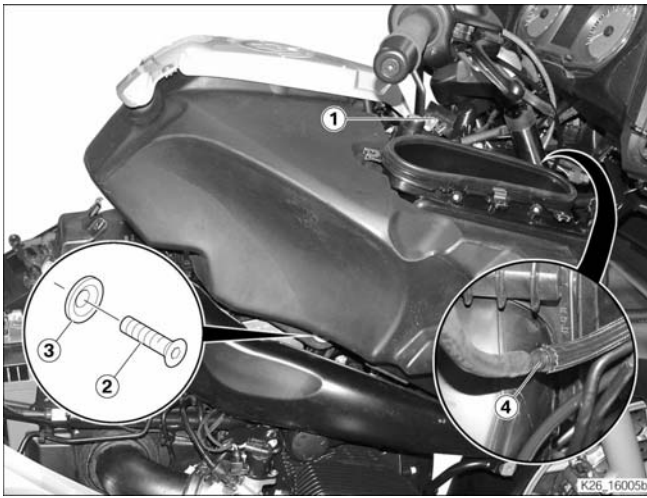


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

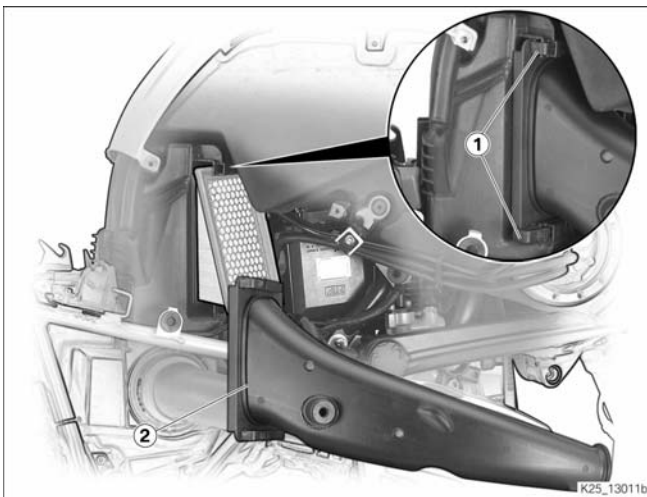


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing intake air pipe

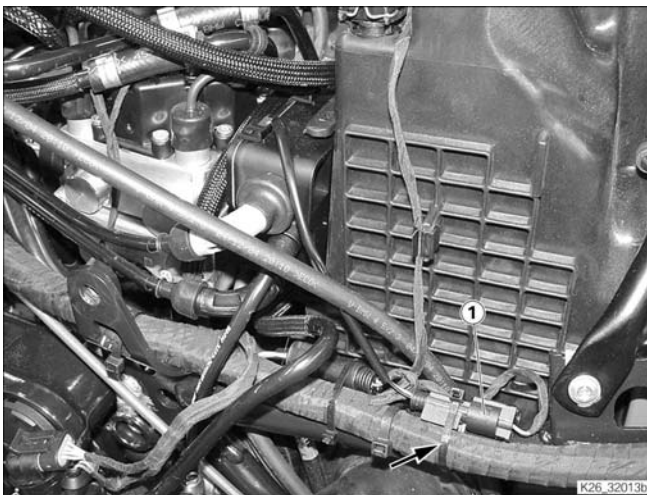
- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Releasing cable divider

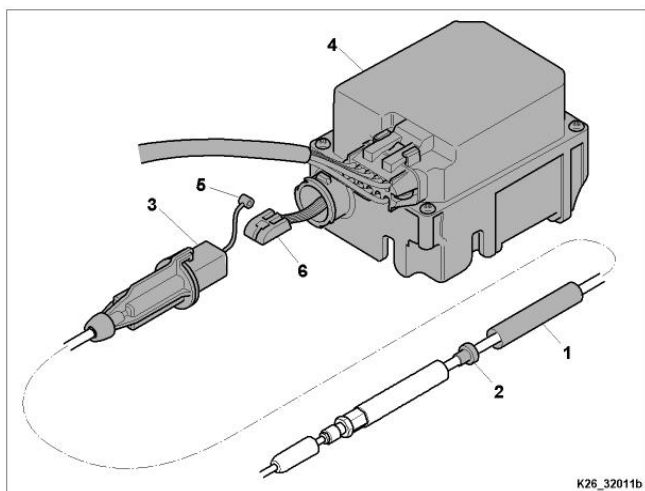
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).

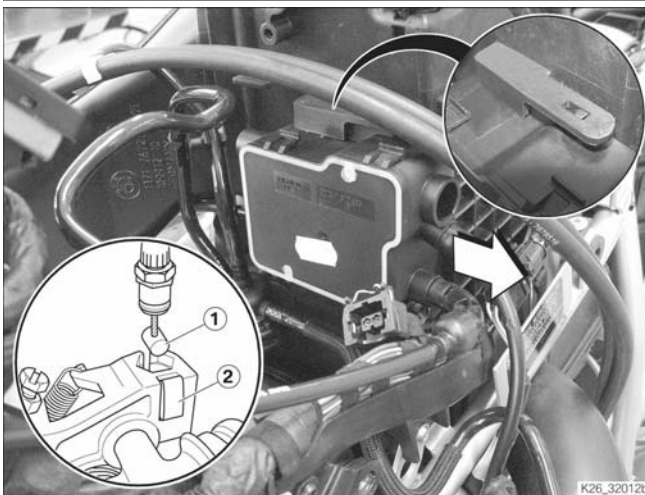


Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).



- Thread through Bowden cable (5) towards the rear.



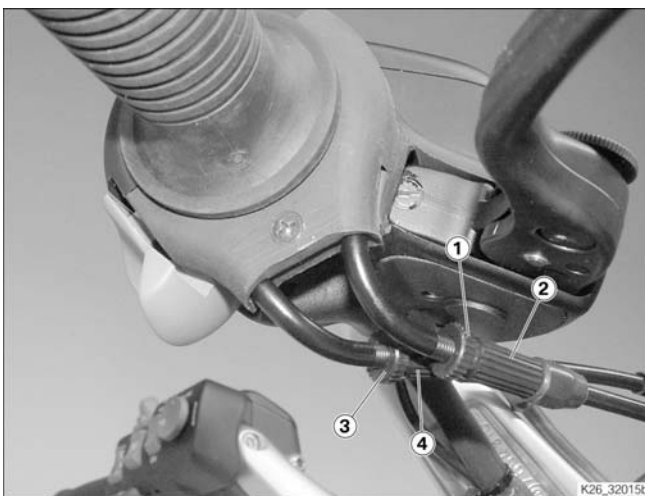
- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

(-) Removing throttle cable on right

- Remove the cap from the throttle-cable divider.

Variant, cruise control

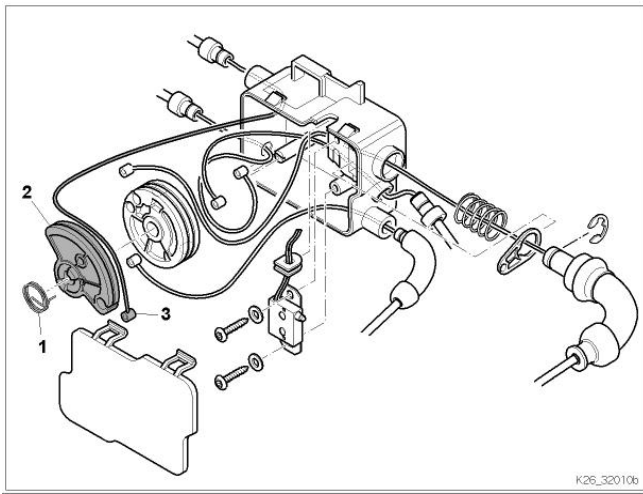
- Completely slacken off lock nut (3).
- Release adjusting screw (4).



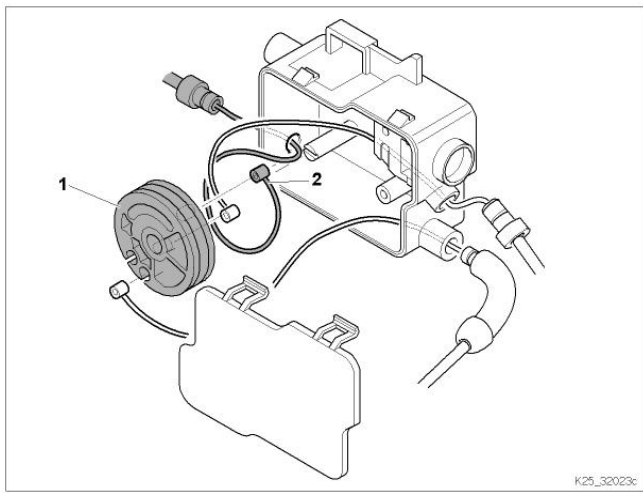
Variant, cruise control

► Removing Bowden cable for cruise control

- Remove spring (1).
- Remove pulley (2).
- Disengage Bowden cable (3) and remove.



- Remove pulley (1).
- Disengage throttle cable (2).
- Remove the throttle cable.

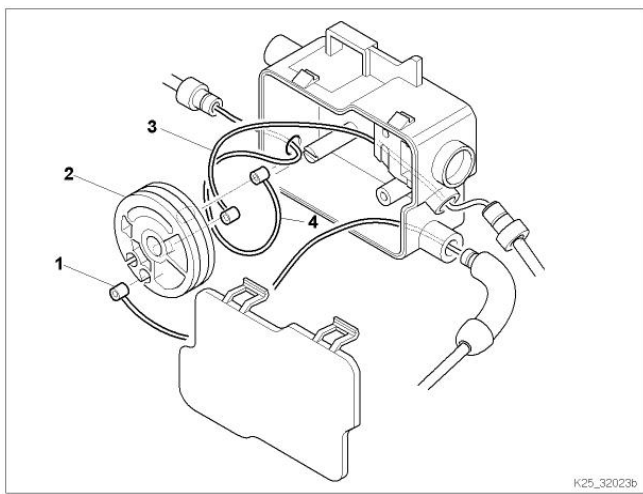


(-) Disassembling cable divider

Attention

Nature: The strands of Bowden cables can be kinked if the correct removal and installation procedures are not followed.

Avoidance: Take care not to kink the strands of Bowden cables during removal and installation.



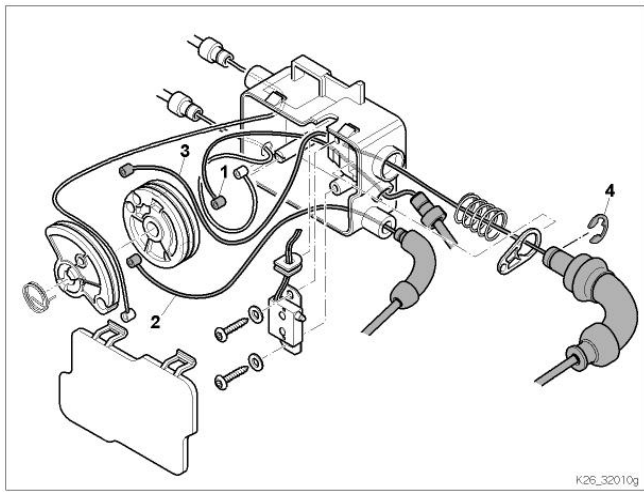
- Detach throttle cable (3).
- Detach Bowden cable (1).

Variant, cruise control

Attention

Nature: The strands of Bowden cables can be kinked if the correct removal and installation procedures are not followed.

Avoidance: Take care not to kink the strands of



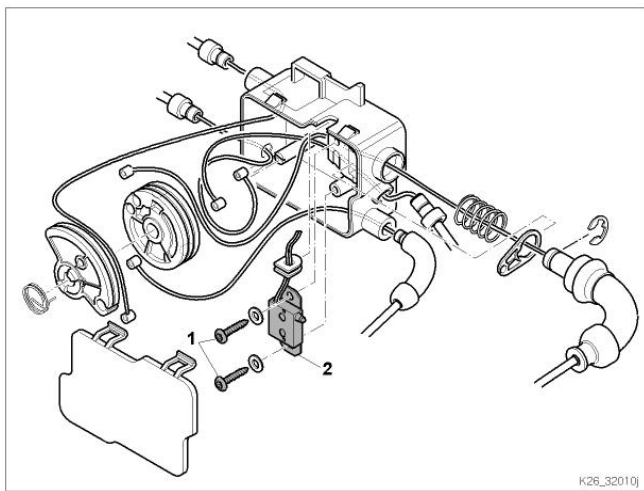
Bowden cables during removal and installation.

- Detach throttle cable (1).
- Detach Bowden cable (2).
- Removing lock washer (4)
- Detach Bowden cable (3).

Variant, cruise control

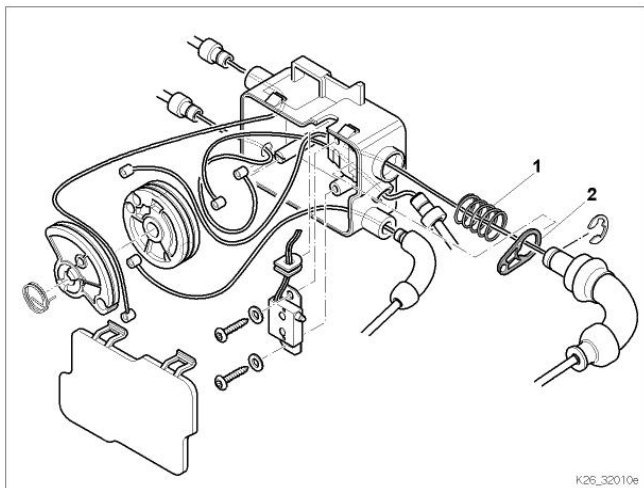
► **Removing switch for cruise control**

- Remove screws (1).
- Remove switch (2).



Variant, cruise control

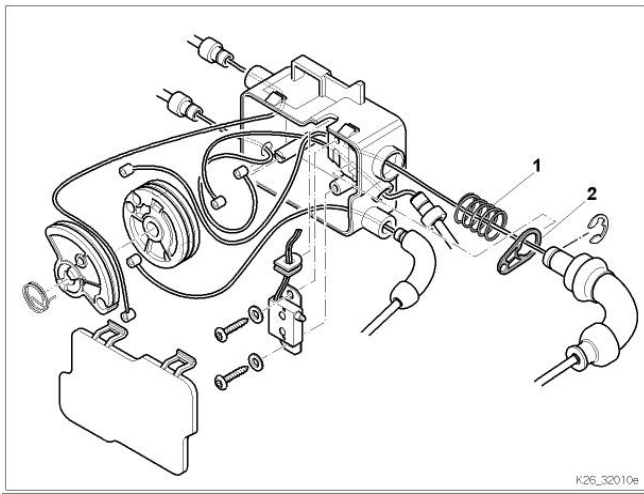
- Using a suitable tool, press back spring (1) and remove switching element (2).
- Remove spring (1).



(-) Assembling cable divider

Variant, cruise control

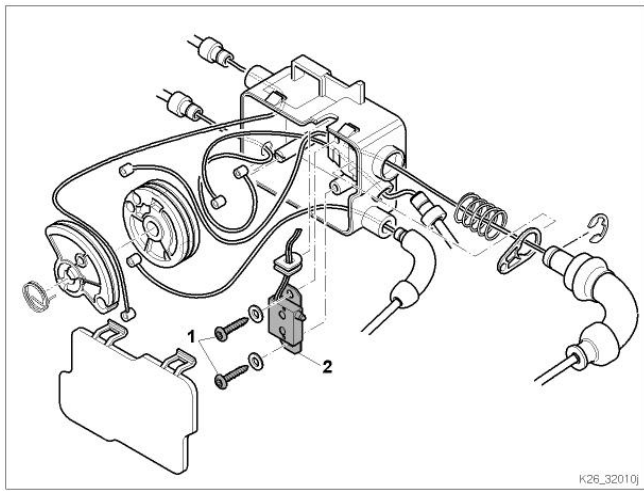
- Fit spring (1).
- Using a suitable tool, press back spring (1) and install switching element (2).



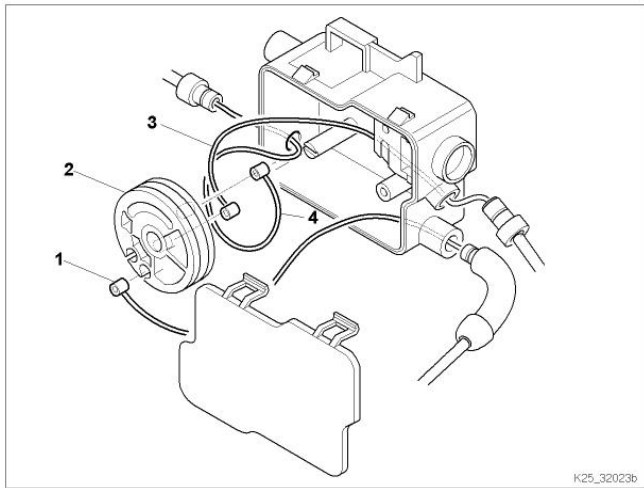
Variant, cruise control

► **Installing switch for cruise control**

- Place switch (2) in position and align. The switching point should be reached at the mid-point in the switching path.
- Remove screws (1).



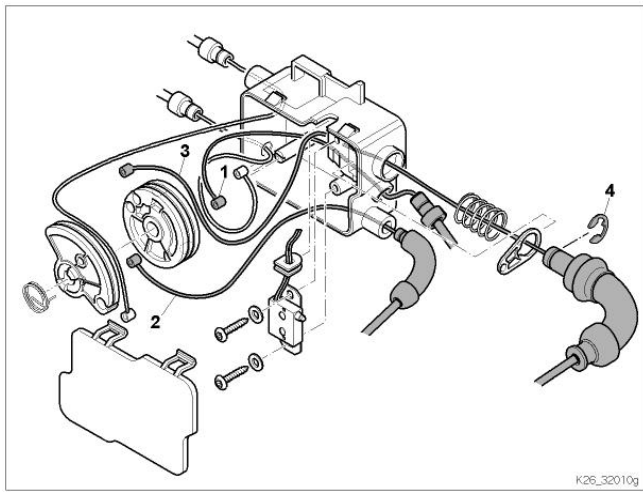
- Fit Bowden cable (1) in the cable divider and attach to cable pulley.
- Fit throttle cable (3) in the cable divider and attach to cable pulley.



Variant, cruise control

⚠ Attention

Nature: The strands of Bowden cables can be kinked if the correct removal and installation procedures are not followed.



Avoidance: Take care not to kink the strands of Bowden cables during removal and installation.

- Fit Bowden cable (3) in the cable divider and attach to cable pulley.
- Install lock washer (4).
- Fit Bowden cable (2) in the cable divider and attach to cable pulley.
- Fit throttle cable (1) in the cable divider and attach to cable pulley.

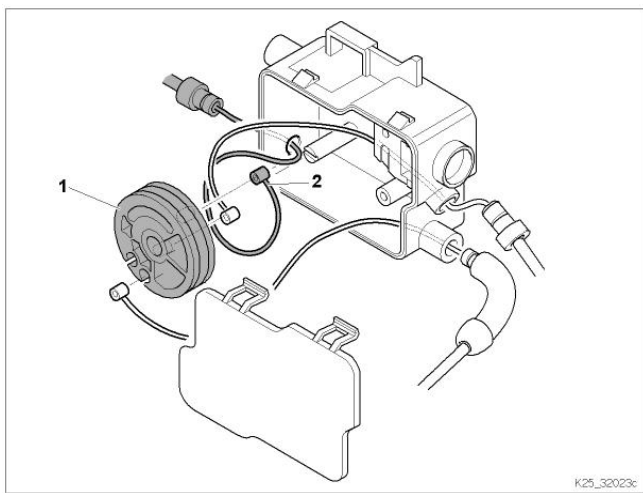
(-) Installing throttle cable on right

- Make sure that the other cable assemblies are engaged correctly.
- Engage throttle cable (2) on pulley (1).

! Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.



- Fit cable pulley (1) into the cable divider, noting the locating pin.

- Close cable divider with cover.

Variant, cruise control

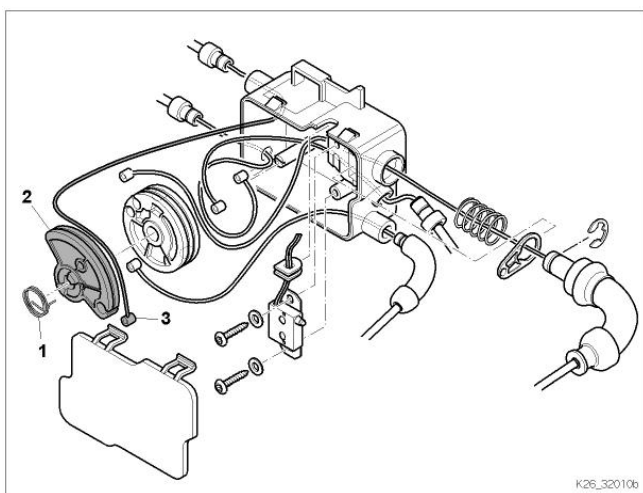
► Installing Bowden cable for cruise control

- Engage Bowden cable (3) on pulley (2).

! Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.



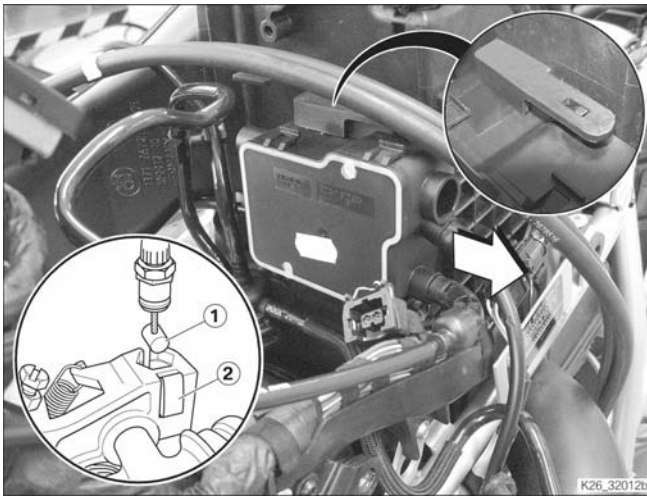
- Fit cable pulley (2) into the cable divider, noting the locating pin.

- Fit spring (1).

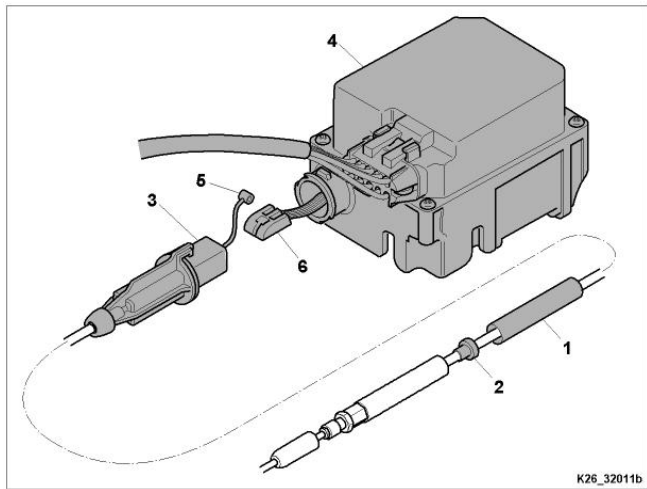
- ◀ Close cable divider with cover.

(-) Securing cable divider

- Thread through Bowden cables to the right and clip

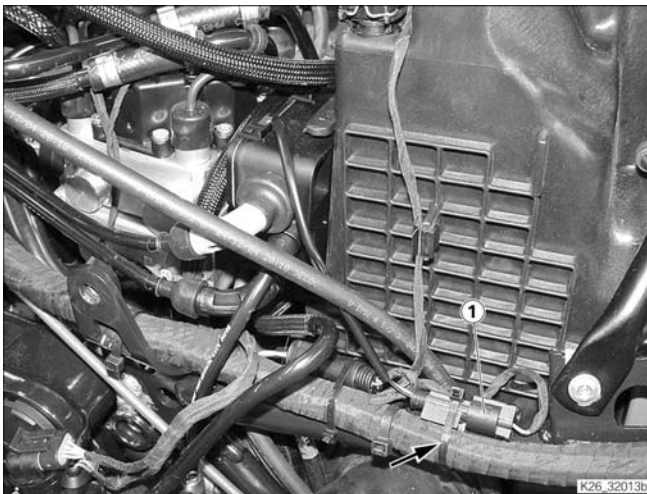


- cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.



Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).



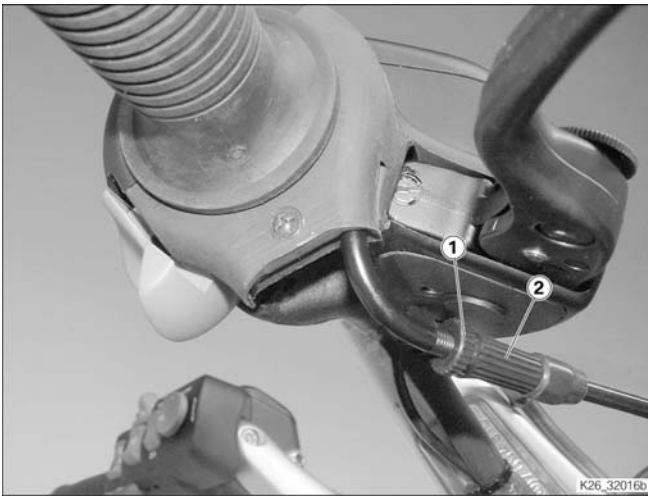
Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).

- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

(-) Adjusting throttle cable

- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

- Tighten lock nut.

Test

- Check the play at the throttle twistgrip.



Technical data

Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

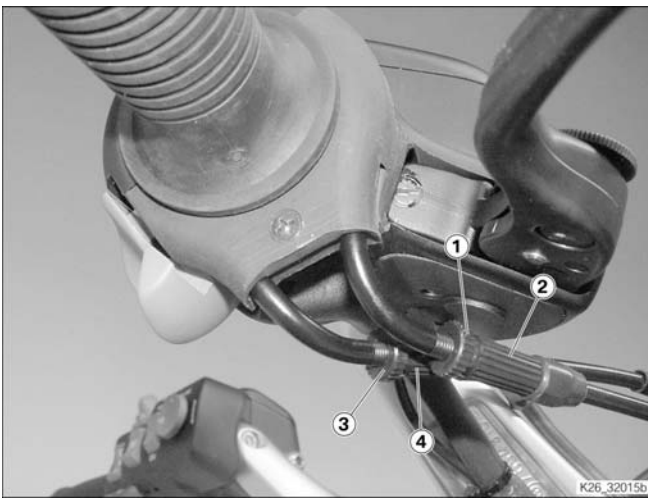
Result: Play at throttle twistgrip is not OK.

Measure:

- Repeat the procedure.

Variant, cruise control

- Completely slacken off lock nut (3).
- Fully tighten adjusting screw (4).
- Adjust Bowden cables.
- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

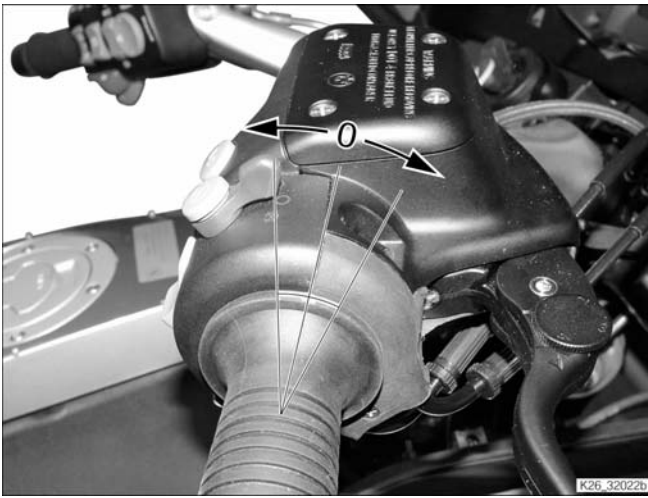
- Tighten locknut (1).
- Completely slacken off lock nut (3).
- With the throttle twistgrip in the idle position, set the gap between locknut (3) and adjusting screw (4) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--


- Tighten locknut (3).



Variant, cruise control

Test

- Turn the throttle twistgrip forward past its zero position.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play is correct at the throttle twistgrip and the microswitch in the throttle-cable divider trips with an audible click.

Measure:

- Setting is OK.


Result: Insufficient play or microswitch does not trip.

Measure:

- Adjust throttle-closer cable or check microswitch.

Test

- Turn the throttle twistgrip back from its zero position.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play at the throttle twistgrip is correct.

Measure:

- Setting is OK.

Result: Insufficient play.

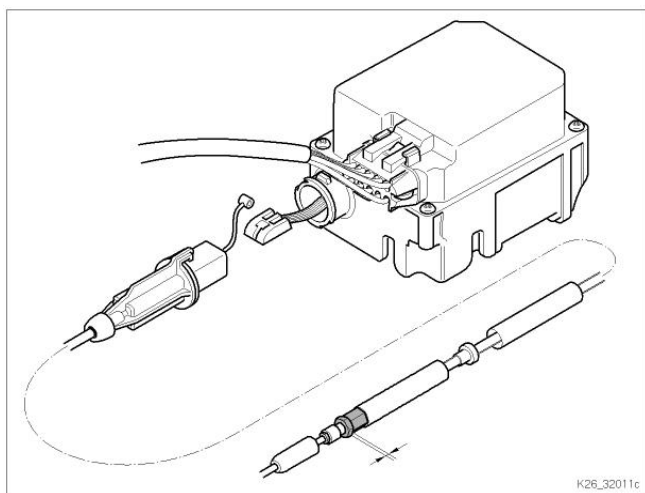
Measure:

- Adjust the throttle-opener cable.

Variant, cruise control

(-) Adjusting Bowden cable for cruise control

- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.



Technical data

Setting for Bowden cable, cruise control		2 - 3 mm	Variant, cruise control
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(-) Checking freedom of movement of throttle cable and checking for kinks and chafing



Note

The throttle cable must be correctly adjusted in order for the electronic engine management system to function correctly.

Test

- Check the throttle cable for kinks and chafing.
- » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
- » The throttle twistgrip returns to the closed position by itself.
- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
- » Slight play perceptible.



Technical data

Test criterion, throttle cable		Results of all test steps satisfied	
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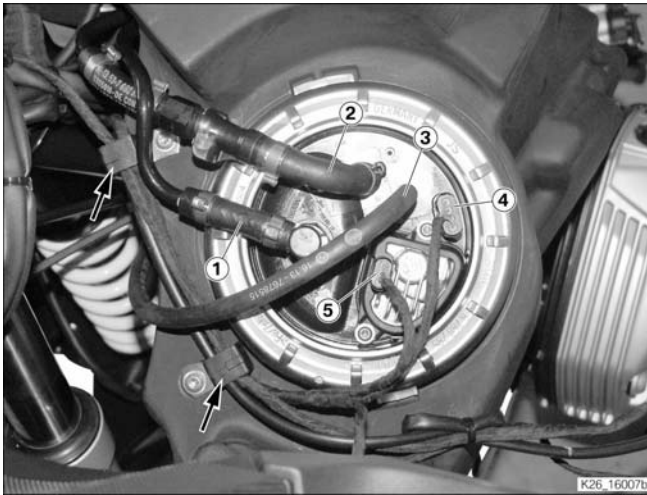
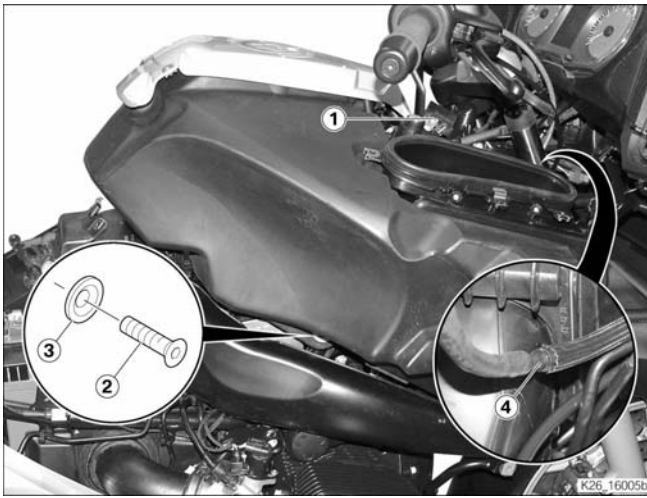
Result: Test criterion not satisfied.

Measure:

- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not



trapped between the fuel tank and the frame.

- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! **Attention**

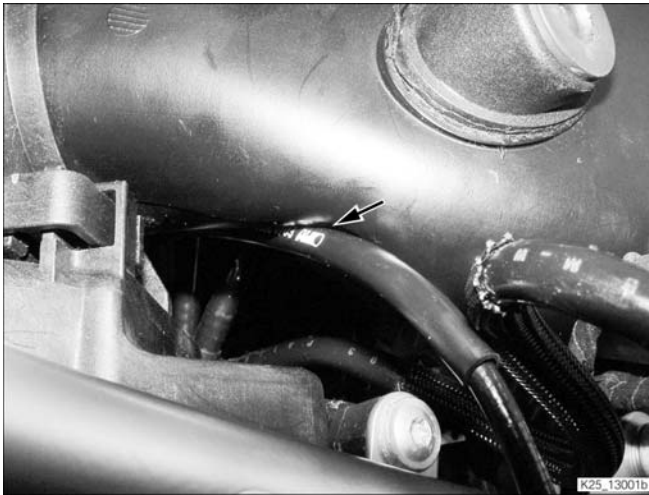
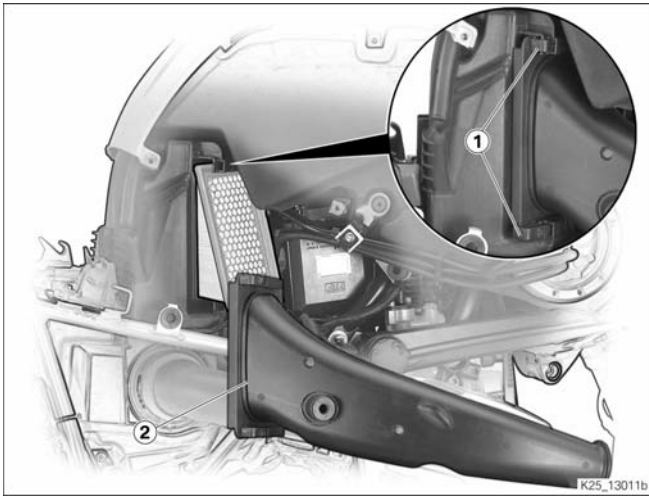
Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



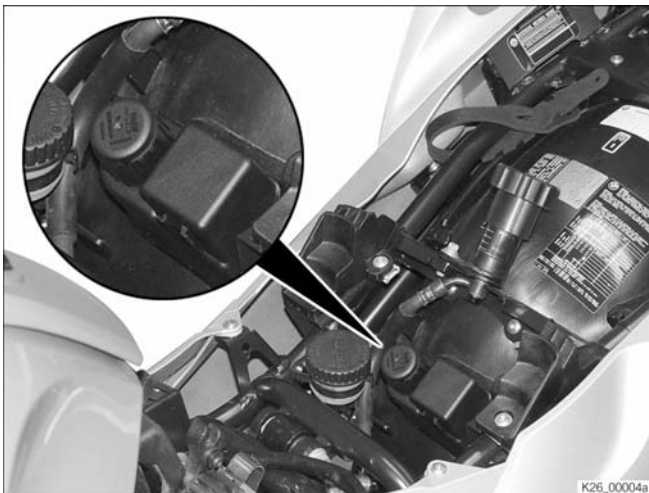
- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581), (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

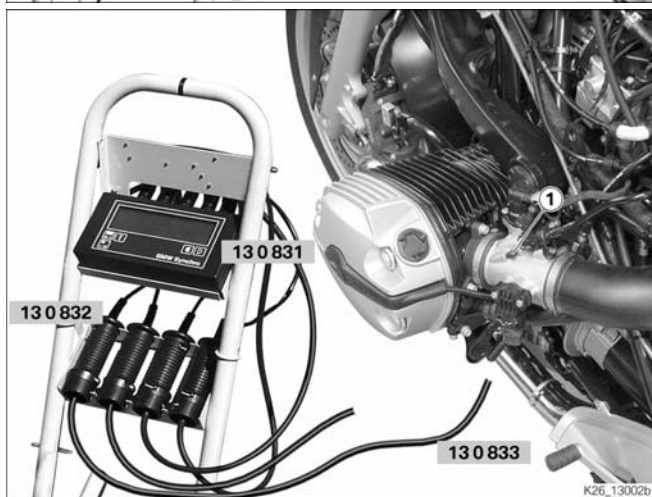
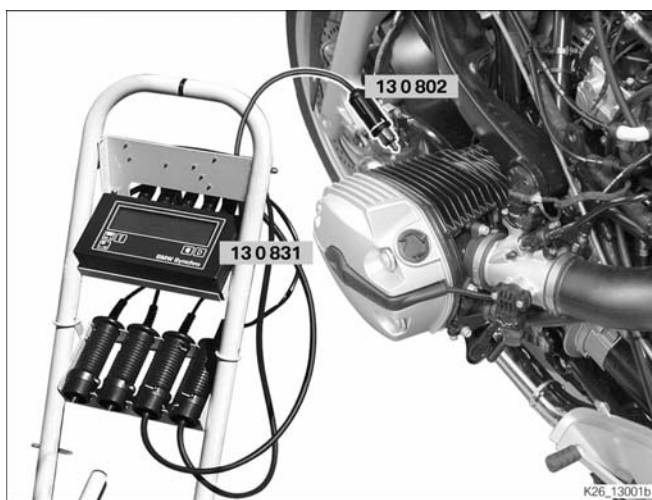
► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the



motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

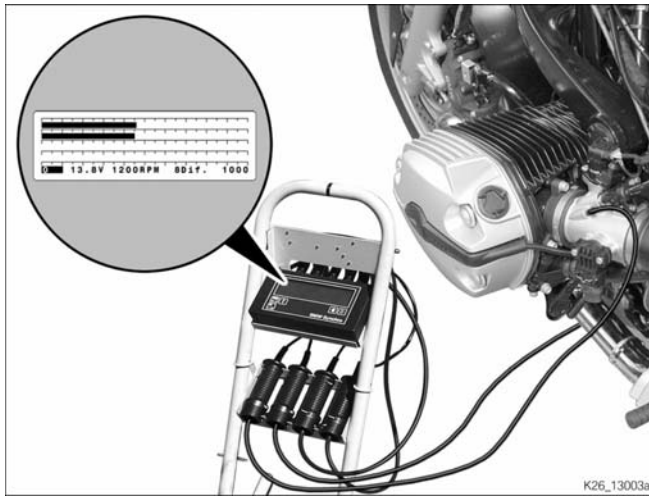
► 1. Checking idle

Test



Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the



system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not


change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

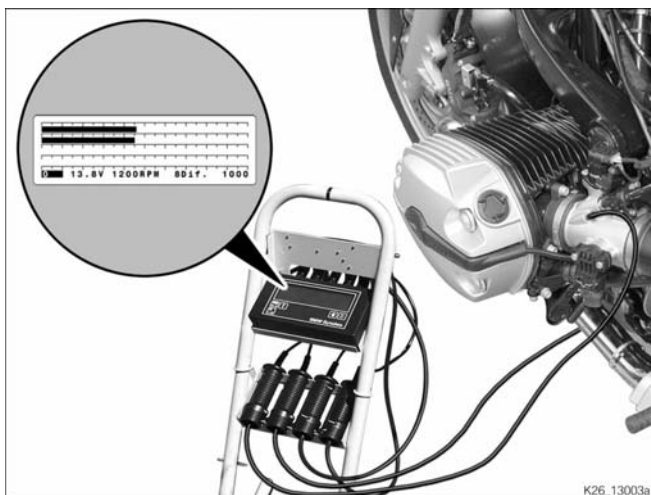
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 -	max. 15 mbar	

	1800 min ⁻¹		
--	---------------------------	--	--

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

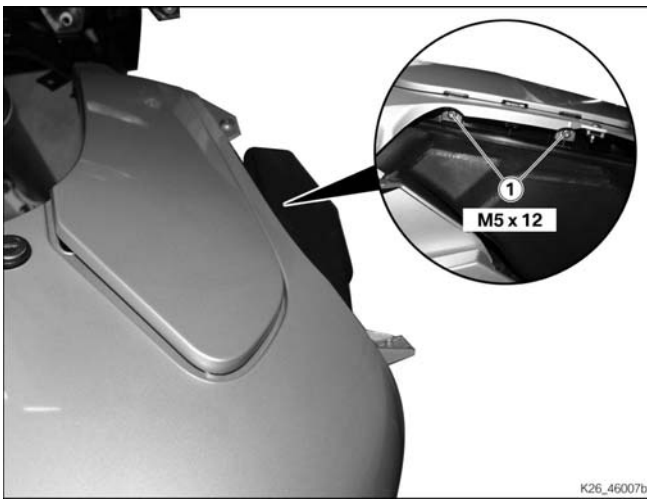
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



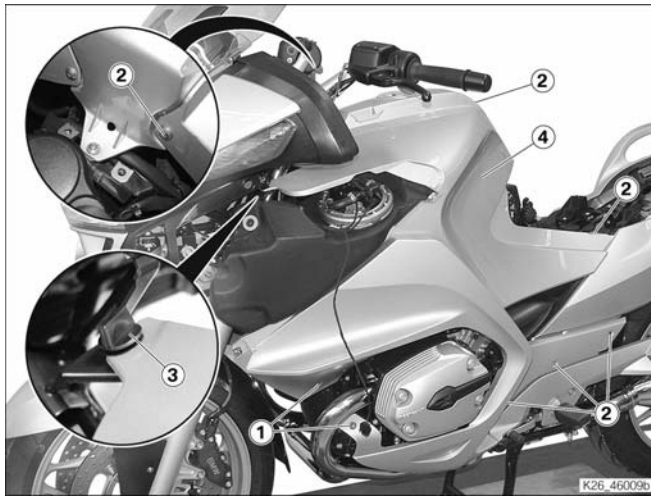
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **32 73 074 Replacing throttle cable (throttle-cable divider - throttle valve, left)**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

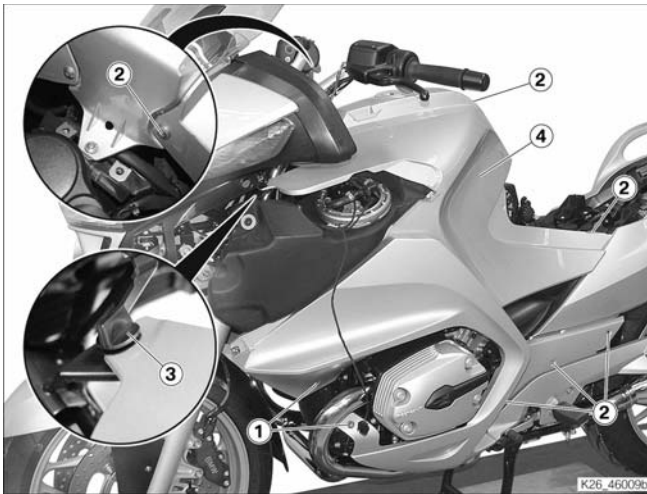


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

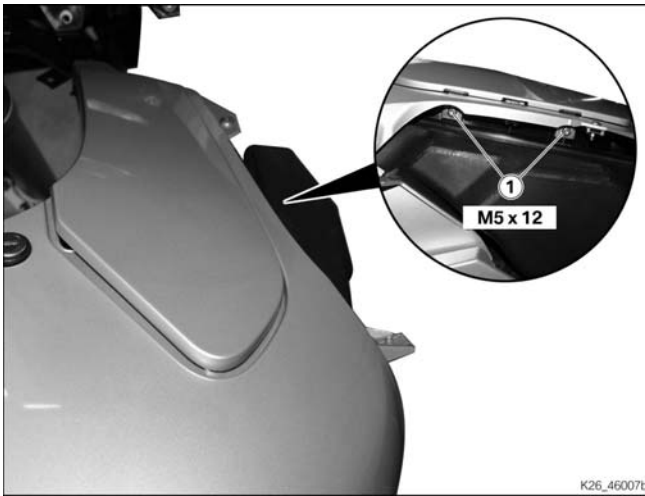
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



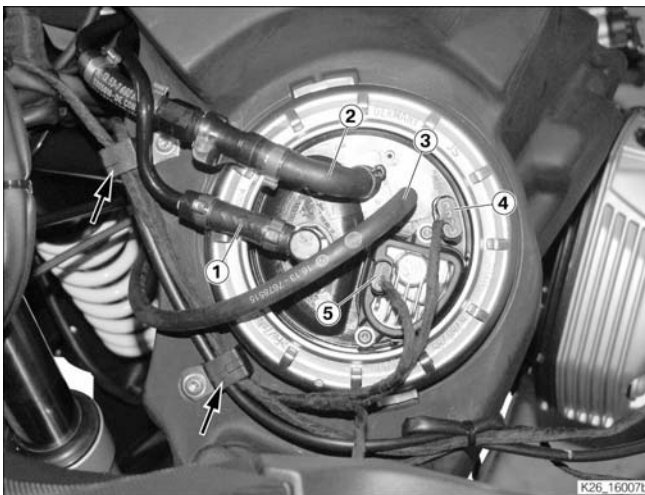
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

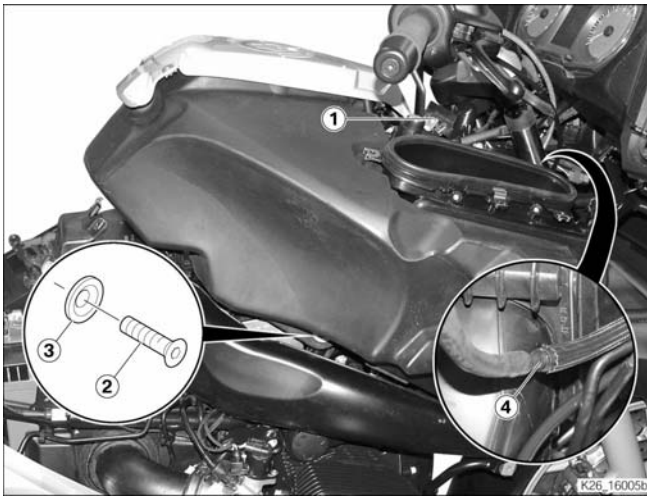


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

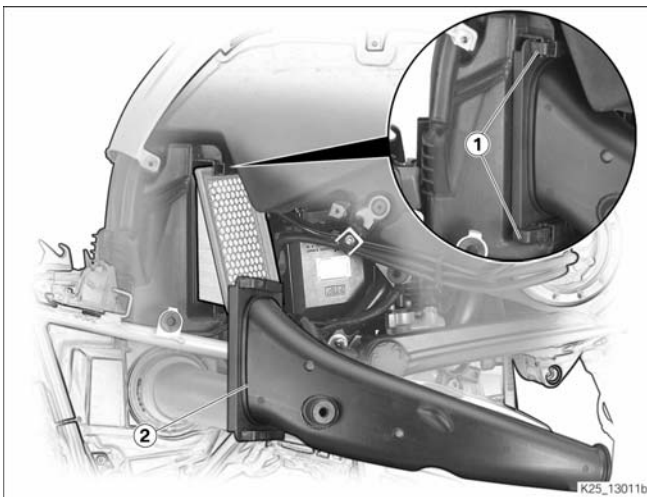


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing intake air pipe

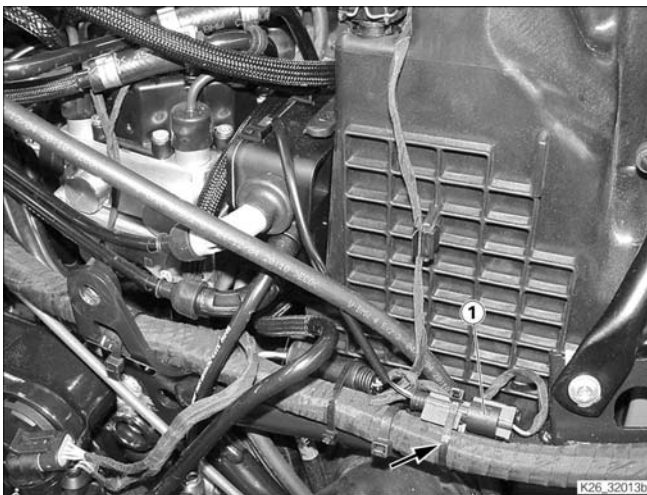
- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Releasing cable divider

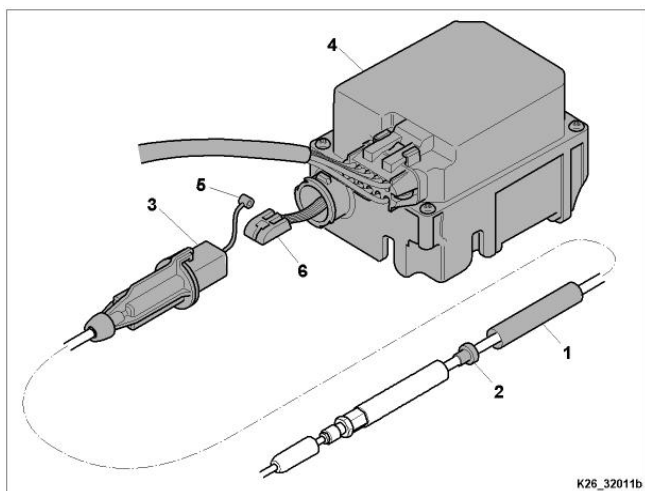
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).

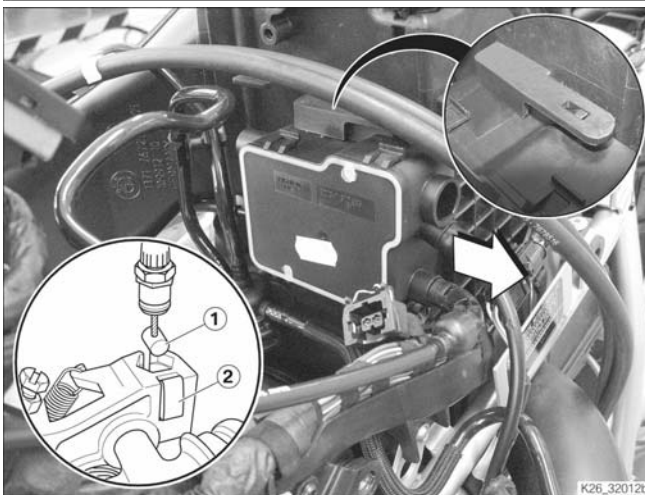


Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).

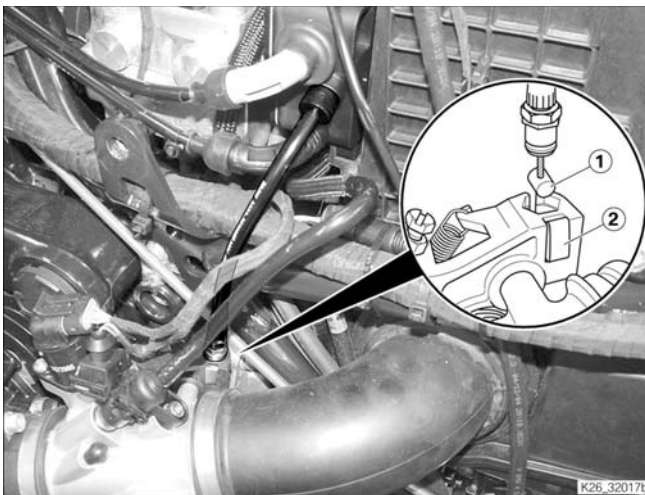


- Thread through Bowden cable (5) towards the rear.



- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

(-) Removing throttle cable on left

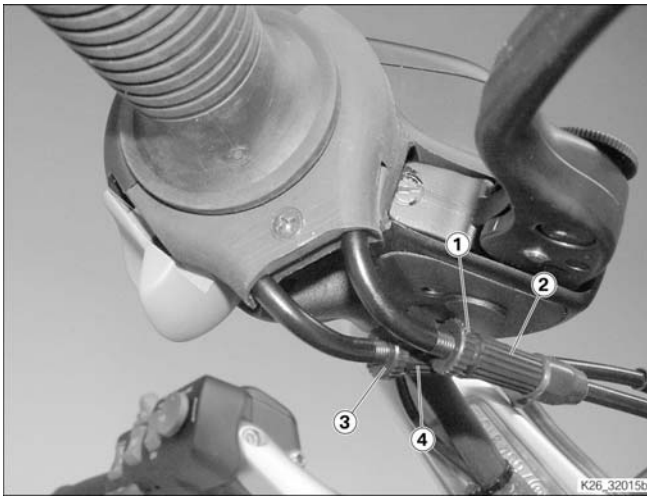


- Disengage the throttle cable from the left throttle valve.
- Using a suitable tool, press back retaining plate (2) from above until the Bowden cable (1) can be removed.

- Remove the cap from the throttle-cable divider.

Variant, cruise control

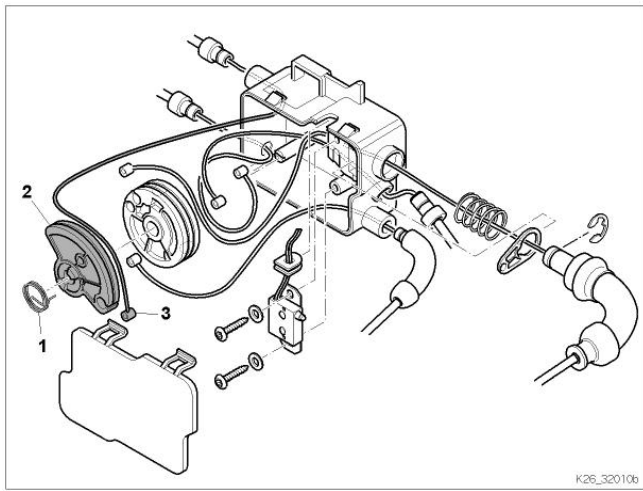
- Completely slacken off lock nut (3).
- Release adjusting screw (4).



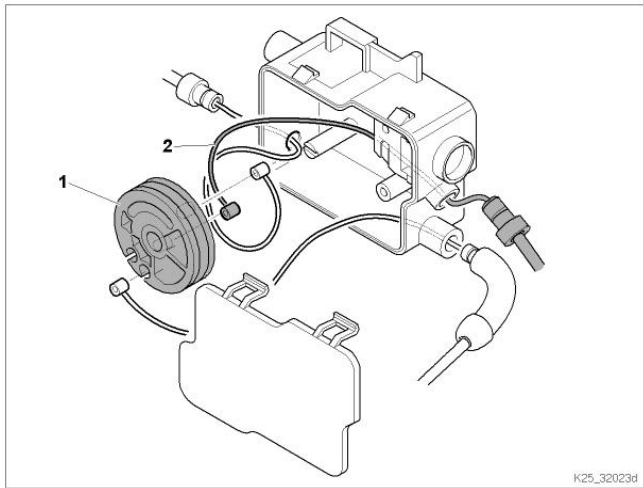
Variant, cruise control

► Removing Bowden cable for cruise control

- Remove spring (1).
- Remove pulley (2).
- Disengage Bowden cable (3) and remove.

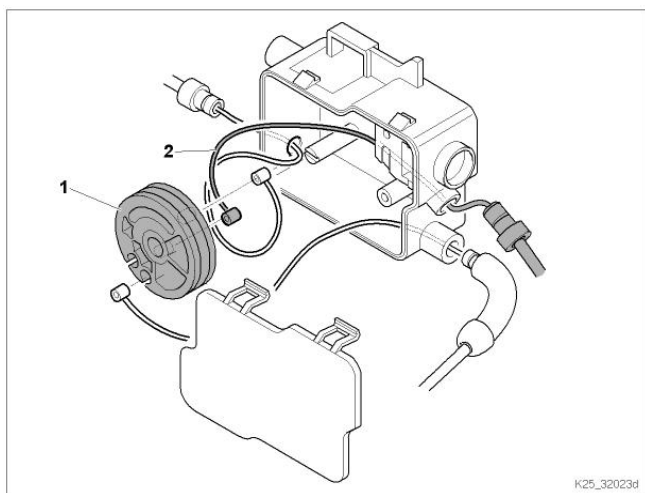


- Remove pulley (1).
- Disengage throttle cable (2).
- Remove the throttle cable.



(-) Installing throttle cable on left

- Make sure that the other cable assemblies are engaged correctly.
- Engage throttle cable (2) on pulley (1).



⚠ Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

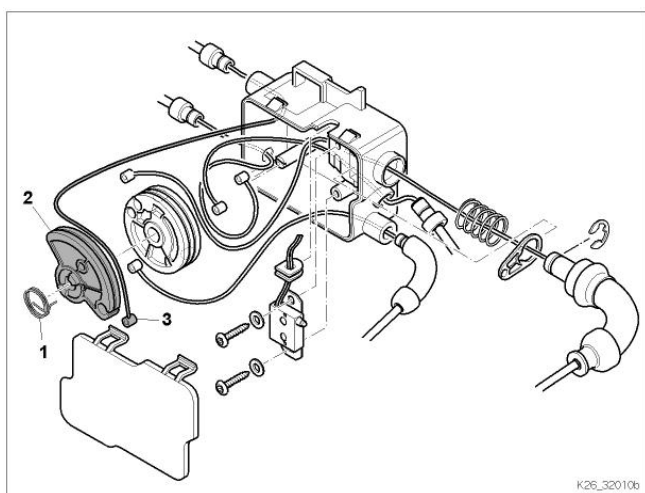
- Fit cable pulley (1) into the cable divider, noting the locating pin.

- Close cable divider with cover.

Variant, cruise control

▶ Installing Bowden cable for cruise control

- Engage Bowden cable (3) on pulley (2).



⚠ Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

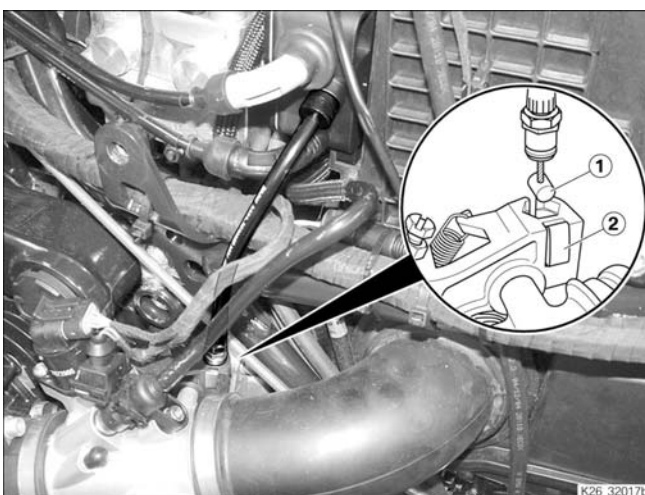
Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (2) into the cable divider, noting the locating pin.

- Fit spring (1).

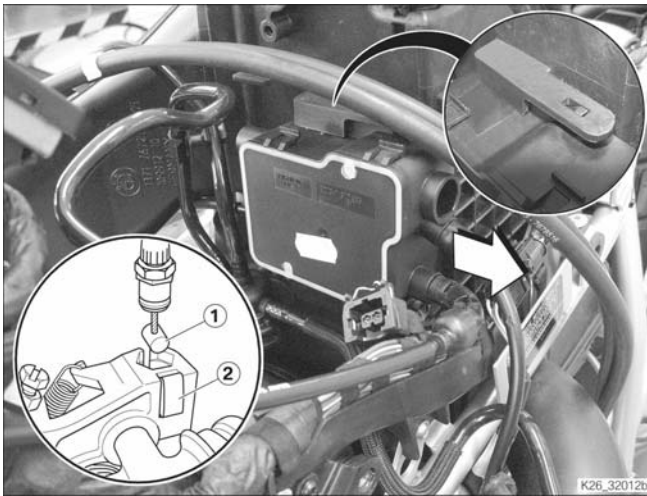
- Close cable divider with cover.

- Using a suitable tool, press back retaining plate (2) from above until the Bowden cable (1) can be inserted.
- Engage throttle cable (1) on the left throttle valve.

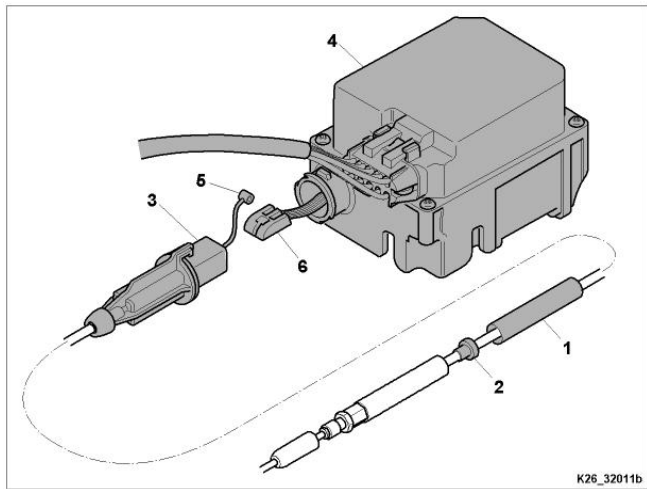


(-) Securing cable divider

- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from

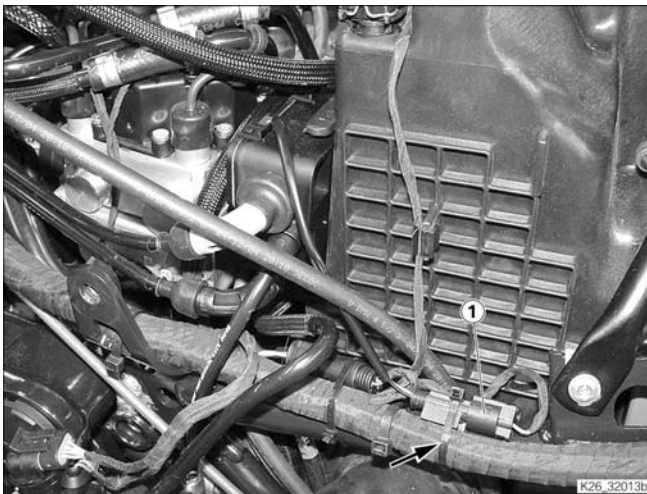


- above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.



Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).



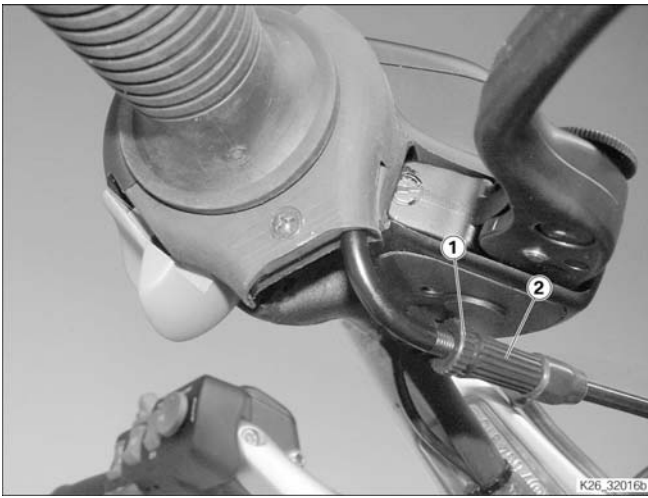
Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).

- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

(-) Adjusting throttle cable

- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

- Tighten lock nut.

Test

- Check the play at the throttle twistgrip.



Technical data

Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

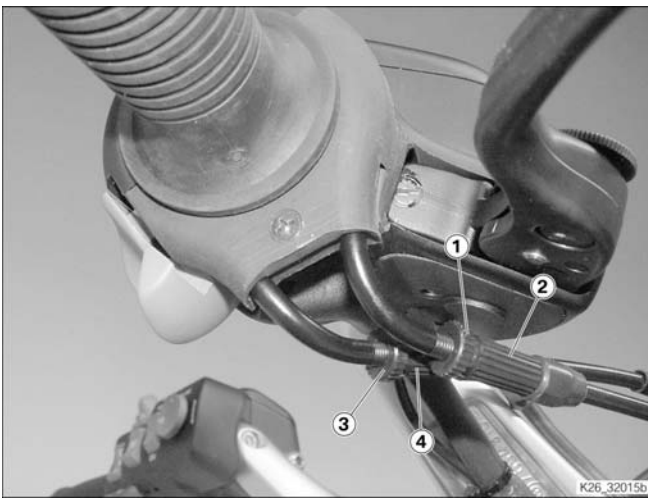
Result: Play at throttle twistgrip is not OK.

Measure:

- Repeat the procedure.

Variant, cruise control

- Completely slacken off lock nut (3).
- Fully tighten adjusting screw (4).
- Adjust Bowden cables.
- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

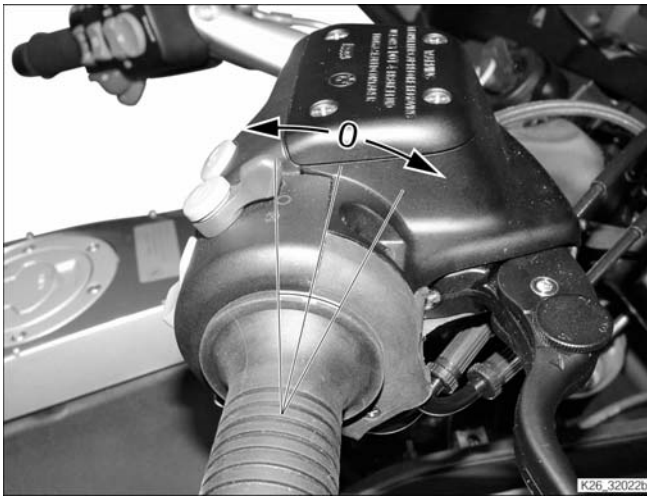
- Tighten locknut (1).
- Completely slacken off lock nut (3).
- With the throttle twistgrip in the idle position, set the gap between locknut (3) and adjusting screw (4) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--


- Tighten locknut (3).



Variant, cruise control

Test

- Turn the throttle twistgrip forward past its zero position.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play is correct at the throttle twistgrip and the microswitch in the throttle-cable divider trips with an audible click.

Measure:

- Setting is OK.


Result: Insufficient play or microswitch does not trip.

Measure:

- Adjust throttle-closer cable or check microswitch.

Test

- Turn the throttle twistgrip back from its zero position.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play at the throttle twistgrip is correct.

Measure:

- Setting is OK.

Result: Insufficient play.

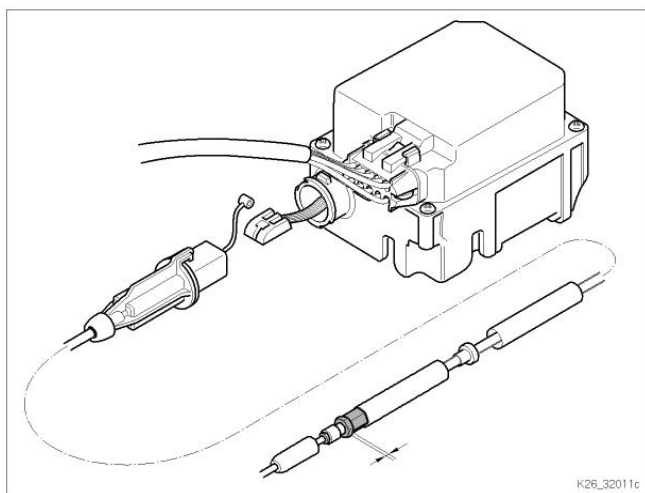
Measure:

- Adjust the throttle-opener cable.

Variant, cruise control

(-) Adjusting Bowden cable for cruise control

- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.



Technical data

Setting for Bowden cable, cruise control		2 - 3 mm	Variant, cruise control
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(-) Checking freedom of movement of throttle cable and checking for kinks and chafing



Note

The throttle cable must be correctly adjusted in order for the electronic engine management system to function correctly.

Test

- Check the throttle cable for kinks and chafing.
- » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
- » The throttle twistgrip returns to the closed position by itself.
- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
- » Slight play perceptible.



Technical data

Test criterion, throttle cable		Results of all test steps satisfied	
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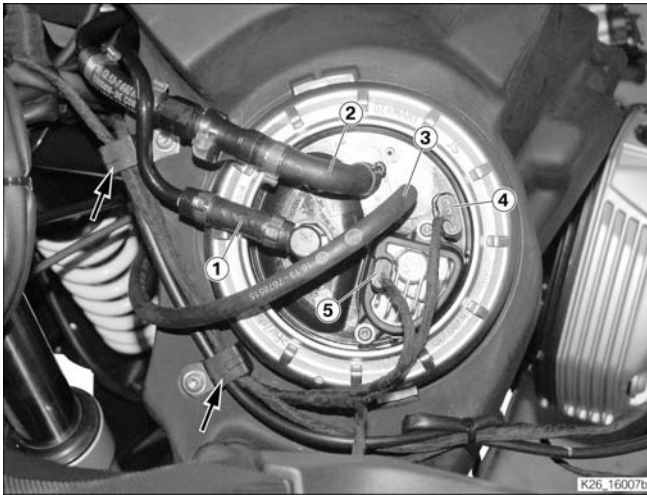
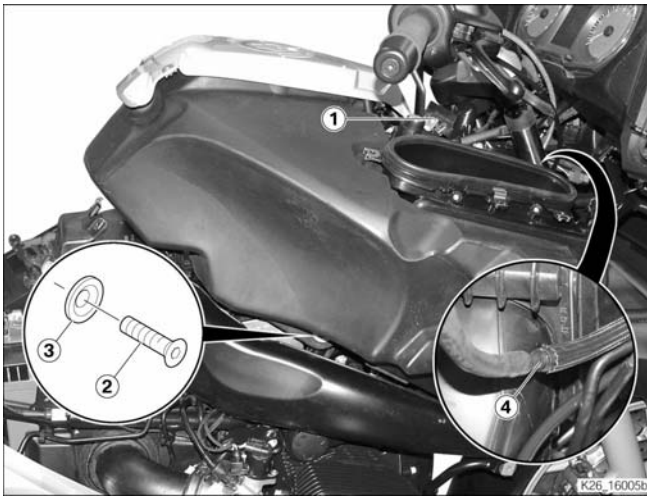
Result: Test criterion not satisfied.

Measure:

- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not



trapped between the fuel tank and the frame.

- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! **Attention**

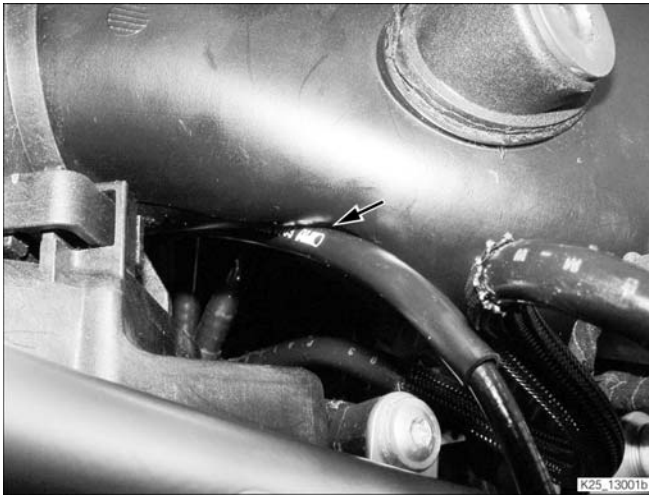
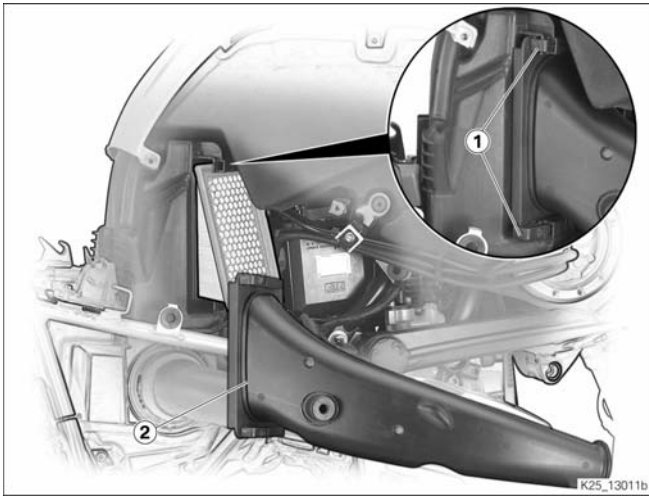
Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



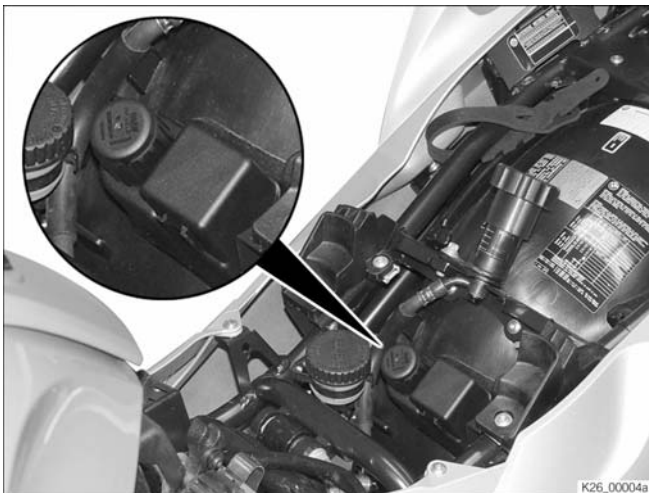
- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581), (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

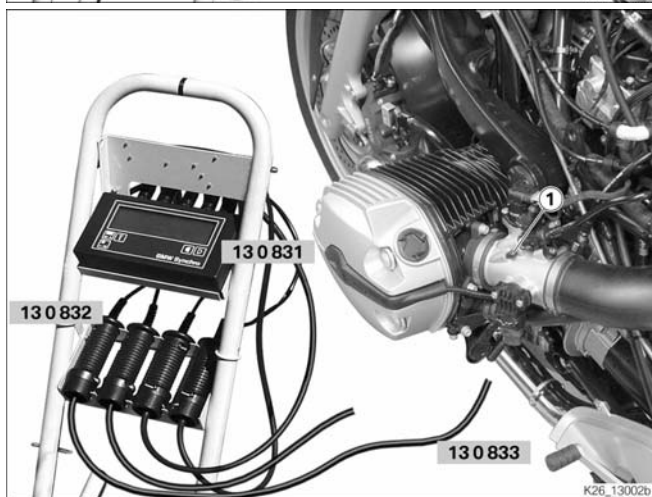
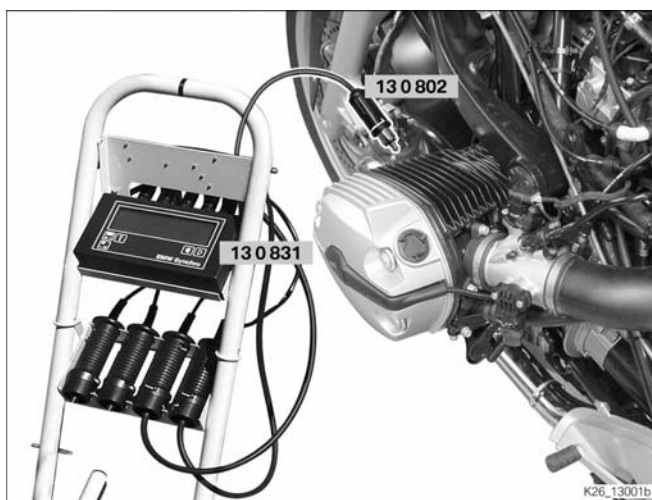
► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the



motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

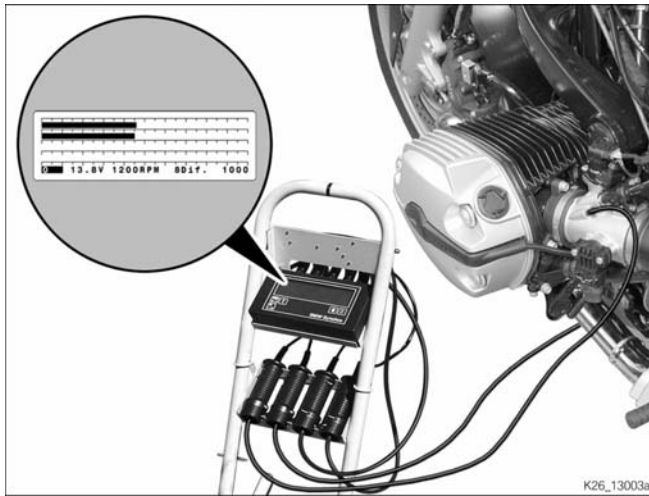
► 1. Checking idle

Test



Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the



system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not


change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

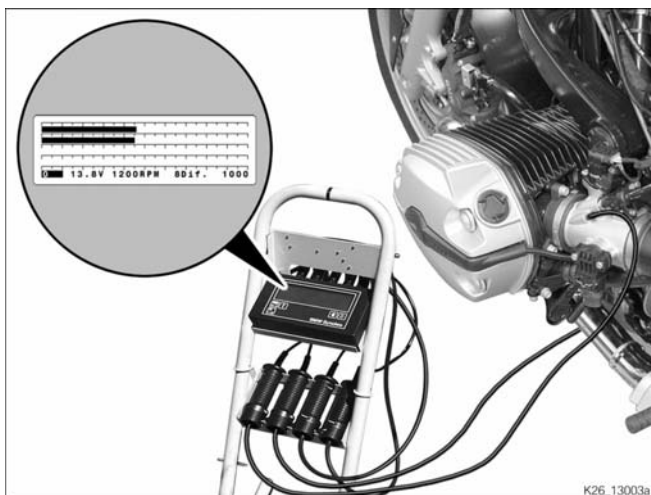
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 -	max. 15 mbar	

	1800 min ⁻¹		
--	---------------------------	--	--

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



▶ **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

-
- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

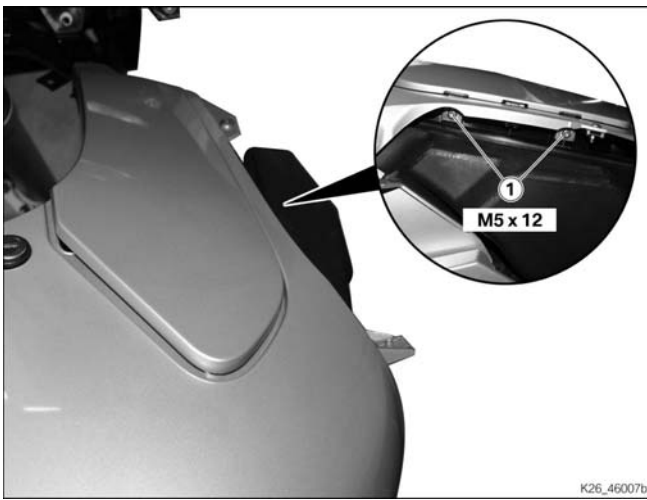
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



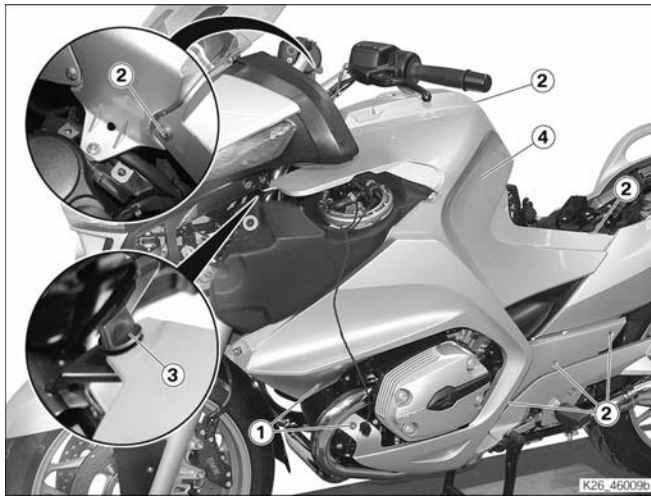
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **32 73 078 Replacing throttle cable (throttle-cable divider - throttle valve, right)**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

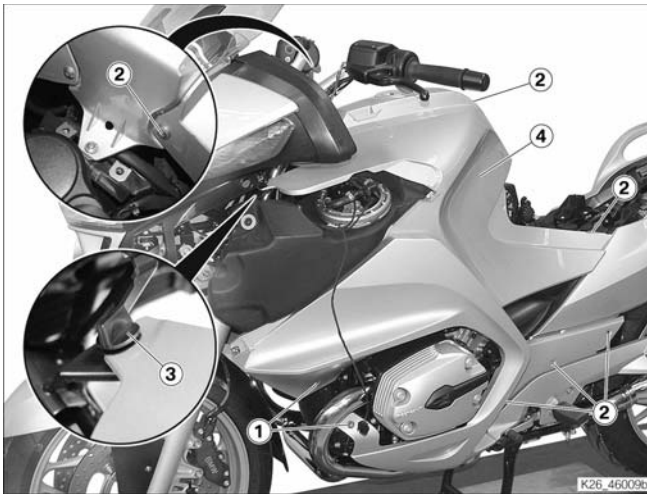


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

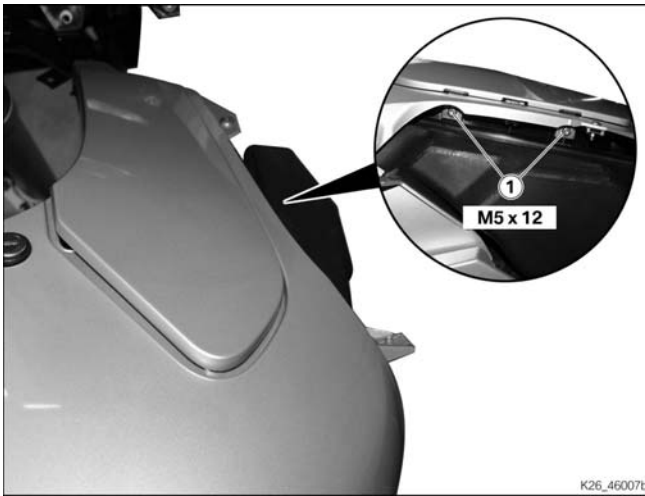
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



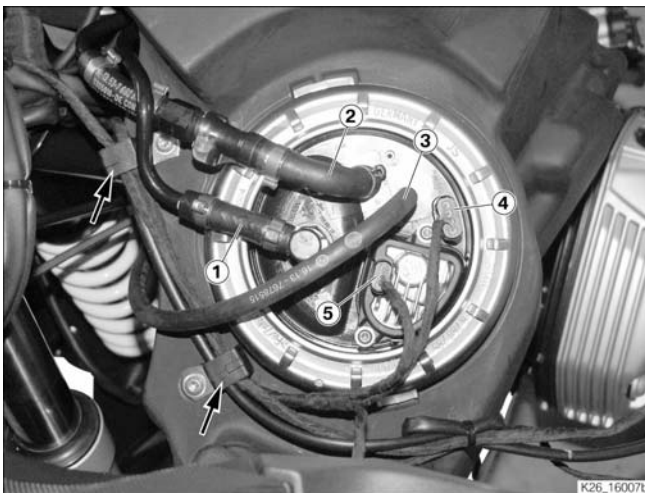
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

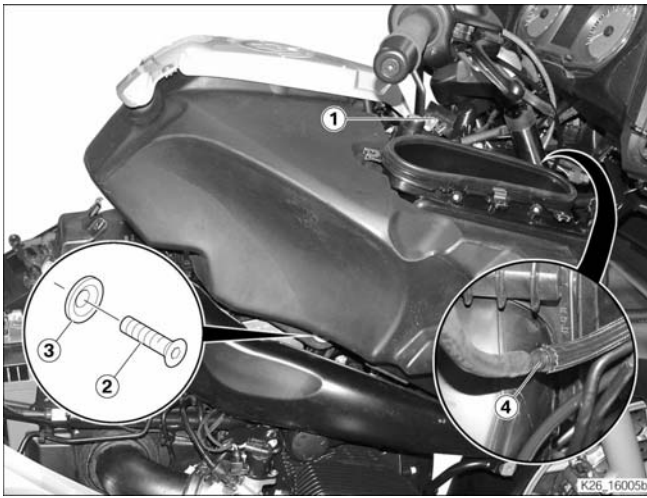


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

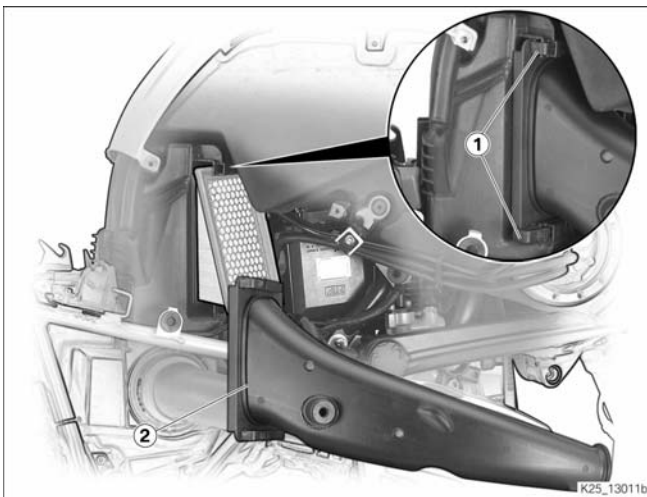


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing intake air pipe

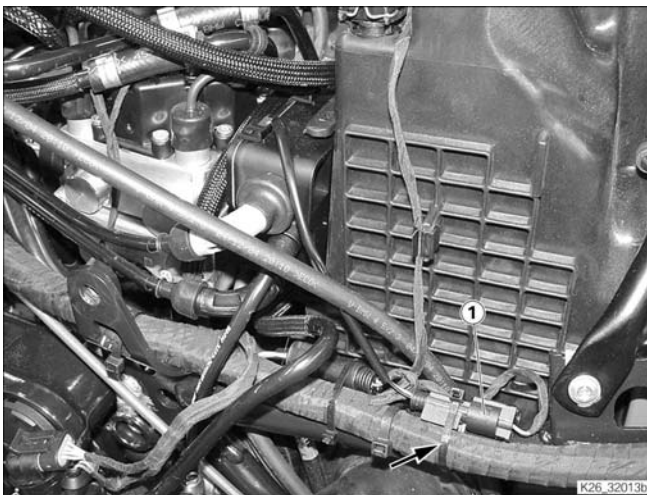
- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Releasing cable divider

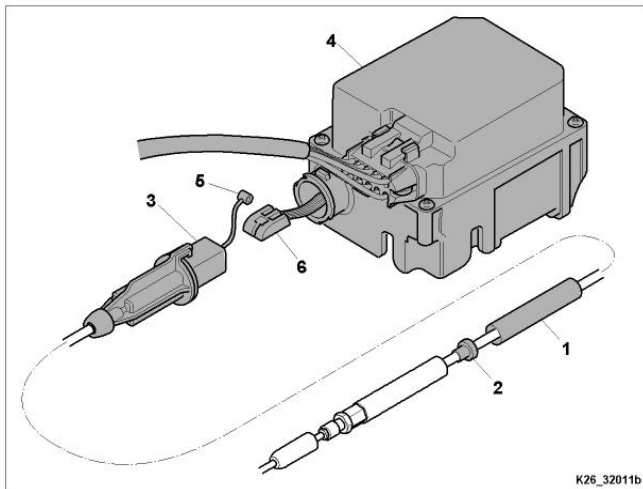
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).

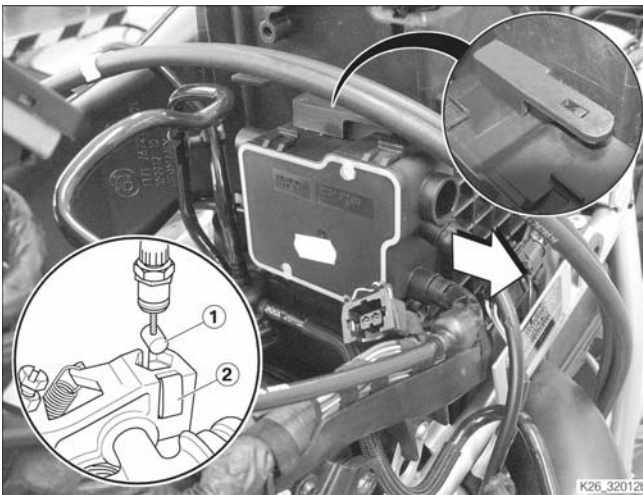


Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).



- Thread through Bowden cable (5) towards the rear.



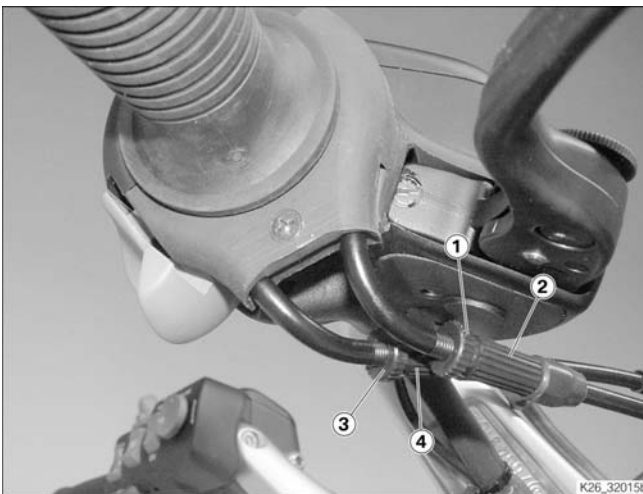
- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

(-) Removing throttle cable on right

- Remove the cap from the throttle-cable divider.

Variant, cruise control

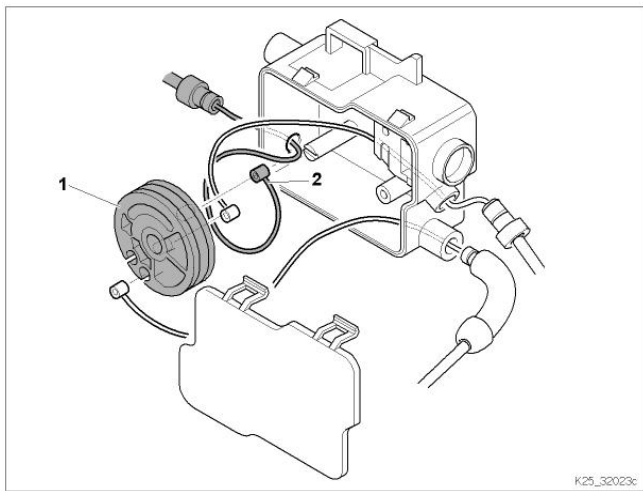
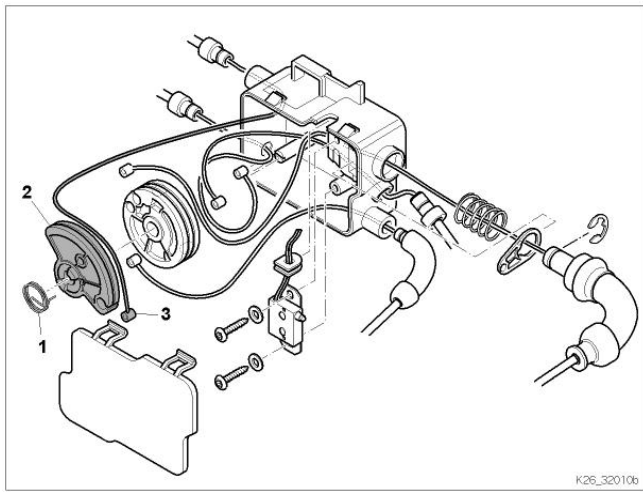
- Completely slacken off lock nut (3).
- Release adjusting screw (4).



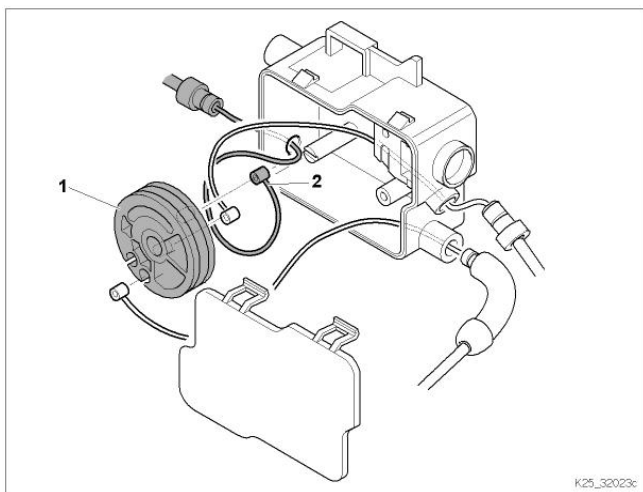
Variant, cruise control

► Removing Bowden cable for cruise control

- Remove spring (1).
- Remove pulley (2).
- Disengage Bowden cable (3) and remove.



- Remove pulley (1).
- Disengage throttle cable (2).
- Remove the throttle cable.



(-) Installing throttle cable on right

- Make sure that the other cable assemblies are engaged correctly.
- Engage throttle cable (2) on pulley (1).

! Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (1) into the cable divider, noting the locating pin.

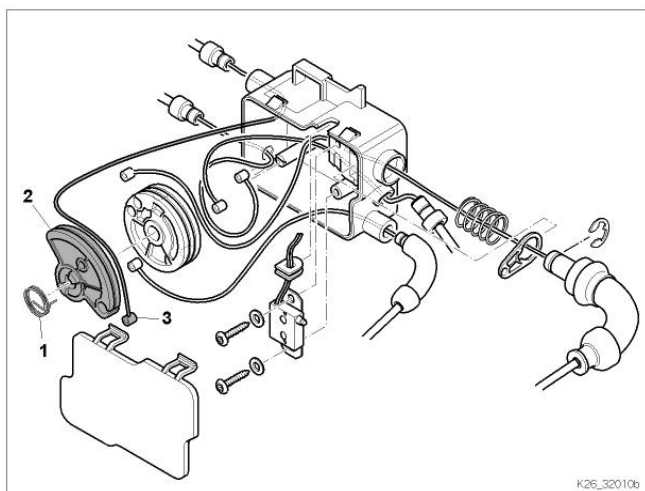
• Close cable divider with cover.

Variant, cruise control

► Installing Bowden cable for cruise control

- Engage Bowden cable (3) on pulley (2).

! Attention



Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

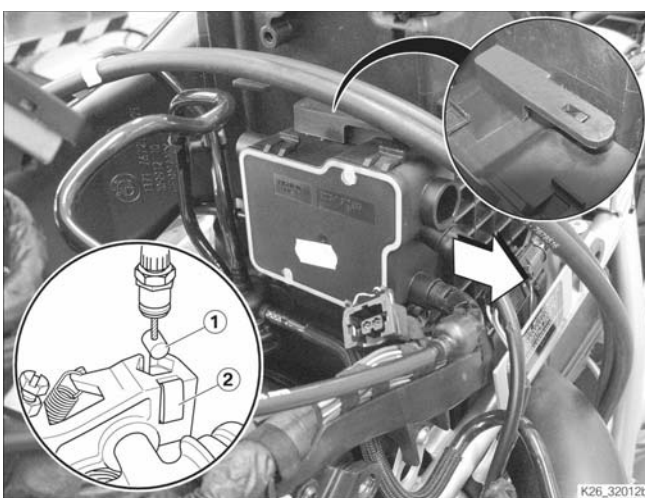
Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (2) into the cable divider, noting the locating pin.
- Fit spring (1).

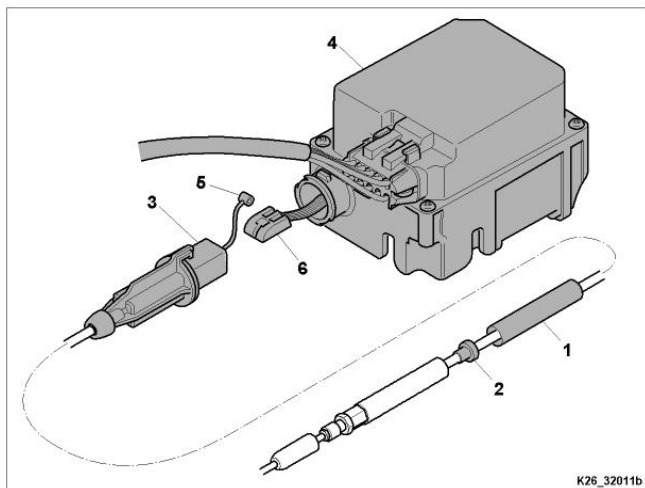


- Close cable divider with cover.

(-) Securing cable divider



- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.

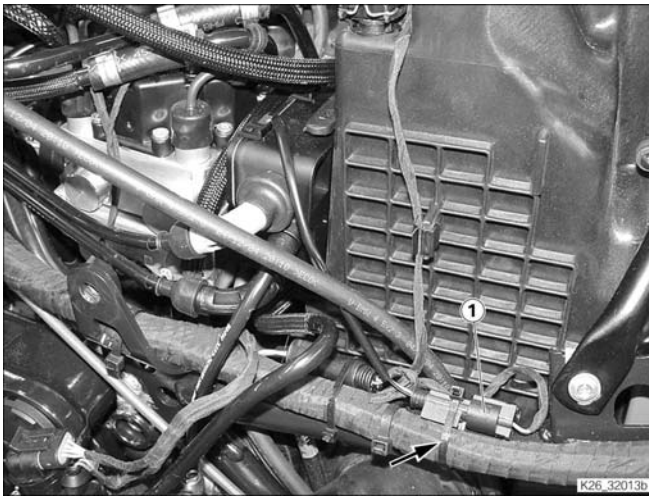


Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).

Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).




- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

(-) Adjusting throttle cable

- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.




 Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten lock nut.

Test

- Check the play at the throttle twistgrip.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

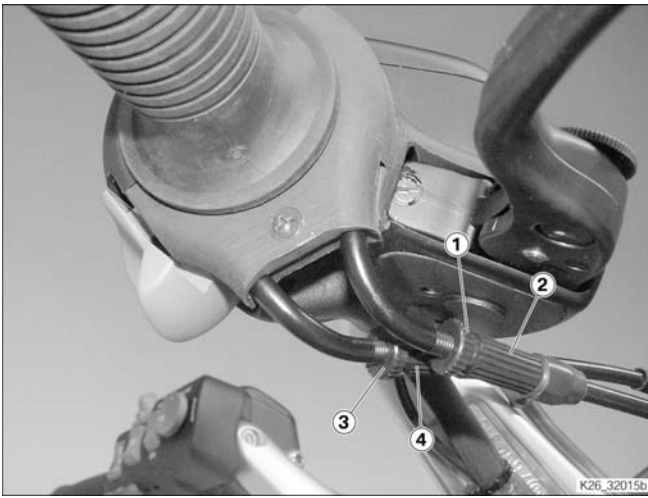
Result: Play at throttle twistgrip is not OK.

Measure:

- Repeat the procedure.


Variant, cruise control

- Completely slacken off lock nut (3).
- Fully tighten adjusting screw (4).
- Adjust Bowden cables.
-




Completely slacken off lock nut (1).

- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.

 Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten locknut (1).
- Completely slacken off lock nut (3).
- With the throttle twistgrip in the idle position, set the gap between locknut (3) and adjusting screw (4) as per specification by turning the adjusting screw.

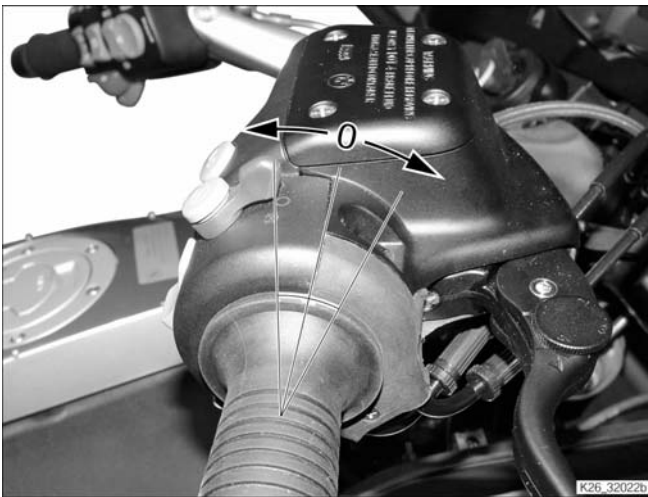
 Technical data			
Setting for throttle-cable play		4 - 5 mm	


- Tighten locknut (3).

Variant, cruise control

Test

- Turn the throttle twistgrip forward past its zero position.



 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play is correct at the throttle twistgrip and the microswitch in the throttle-cable divider trips with an audible click.

Measure:

- Setting is OK.

Result: Insufficient play or microswitch does not trip.

Measure:

- Adjust throttle-closer cable or check microswitch.

Test

- Turn the throttle twistgrip back from its zero position.



Technical data

Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play at the throttle twistgrip is correct.

Measure:

- Setting is OK.

Result: Insufficient play.

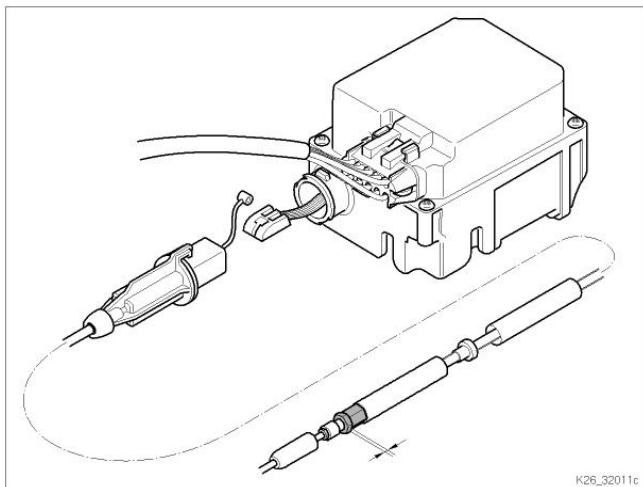
Measure:

- Adjust the throttle-opener cable.

Variant, cruise control

(-) Adjusting Bowden cable for cruise control

- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.



Technical data

Setting for Bowden cable, cruise control		2 - 3 mm	Variant, cruise control
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(-) Checking freedom of movement of throttle cable and checking for kinks and chafing




Note

The throttle cable must be correctly adjusted in order for the electronic engine management system to function correctly.

Test

- Check the throttle cable for kinks and chafing.
- » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
- » The throttle twistgrip returns to the closed position by itself.

- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
- » Slight play perceptible.

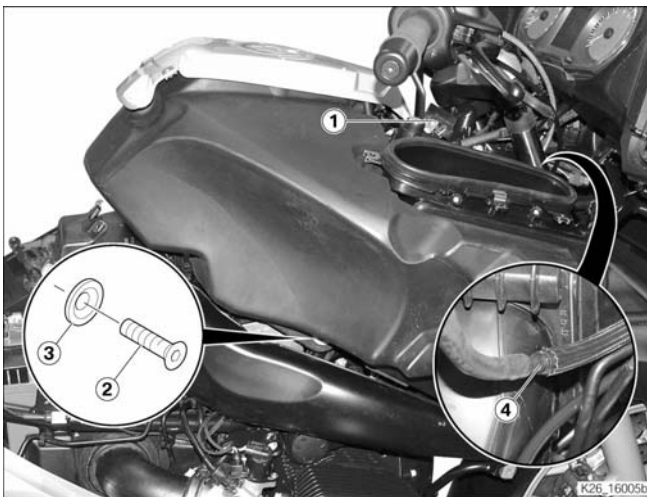
 Technical data			
Test criterion, throttle cable		Results of all test steps satisfied	

Result: Test criterion not satisfied.


Measure:

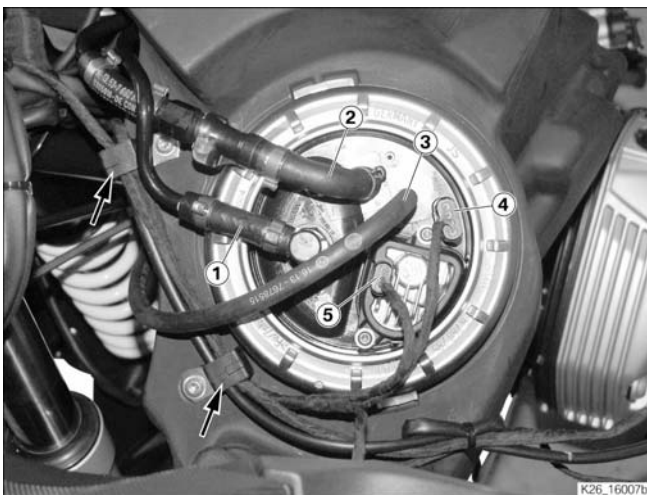
- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

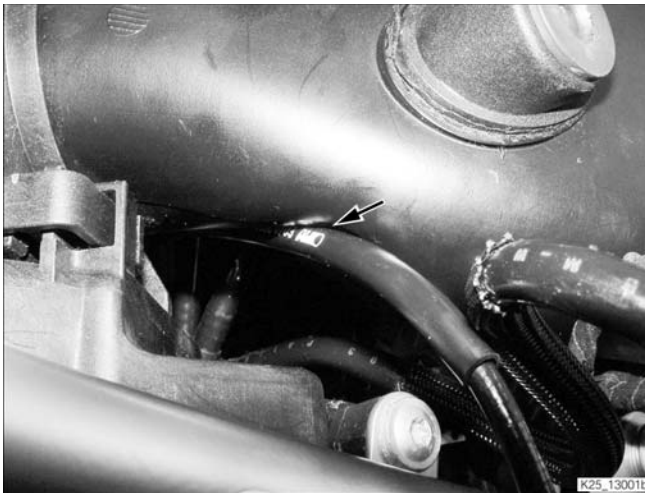
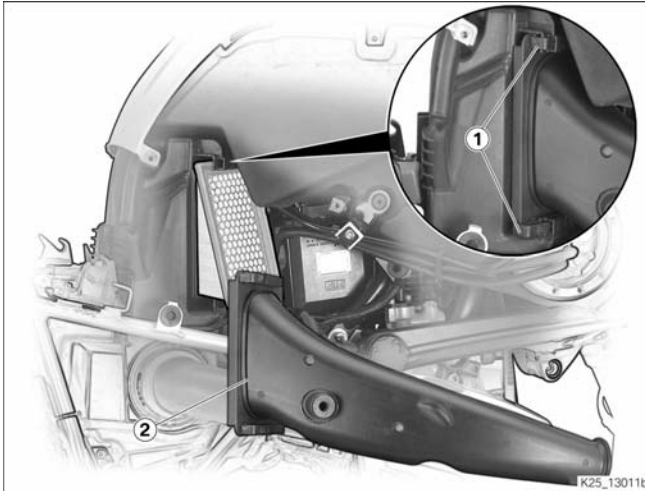
Avoidance: Make sure that the latch is open/pressed when you connect the two elements of

the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

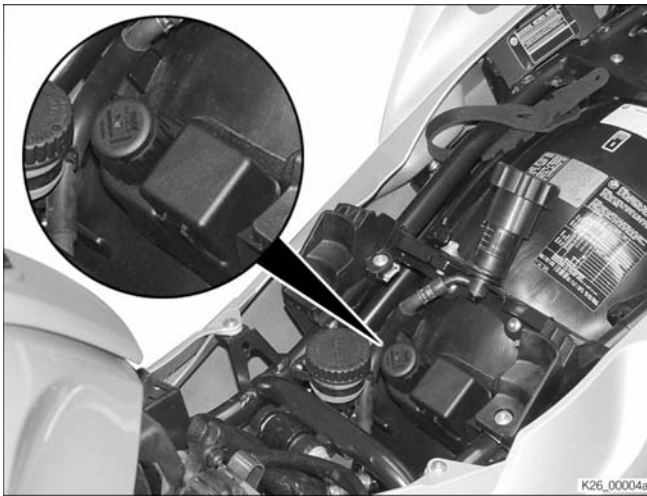
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581), (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
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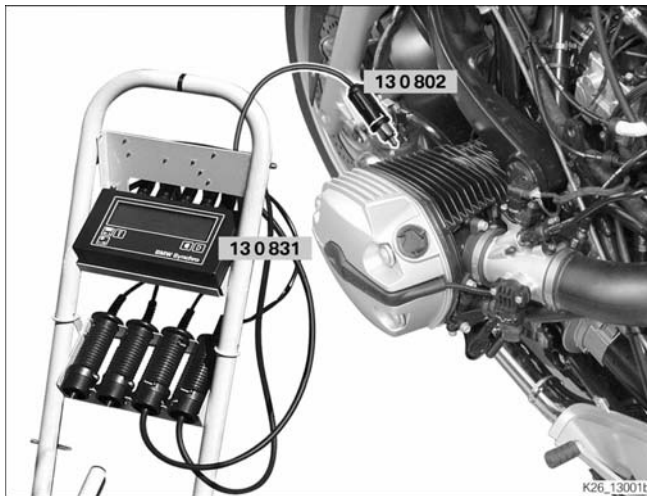
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the

throttle cable.**Measure:**

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

**Note**

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.

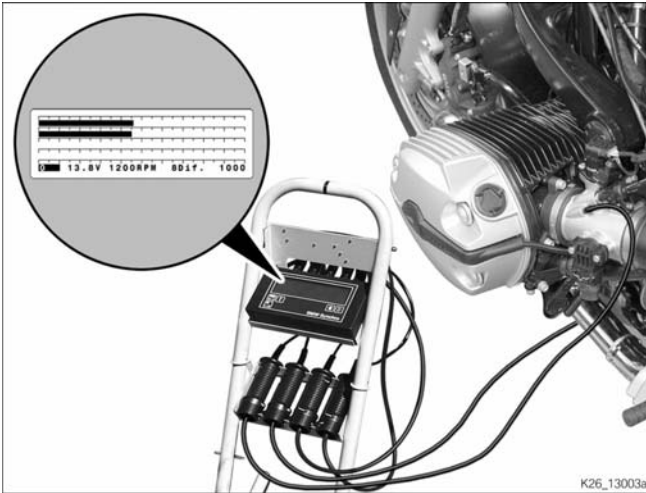
**Attention**

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to

synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

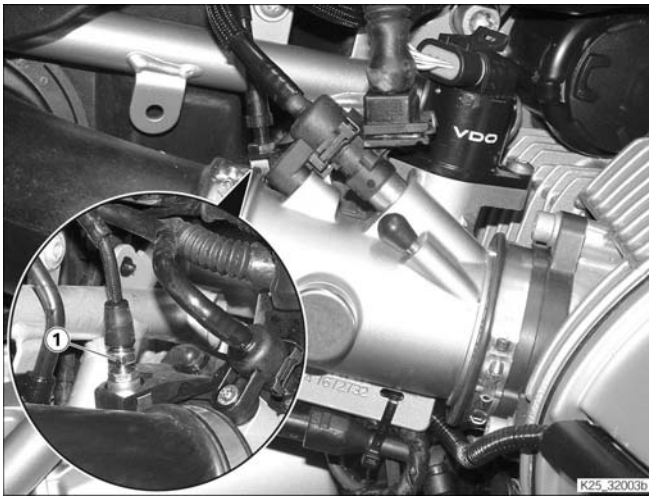
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change



simultaneously as you slowly operate the throttle.
 » Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

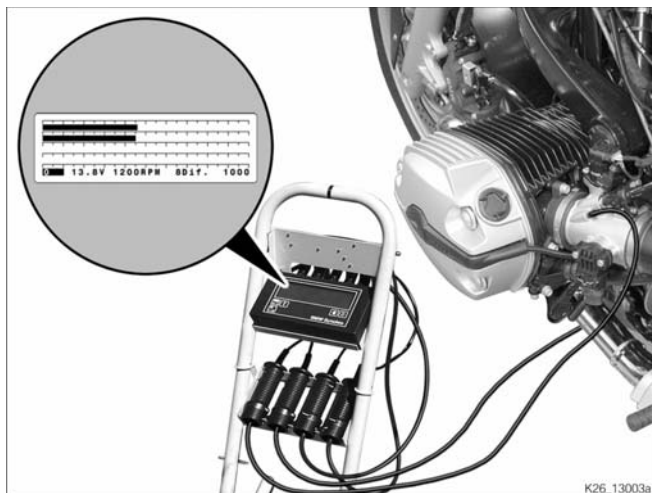
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.

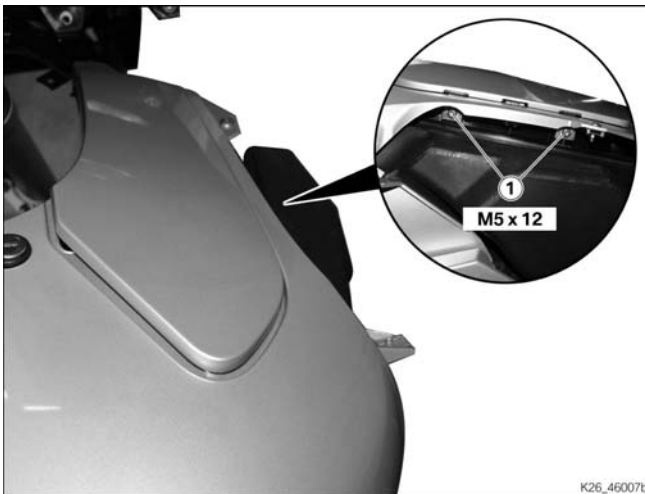
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

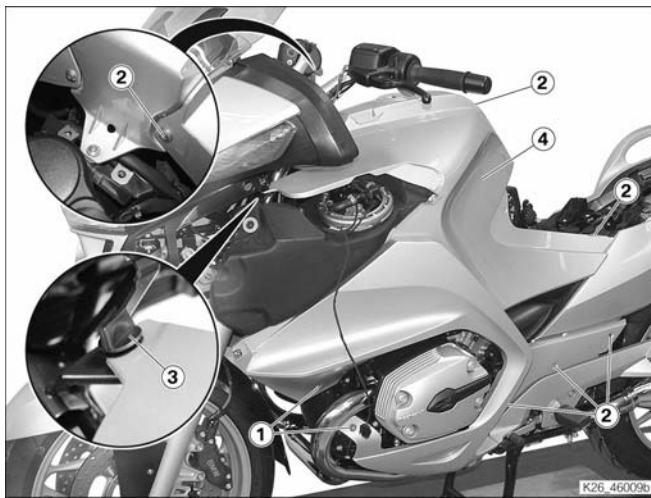
(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover

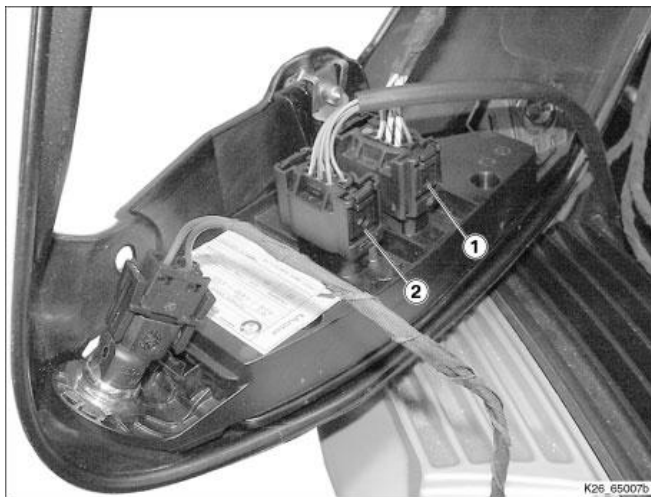
- Fit tank cover.
- Install screws (2).



- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **32 73 101 Replacing throttle cable to handlebar**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

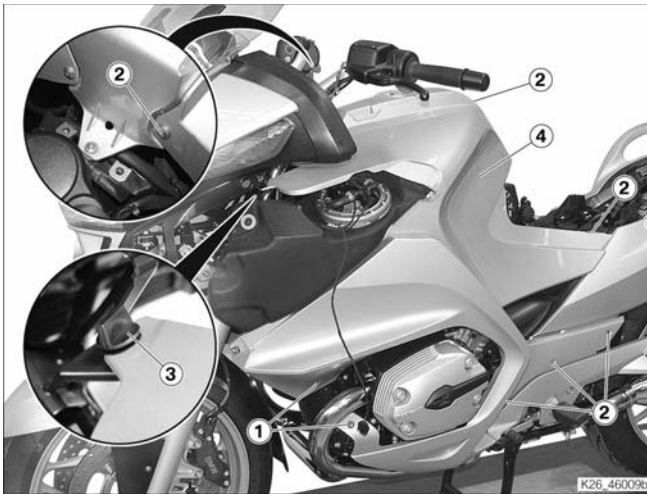


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

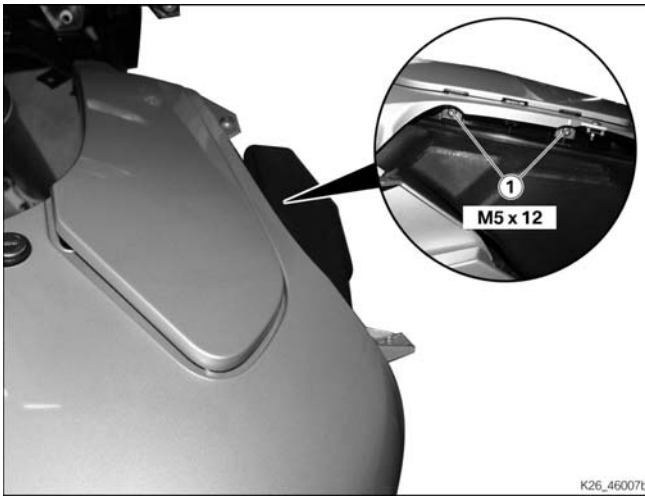
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



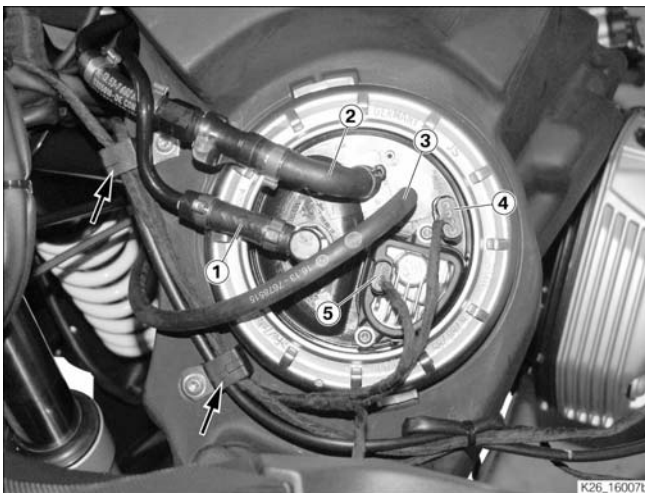
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

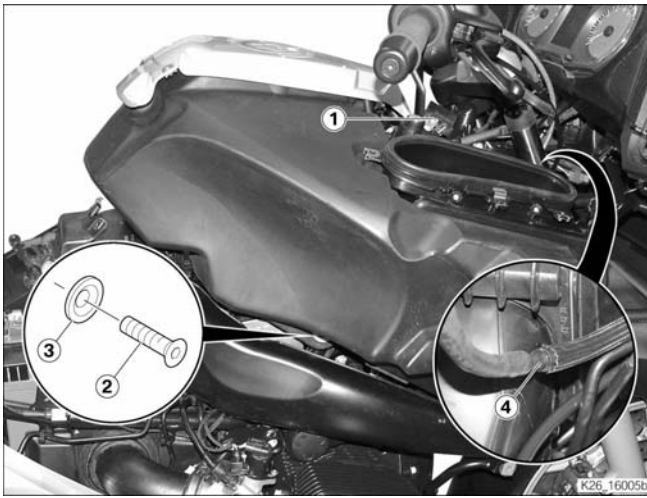


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

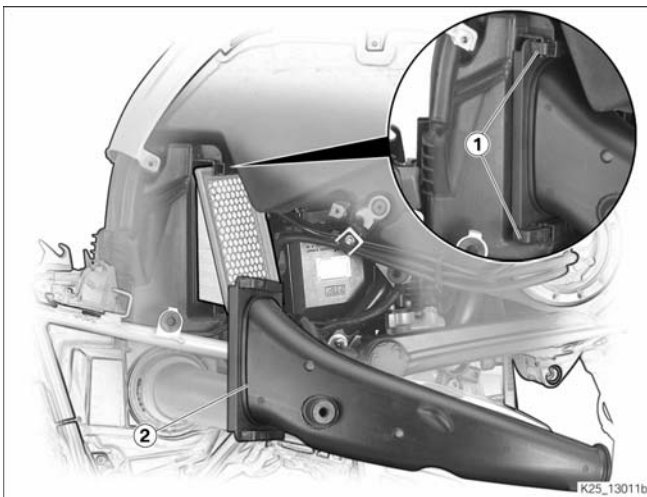


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing intake air pipe

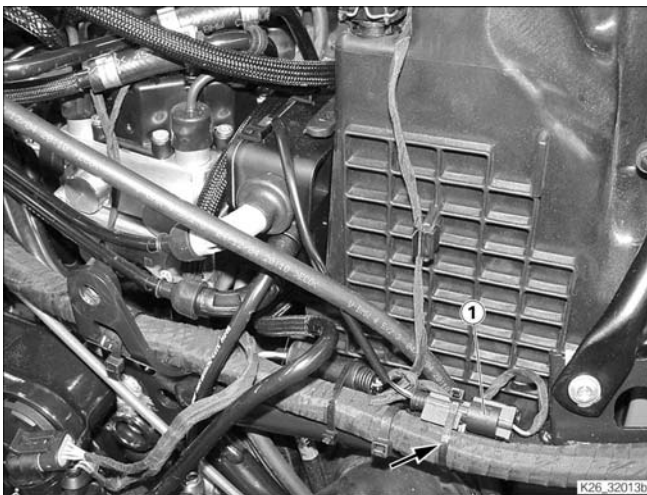
- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Releasing cable divider

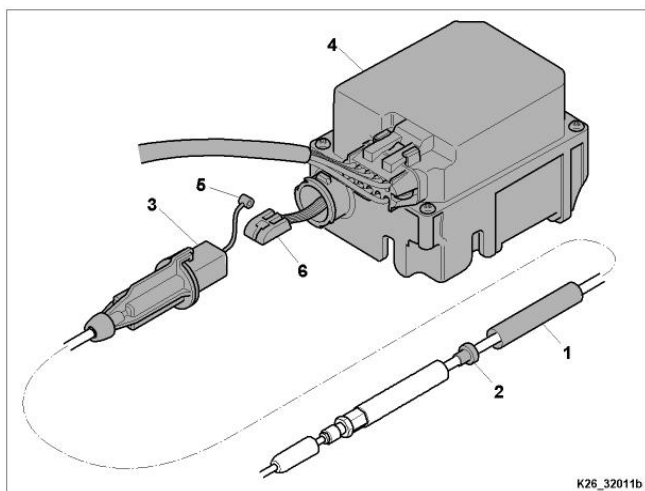
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).

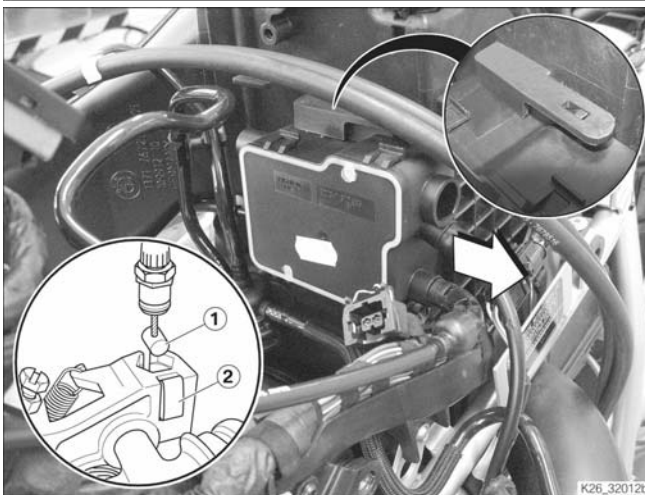


Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).

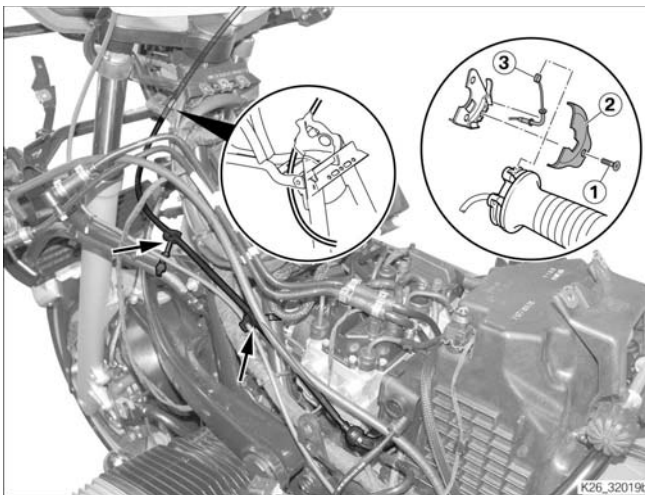


- Thread through Bowden cable (5) towards the rear.



- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

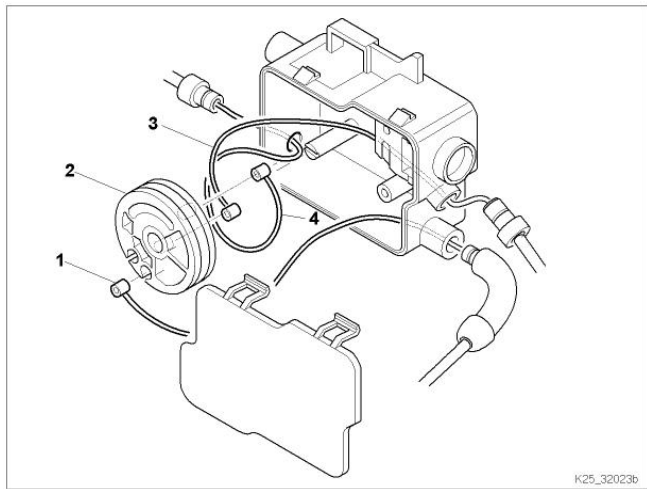
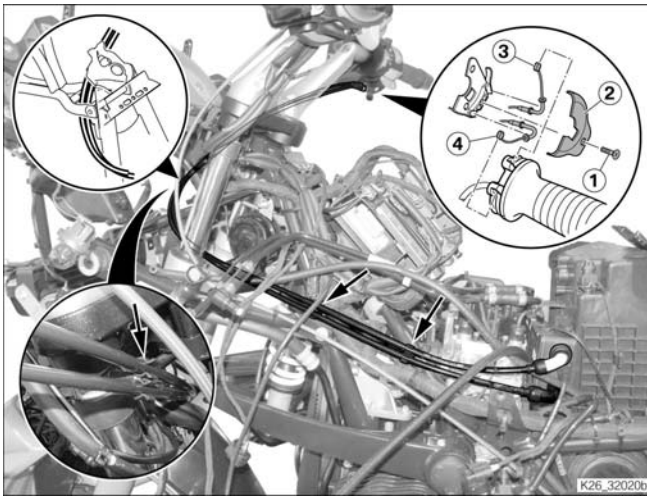
(-) Removing throttle cable to handlebar



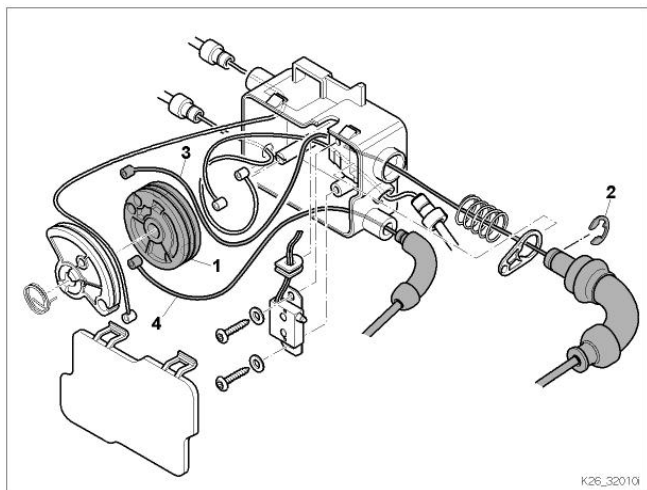
- Remove screw (1).
- Remove cover (2) from throttle twistgrip.
- Disengage Bowden cable (3).
- Unclip Bowden cable (3) from retainers (arrows) on frame.

Variant, cruise control

- Remove screw (1).
- Remove cover (2) from throttle twistgrip.
- Disengage Bowden cables (3) and (4).
- Unclip Bowden cables (3) and (4) from retainers (arrows) on frame.



- Remove the cap from the throttle-cable divider.
- Remove pulley (2).
- Disengage Bowden cables (1).
- Remove Bowden cable.

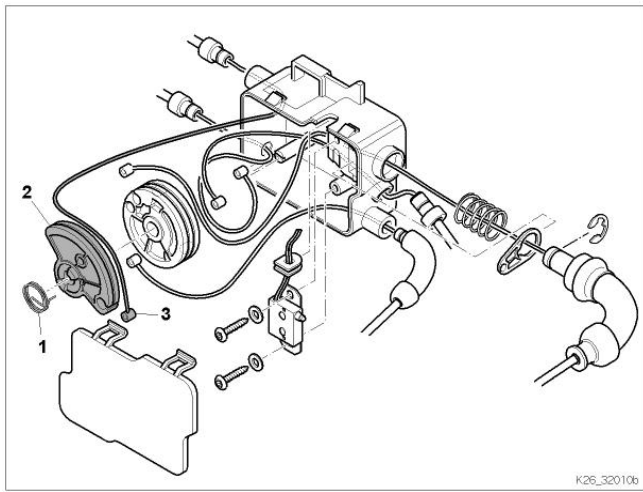


Variant, cruise control

- Remove the cap from the throttle-cable divider.

► Removing Bowden cable for cruise control

- Remove spring (1).
- Remove pulley (2).
- Disengage Bowden cable (3) and remove.

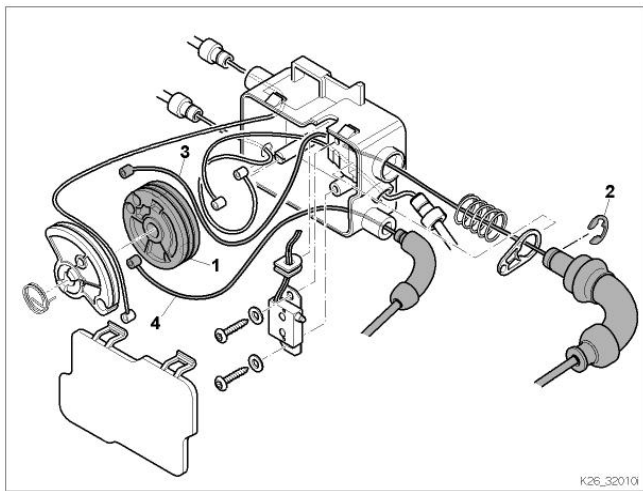


K26_32010a



Variant, cruise control

- Remove pulley (1).
- Removing lock washer (2)
- Disengage Bowden cables (3) and (4).
- Unclip Bowden cables (3) and (4) from retainers on frame.
- Remove Bowden cables while paying attention to the gaiter.



K26_32010a

(-) Installing throttle cable to handlebar

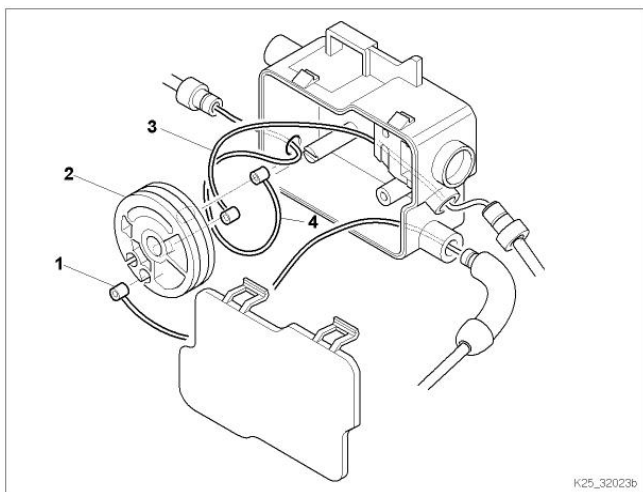
- Engage Bowden cable (1) on pulley (2).
- Make sure that the other cable assemblies are engaged correctly.



Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

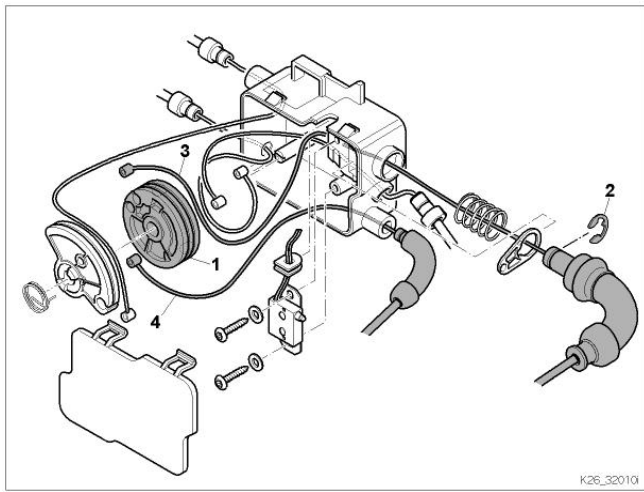


K25_32023b

- Fit cable pulley (2) into the cable divider, noting the locating pin.
- Close cable divider with cover.

Variant, cruise control

- Fit Bowden cables (3) and (4) in the cable divider while paying attention to the gaiter.
- Engage Bowden cables (3) and (4) on cable pulley (1).
- Install lock washer (2).
- Make sure that the other cable assemblies are



engaged correctly.

⚠ Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (1) in cable divider, paying attention to the locator pin.

Variant, cruise control

► Installing Bowden cable for cruise control

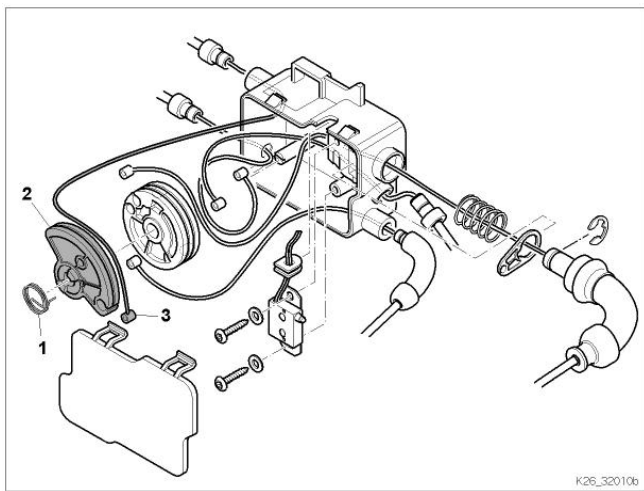
- Engage Bowden cable (3) on pulley (2).

⚠ Attention

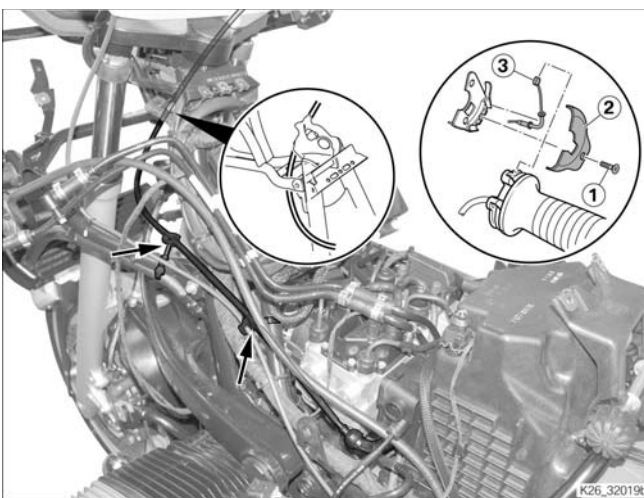
Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (2) into the cable divider, noting the locating pin.
- Fit spring (1).

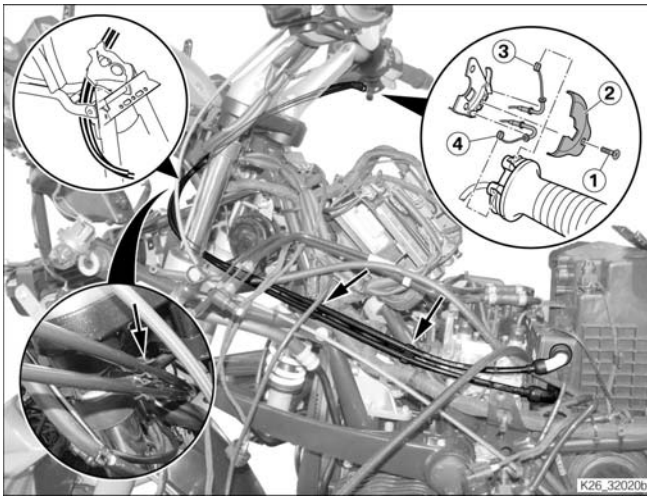


- Close cable divider with cover.
- Clip Bowden cable (3) into retainers (arrows) on frame.
- Engage Bowden cable (3) on the throttle twistgrip.
- Fit cover (2) on throttle twistgrip and secure with screw (1).



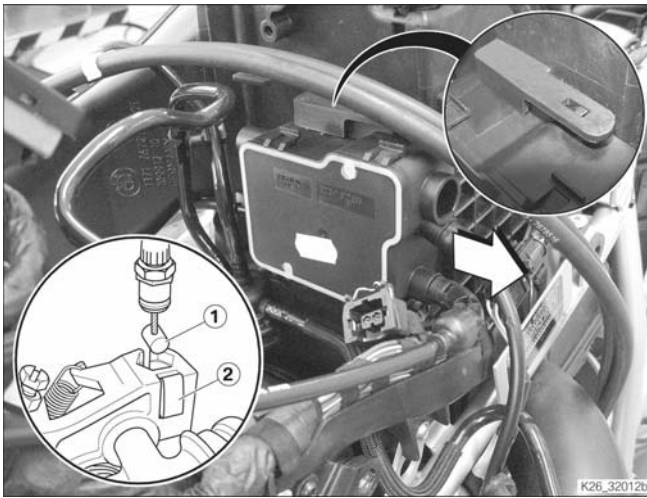
Variant, cruise control

- Clip Bowden cables (3) and (4) into retainers on frame.
- Engage Bowden cables (3) and (4) on the throttle twistgrip.
- Fit cover (2) on throttle twistgrip and secure with screw

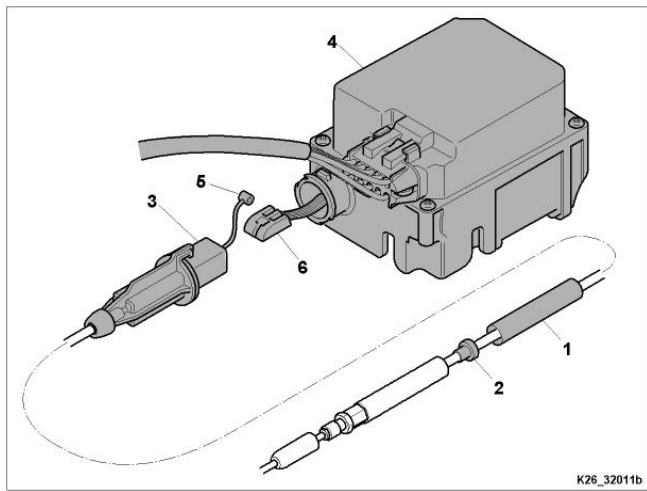


(1).

(-) Securing cable divider



- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.

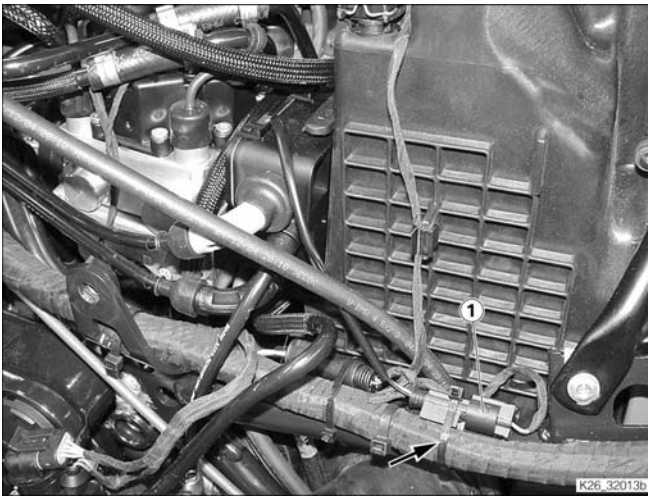


Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).

Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).




- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

(-) Adjusting throttle cable

- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.




 Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten lock nut.

Test

- Check the play at the throttle twistgrip.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	

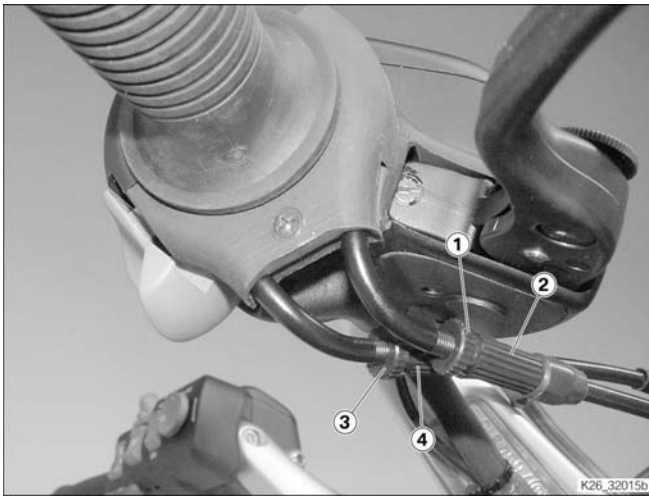
Result: Play at throttle twistgrip is not OK.

Measure:

- Repeat the procedure.

Variant, cruise control

- Completely slacken off lock nut (3).
- Fully tighten adjusting screw (4).
- Adjust Bowden cables.
- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

- Tighten locknut (1).
- Completely slacken off lock nut (3).
- With the throttle twistgrip in the idle position, set the gap between locknut (3) and adjusting screw (4) as per specification by turning the adjusting screw.



Technical data

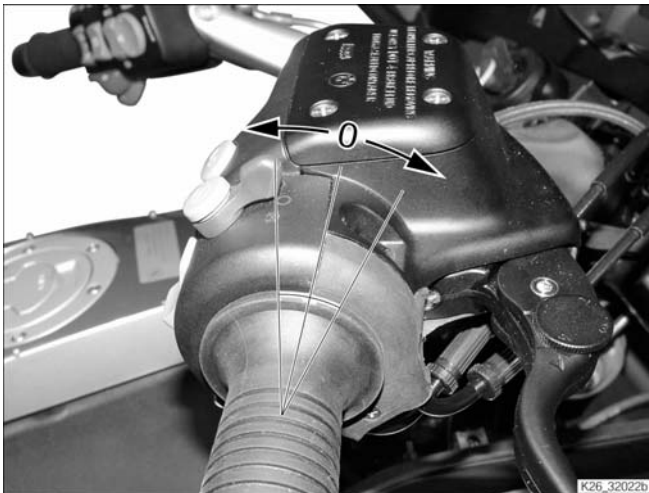
Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

- Tighten locknut (3).

Variant, cruise control

Test

- Turn the throttle twistgrip forward past its zero position.



Technical data

Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
--	--	-------------	--

Result: Play is correct at the throttle twistgrip and the microswitch in the throttle-cable divider trips with an audible click.

Measure:

- Setting is OK.

Result: Insufficient play or microswitch does not trip.

Measure:

- Adjust throttle-closer cable or check microswitch.

Test

- Turn the throttle twistgrip back from its zero position.



Technical data

Setting, play for Bowden cable of throttle		max. 0.5 mm	
--	--	-------------	--

twistgrip			
-----------	--	--	--

Result: Play at the throttle twistgrip is correct.

Measure:

- Setting is OK.

Result: Insufficient play.

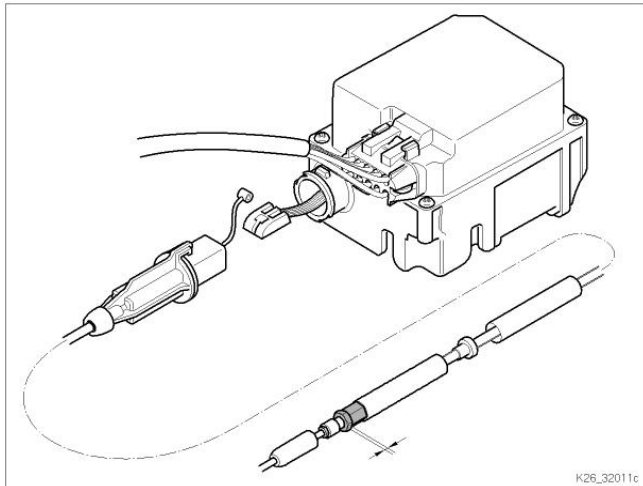
Measure:

- Adjust the throttle-opener cable.

Variant, cruise control

(-) Adjusting Bowden cable for cruise control

- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.



(-) Checking freedom of movement of throttle cable and checking for kinks and chafing



Note

The throttle cable must be correctly adjusted in order for the electronic engine management system to function correctly.

Test

- Check the throttle cable for kinks and chafing.
- » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
- » The throttle twistgrip returns to the closed position by itself.
- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
- » Slight play perceptible.



Technical data

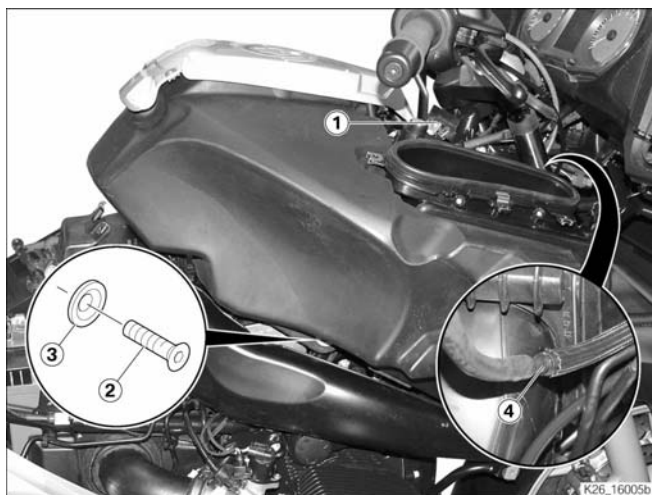
Test criterion, throttle cable		Results of all test steps satisfied	
--------------------------------	--	-------------------------------------	--

Result: Test criterion not satisfied.

Measure:

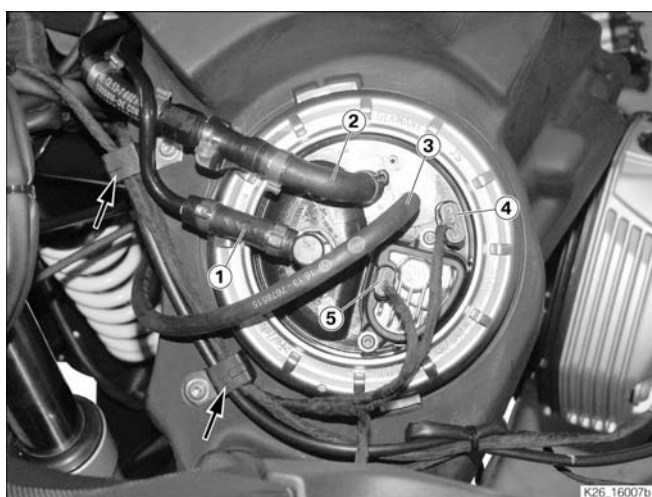
- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

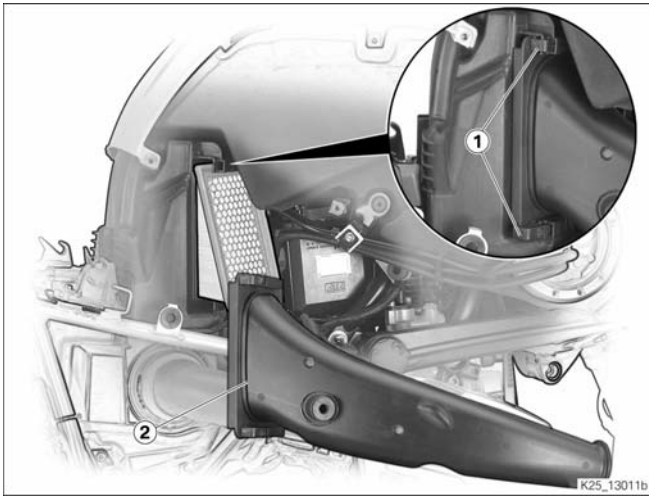
Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

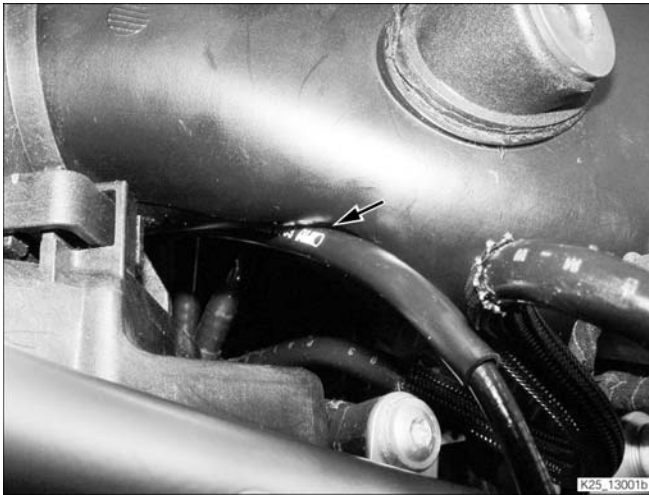
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter



- housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



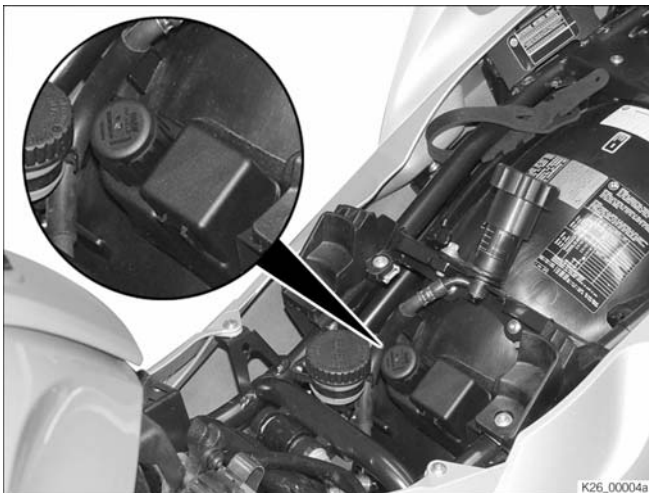
- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
---	--	------------	--

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

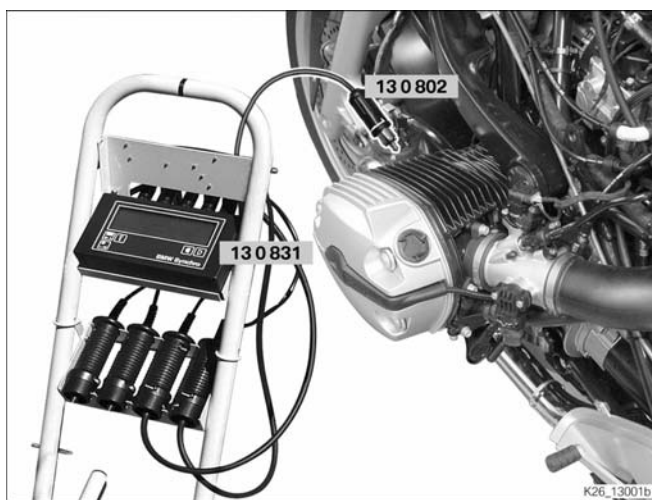
► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the



motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

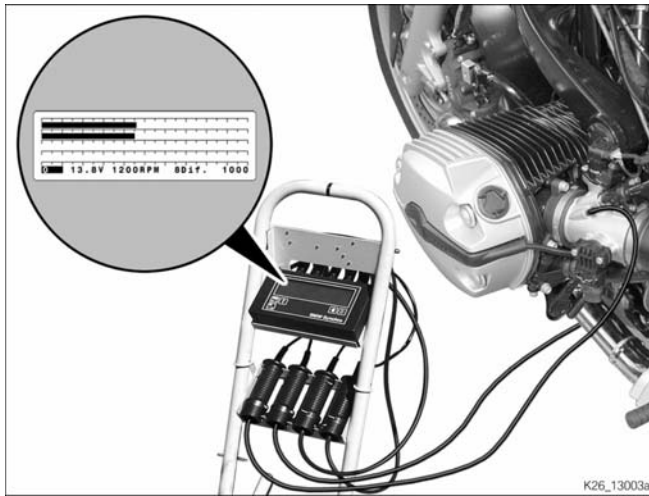
► 1. Checking idle

Test



Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the



system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not


change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

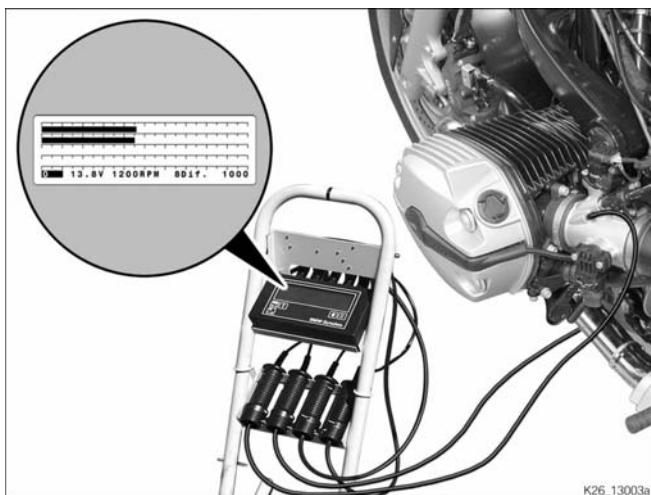
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 -	max. 15 mbar	

	1800 min ⁻¹		
--	---------------------------	--	--

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



▶ **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

-
- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

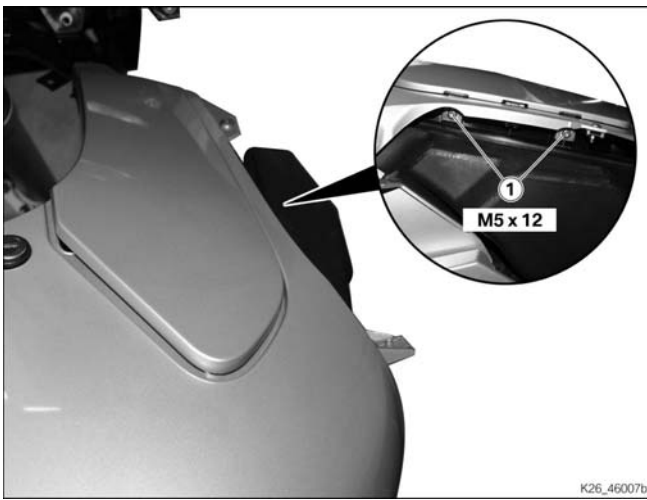
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



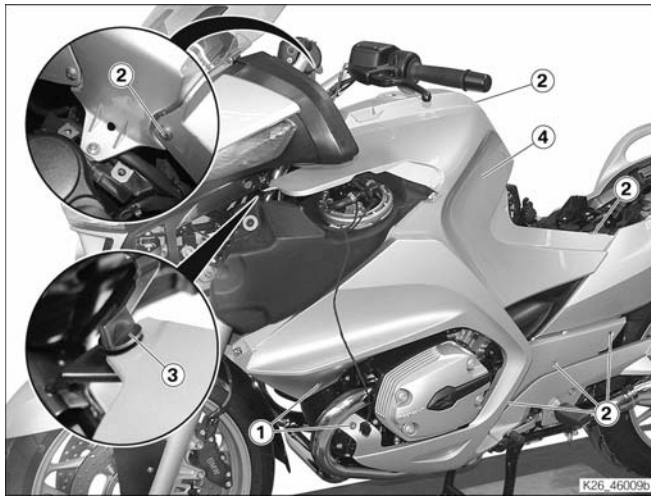
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **32 73 150 Replacing Bowden cable for cruise control**

Variant, cruise control

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

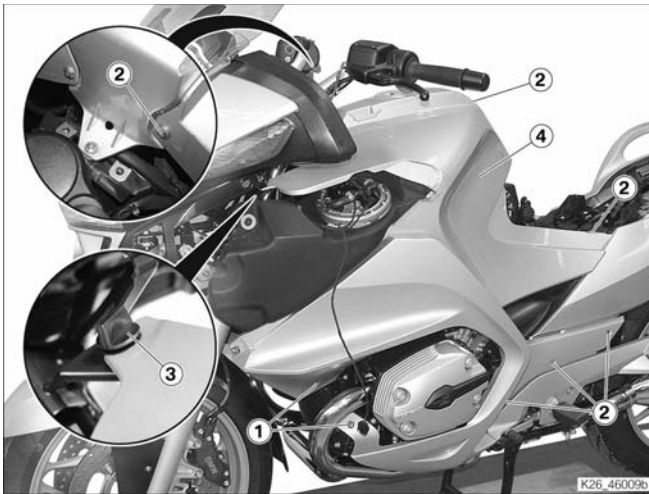


- Disconnect plug (1) from socket.



- Remove trim panel.

(-) Removing entire left side tank cover



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

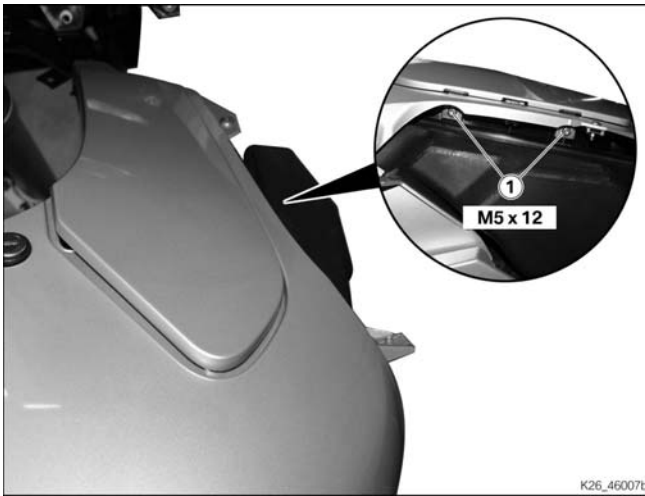
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



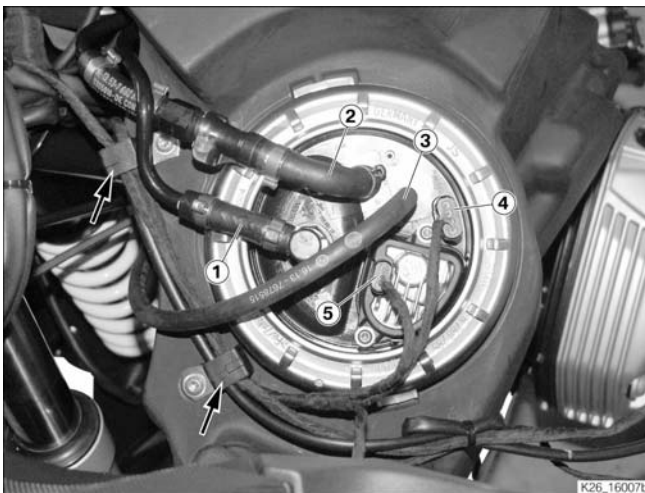
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

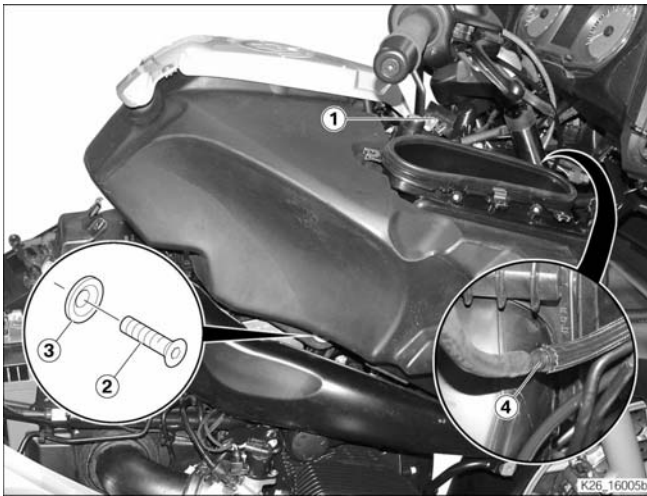


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

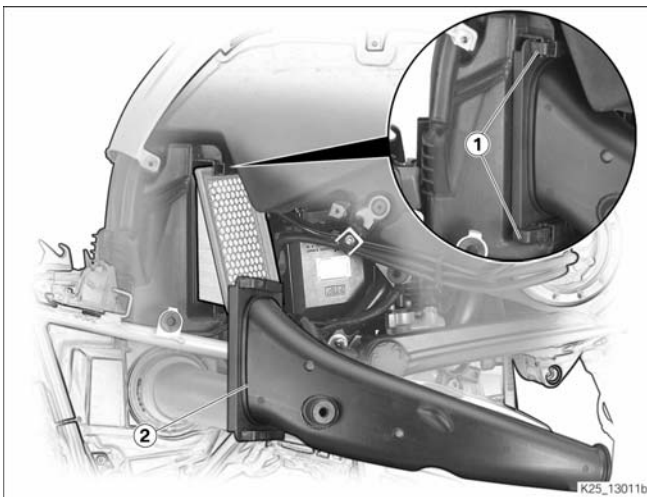


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing intake air pipe

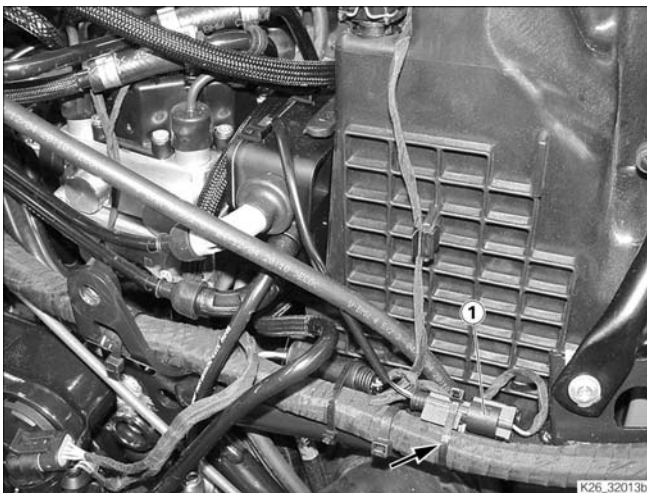
- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Releasing cable divider

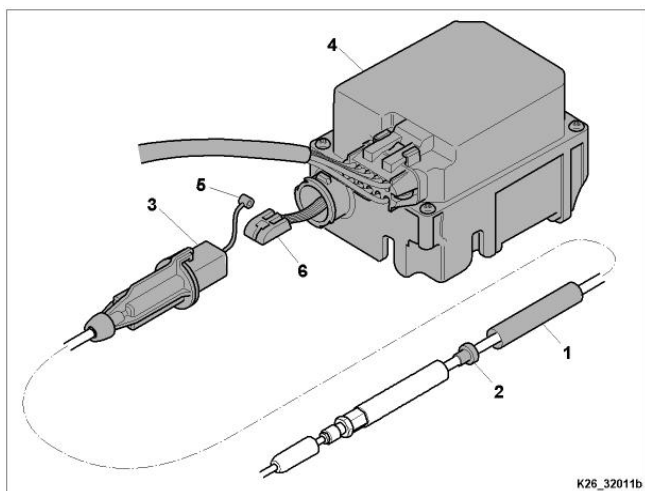
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).

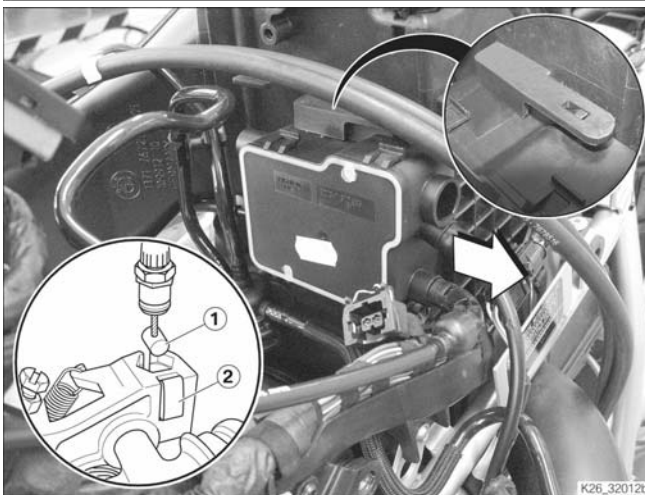


Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).

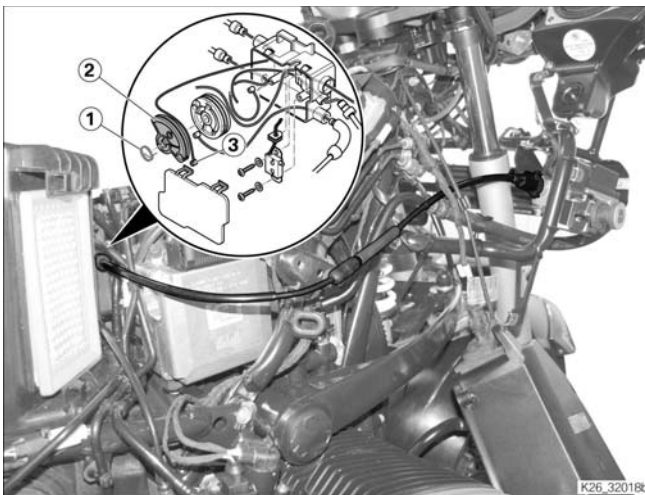


- Thread through Bowden cable (5) towards the rear.



- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

(-) Removing Bowden cable for cruise control



- Remove the cap from the throttle-cable divider.
- Remove spring (1).
- Remove pulley (2).
- Disengage Bowden cable (3) and remove.

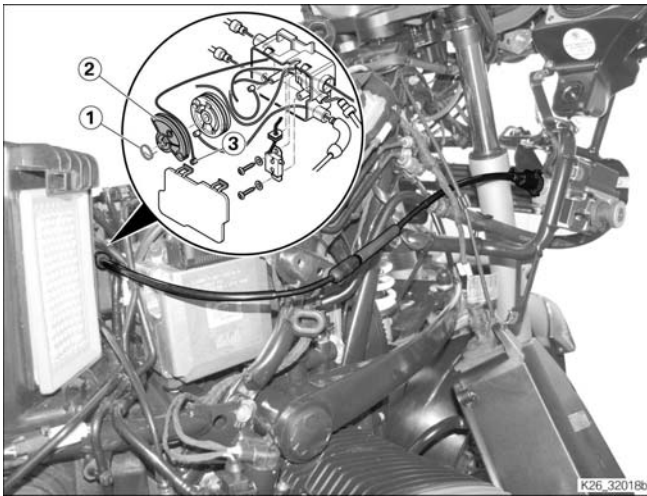
(-) Installing Bowden cable for cruise control

- Engage Bowden cable (3) on pulley (2).



Attention

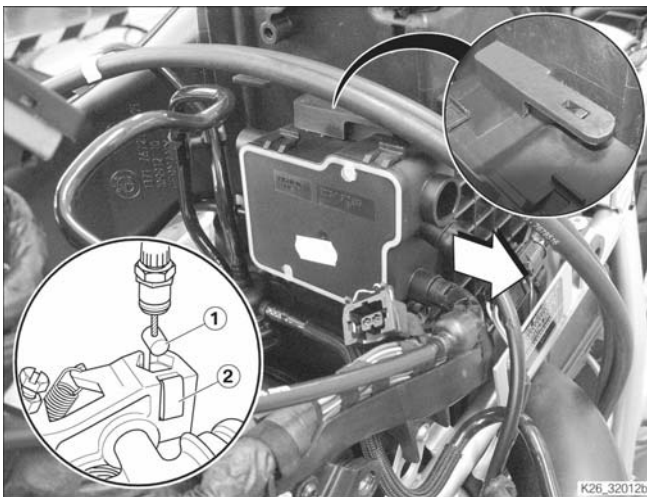
Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.



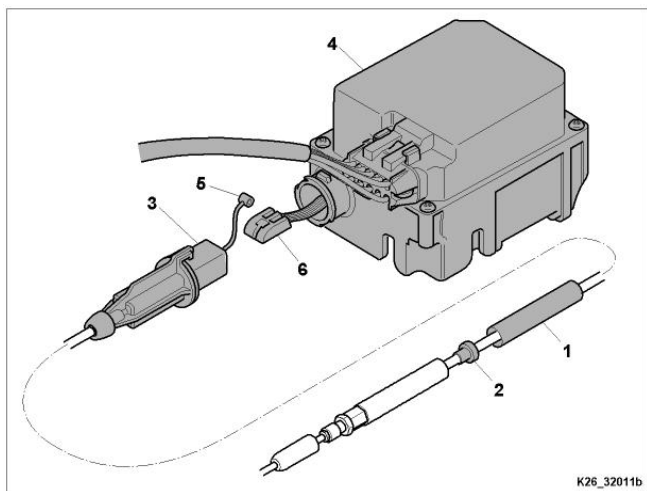
Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (2) into the cable divider, noting the locating pin.
- Fit spring (1).
- Close cable divider with cover.

(-) Securing cable divider



- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.

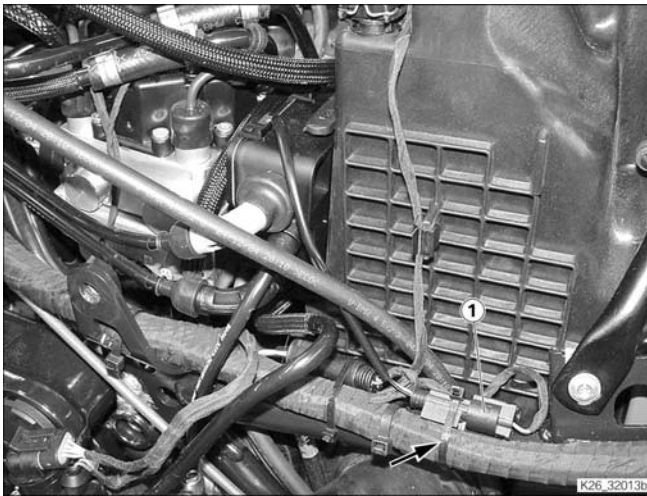


Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).

Variant, cruise control

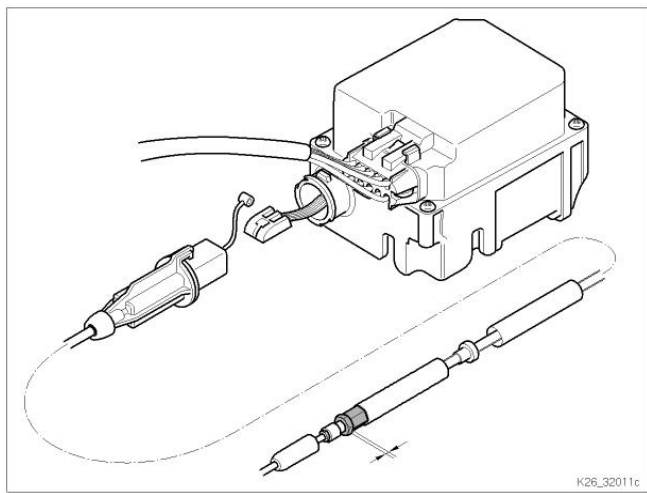
- Connect plug (1) and secure cable tie (arrow).




- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

(-) Adjusting Bowden cable for cruise control

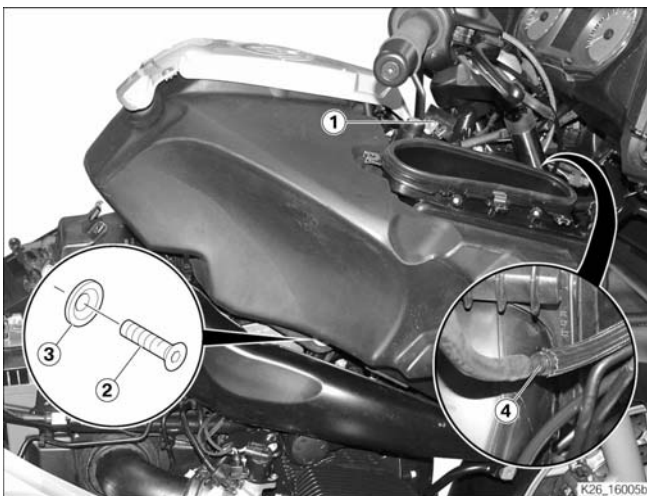
- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.




 Technical data			
Setting for Bowden cable, cruise control		2 - 3 mm	Variant, cruise control

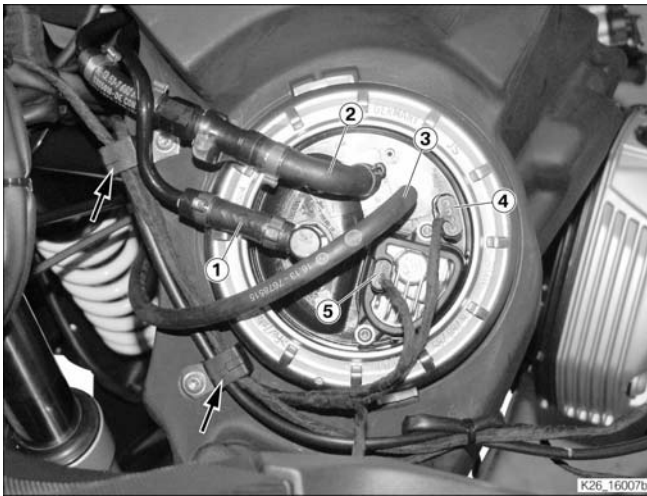
(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.



 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).



- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

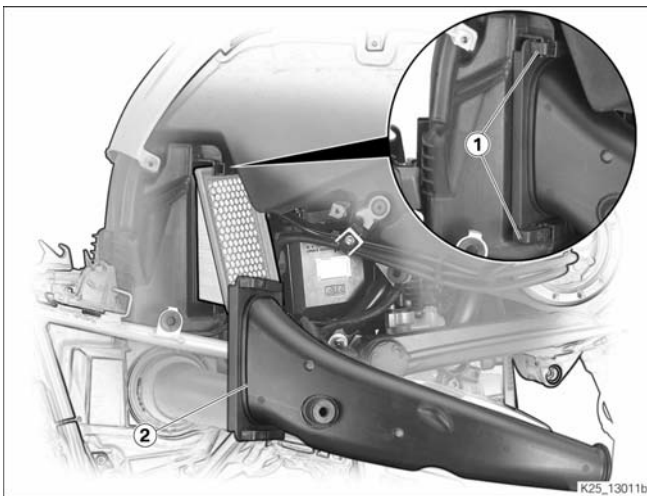
⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

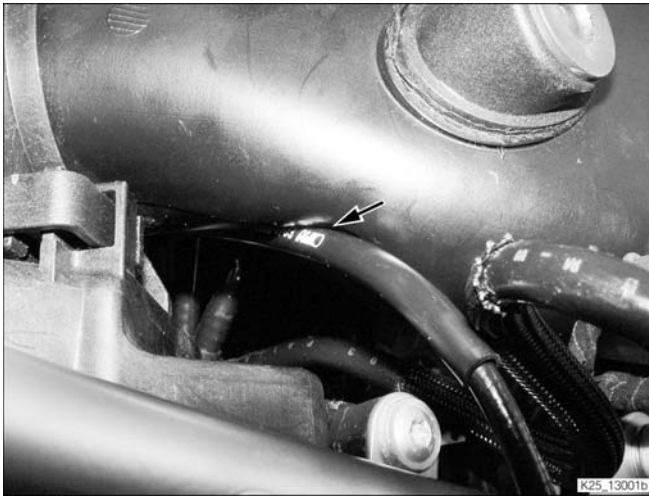
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing intake air pipe



- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

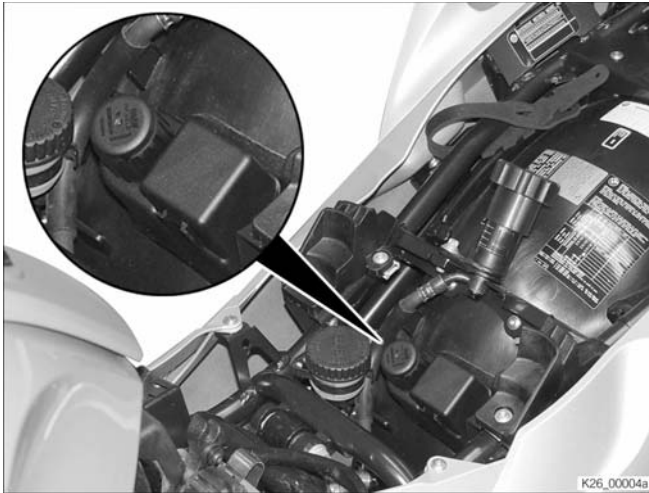


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.

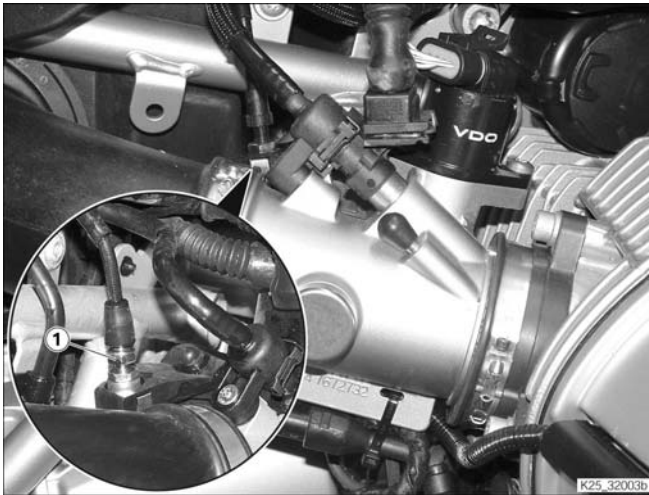


Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

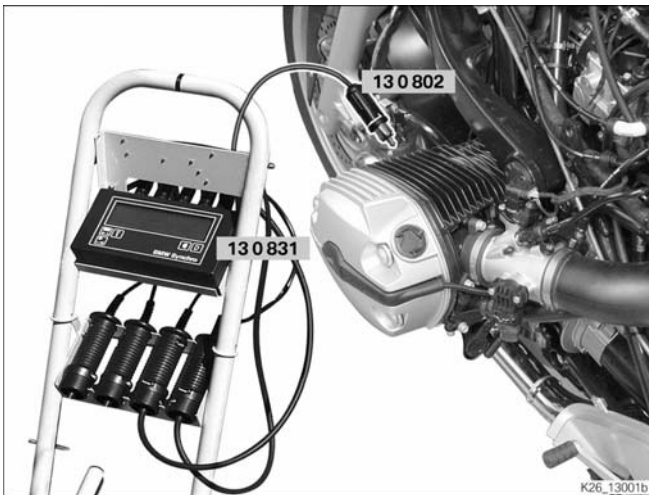
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

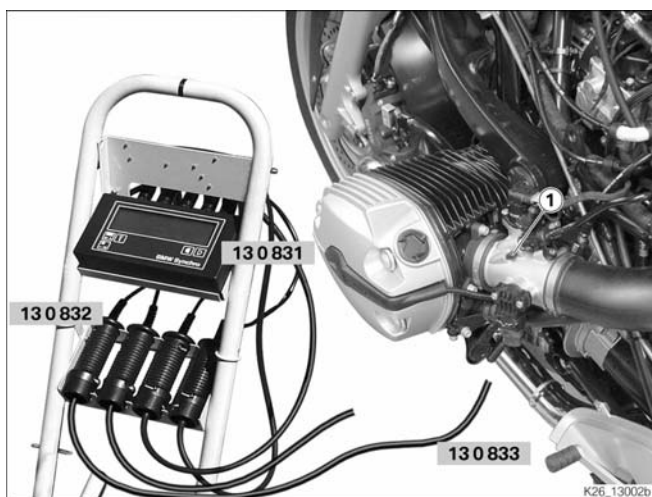


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- » The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



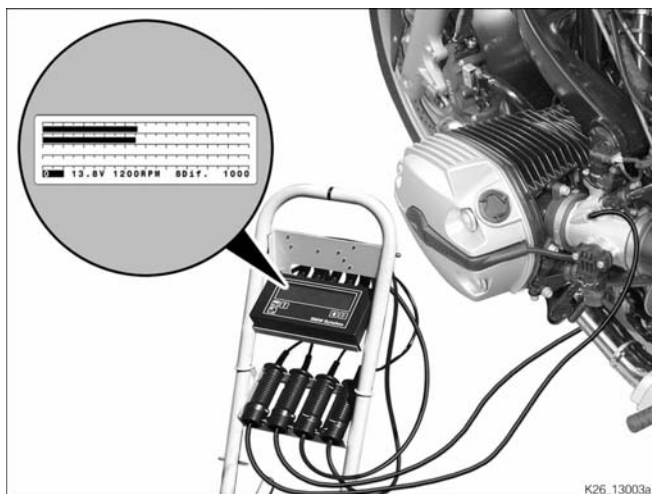
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

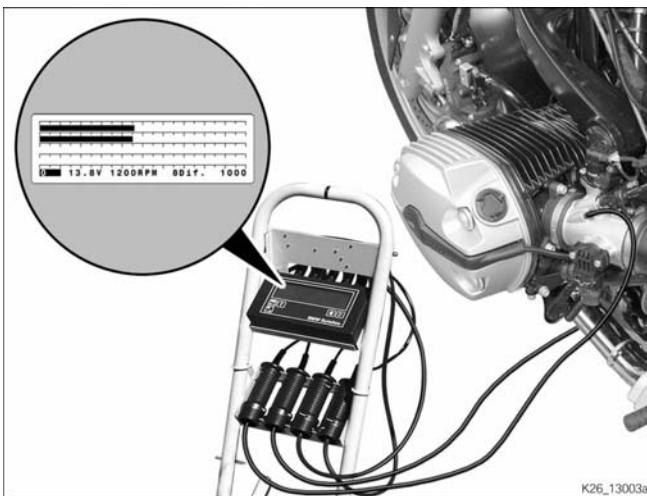
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmetered air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

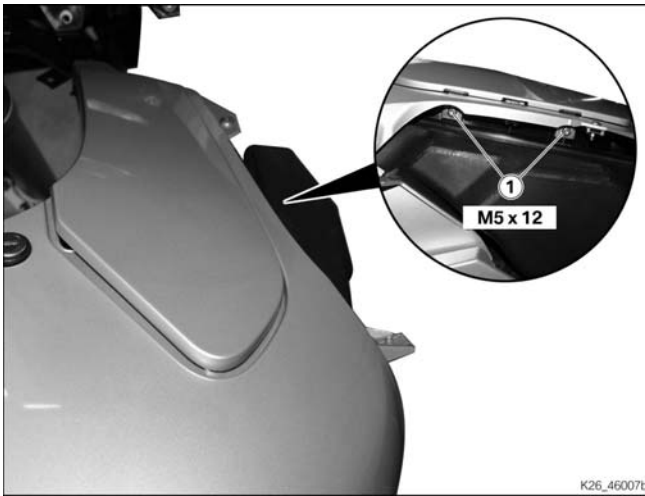
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



**32 73 506 Replacing throttle cable (throttle-cable divider/ throttle valve, left)
(associated work)**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

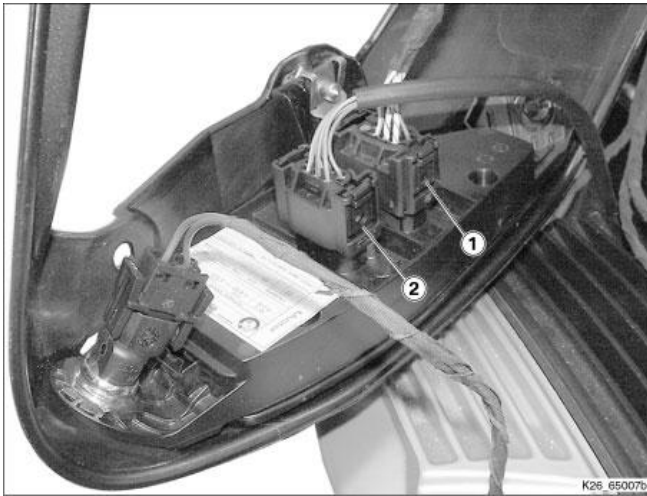


- Disconnect plug (1) from socket.

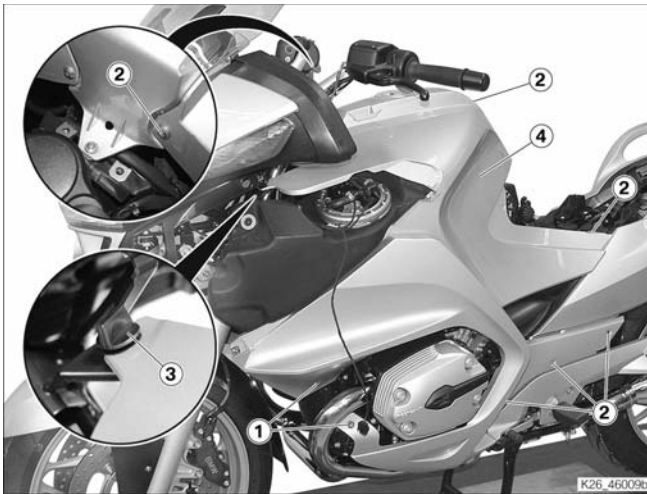


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

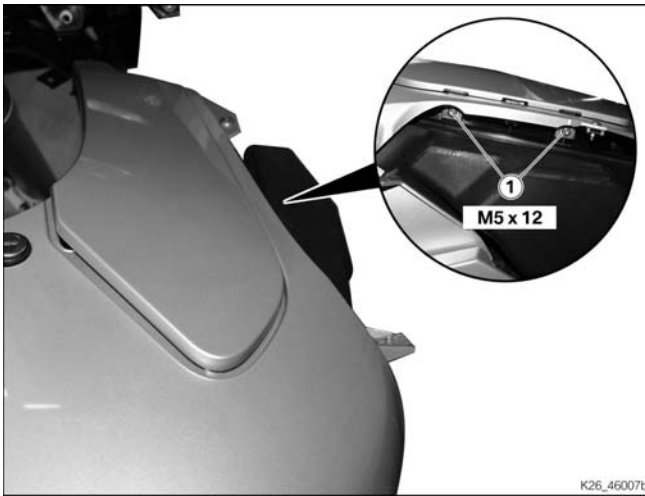
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



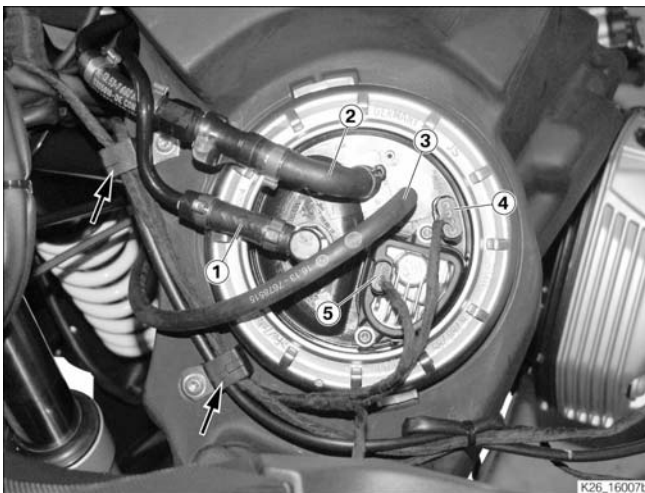
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

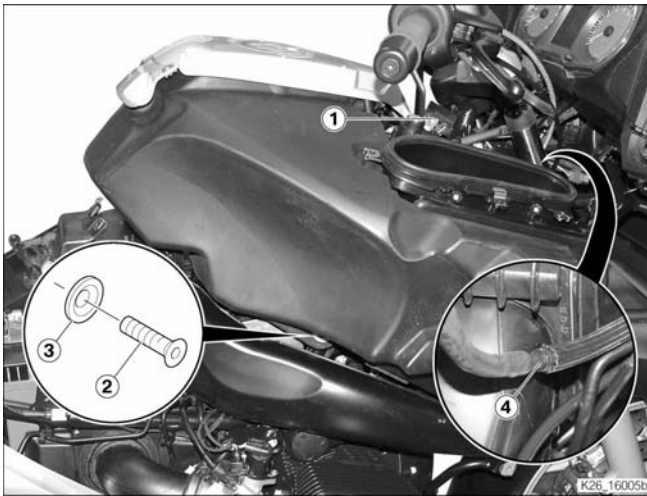


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

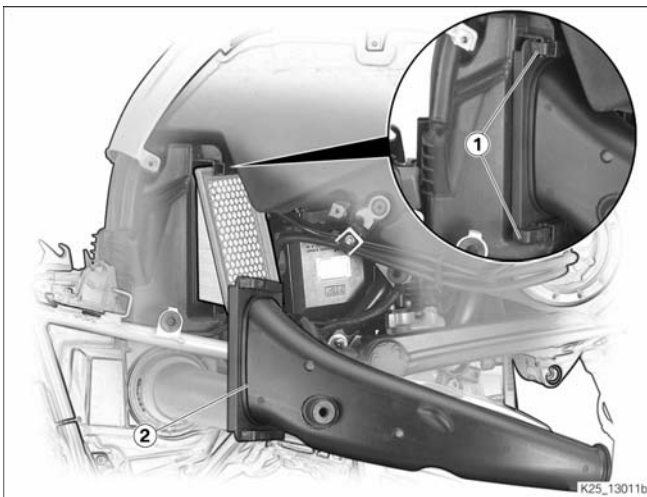


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing intake air pipe

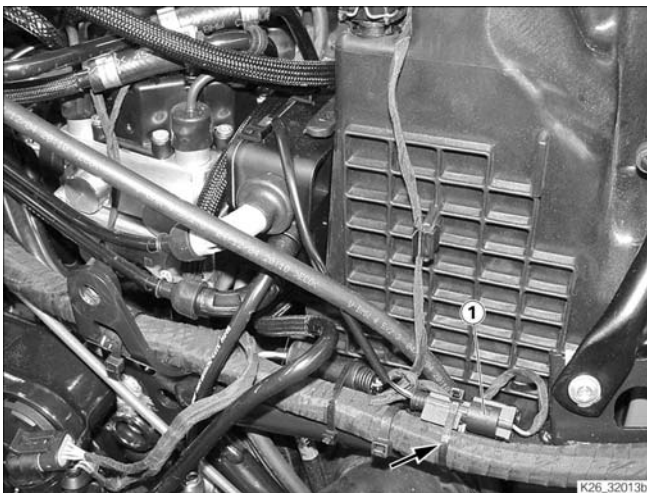
- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Releasing cable divider

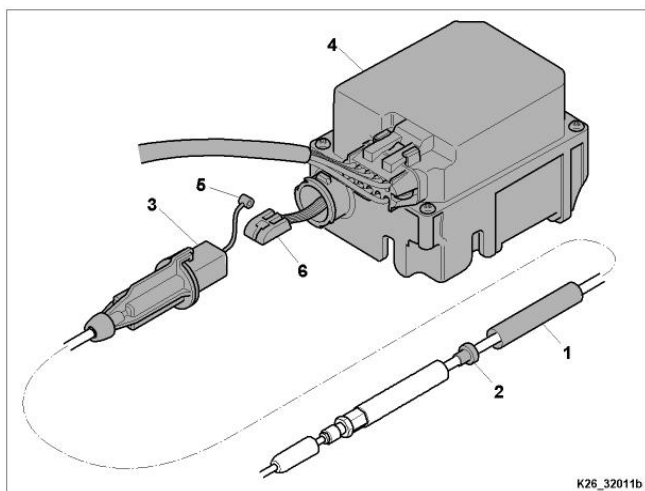
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).

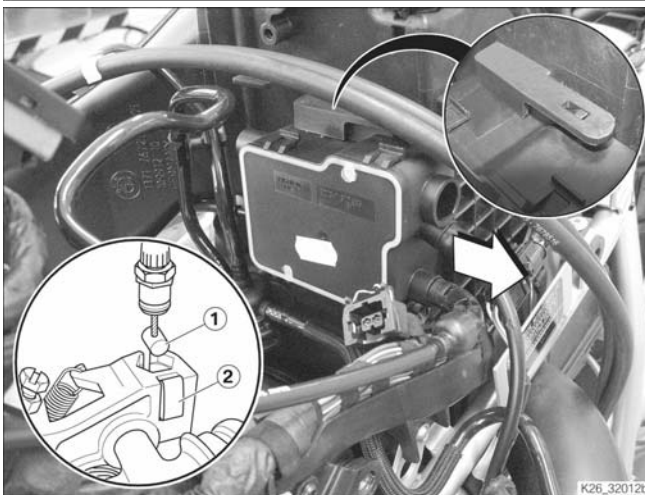


Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).

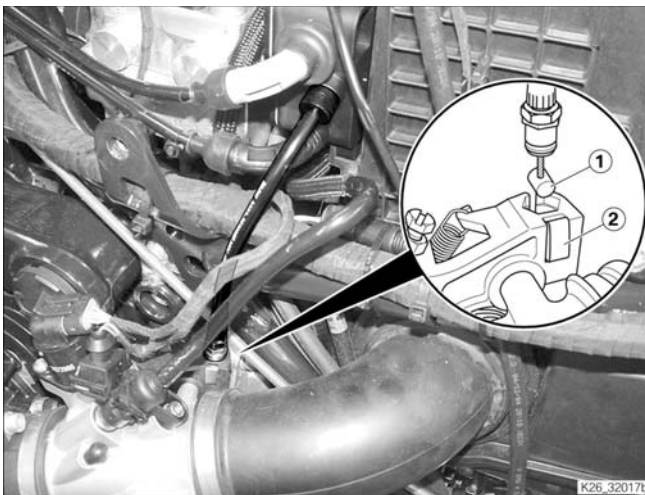


- Thread through Bowden cable (5) towards the rear.



- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

(-) Removing throttle cable on left

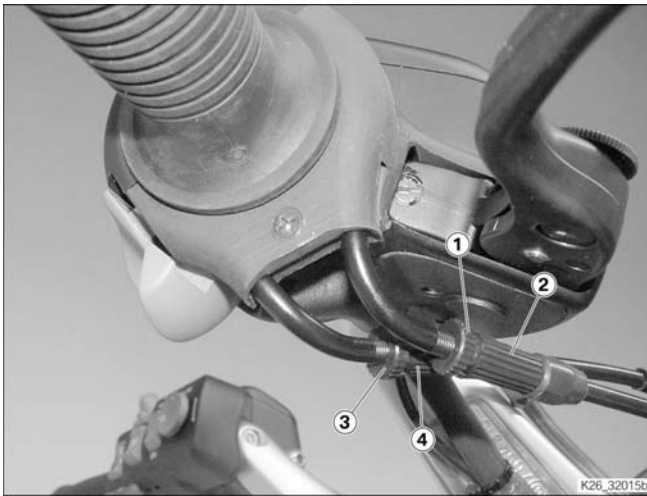


- Disengage the throttle cable from the left throttle valve.
- Using a suitable tool, press back retaining plate (2) from above until the Bowden cable (1) can be removed.

- Remove the cap from the throttle-cable divider.

Variant, cruise control

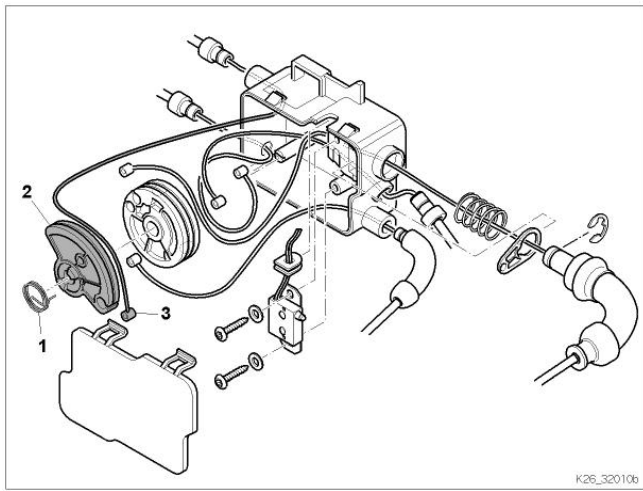
- Completely slacken off lock nut (3).
- Release adjusting screw (4).



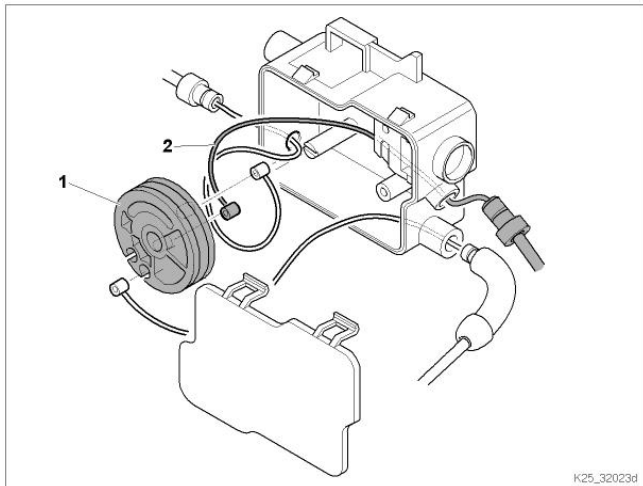
Variant, cruise control

► Removing Bowden cable for cruise control

- Remove spring (1).
- Remove pulley (2).
- Disengage Bowden cable (3) and remove.

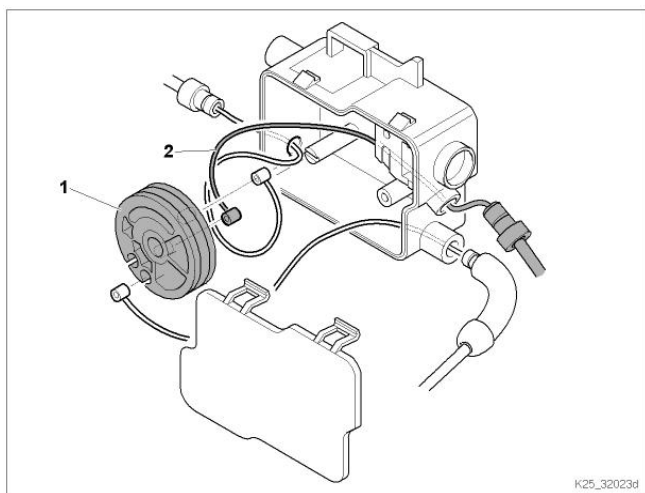


- Remove pulley (1).
- Disengage throttle cable (2).
- Remove the throttle cable.



(-) Installing throttle cable on left

- Make sure that the other cable assemblies are engaged correctly.
- Engage throttle cable (2) on pulley (1).



⚠ Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

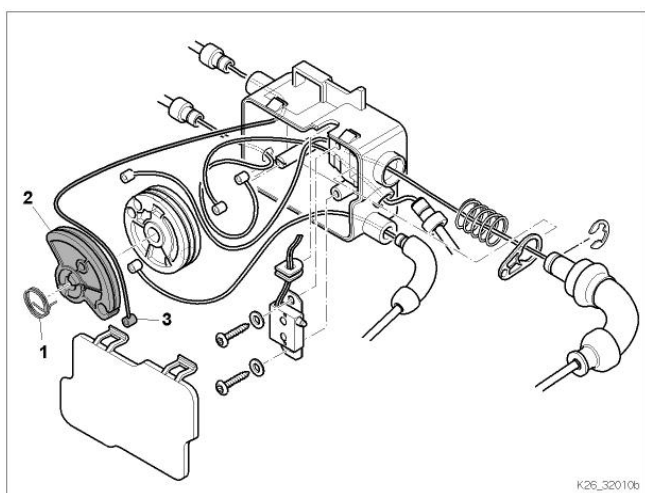
- Fit cable pulley (1) into the cable divider, noting the locating pin.

- Close cable divider with cover.

Variant, cruise control

▶ Installing Bowden cable for cruise control

- Engage Bowden cable (3) on pulley (2).



⚠ Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

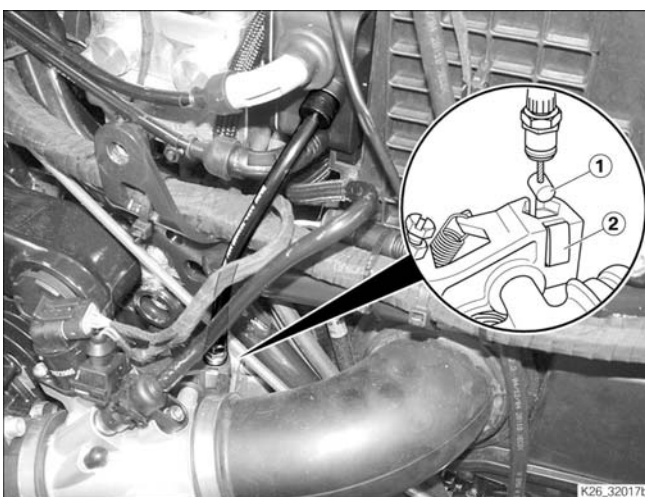
Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (2) into the cable divider, noting the locating pin.

- Fit spring (1).

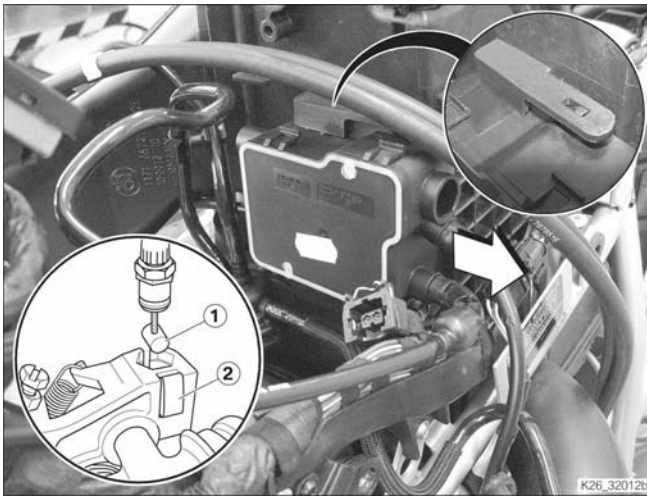
- Close cable divider with cover.

- Using a suitable tool, press back retaining plate (2) from above until the Bowden cable (1) can be inserted.
- Engage throttle cable (1) on the left throttle valve.

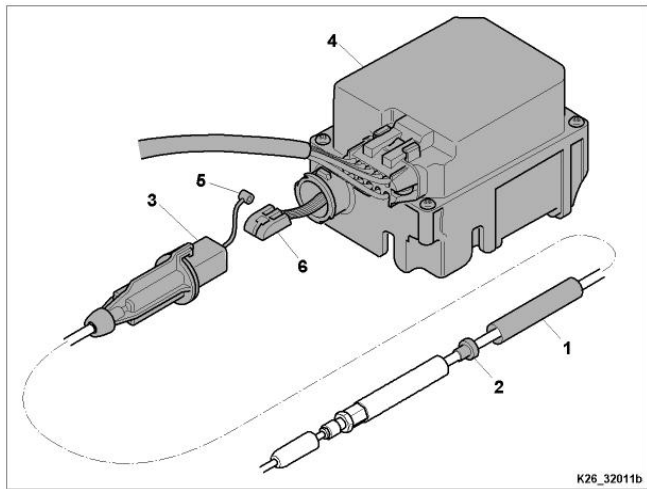


(-) Securing cable divider

- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from

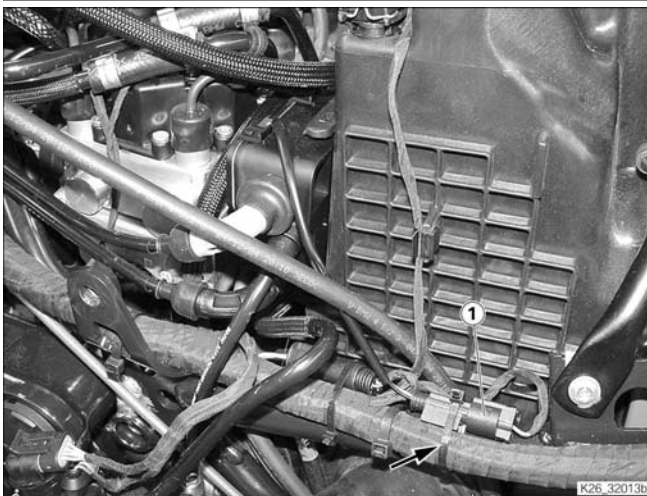


- above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.



Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).



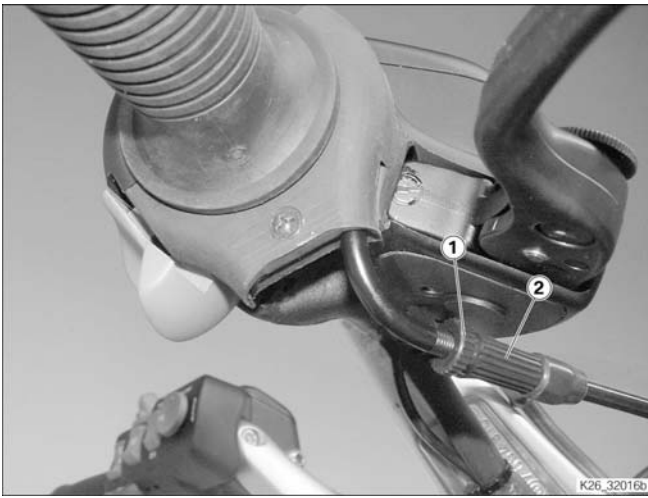
Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).

- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

(-) Adjusting throttle cable

- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

- Tighten lock nut.

Test

- Check the play at the throttle twistgrip.



Technical data

Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

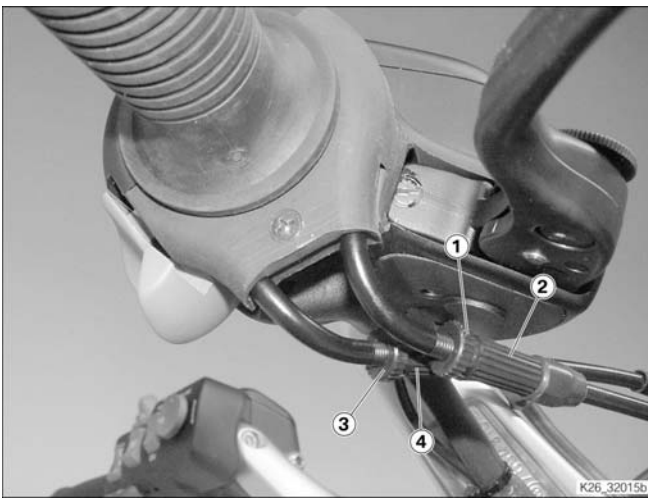
Result: Play at throttle twistgrip is not OK.

Measure:

- Repeat the procedure.

Variant, cruise control

- Completely slacken off lock nut (3).
- Fully tighten adjusting screw (4).
- Adjust Bowden cables.
- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

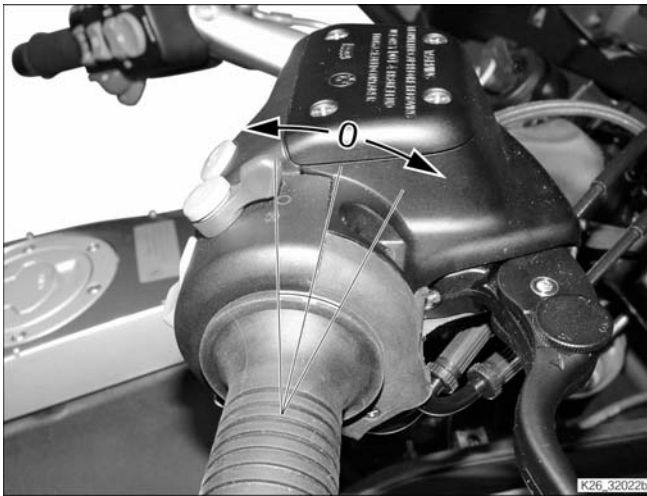
- Tighten locknut (1).
- Completely slacken off lock nut (3).
- With the throttle twistgrip in the idle position, set the gap between locknut (3) and adjusting screw (4) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--


- Tighten locknut (3).



Variant, cruise control

Test

- Turn the throttle twistgrip forward past its zero position.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play is correct at the throttle twistgrip and the microswitch in the throttle-cable divider trips with an audible click.

Measure:

- Setting is OK.


Result: Insufficient play or microswitch does not trip.

Measure:

- Adjust throttle-closer cable or check microswitch.

Test

- Turn the throttle twistgrip back from its zero position.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play at the throttle twistgrip is correct.

Measure:

- Setting is OK.

Result: Insufficient play.

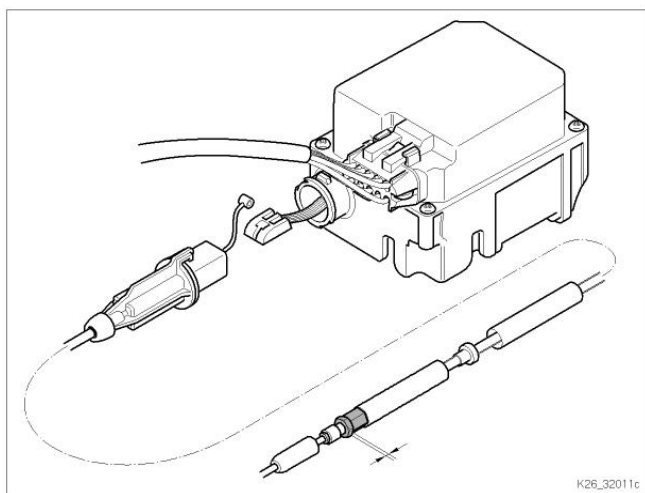
Measure:

- Adjust the throttle-opener cable.

Variant, cruise control

(-) Adjusting Bowden cable for cruise control

- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.



Technical data

Setting for Bowden cable, cruise control		2 - 3 mm	Variant, cruise control
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(-) Checking freedom of movement of throttle cable and checking for kinks and chafing



Note

The throttle cable must be correctly adjusted in order for the electronic engine management system to function correctly.

Test

- Check the throttle cable for kinks and chafing.
- » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
- » The throttle twistgrip returns to the closed position by itself.
- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
- » Slight play perceptible.



Technical data

Test criterion, throttle cable		Results of all test steps satisfied	
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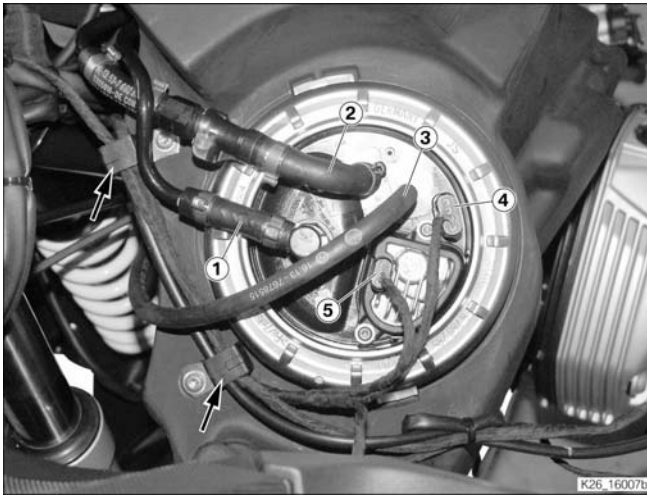
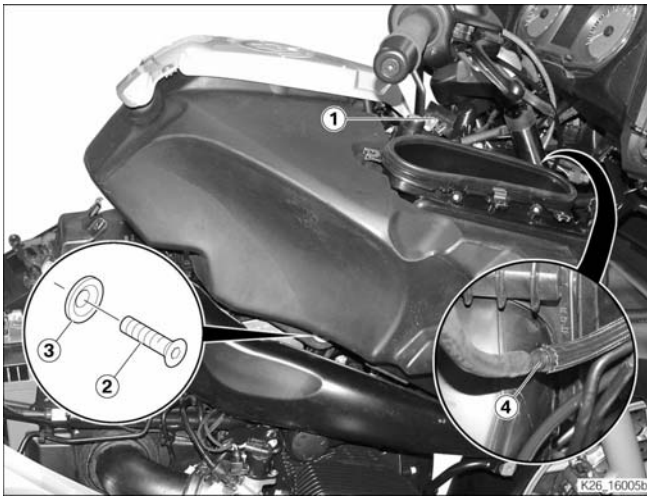
Result: Test criterion not satisfied.

Measure:

- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not



trapped between the fuel tank and the frame.

- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! **Attention**

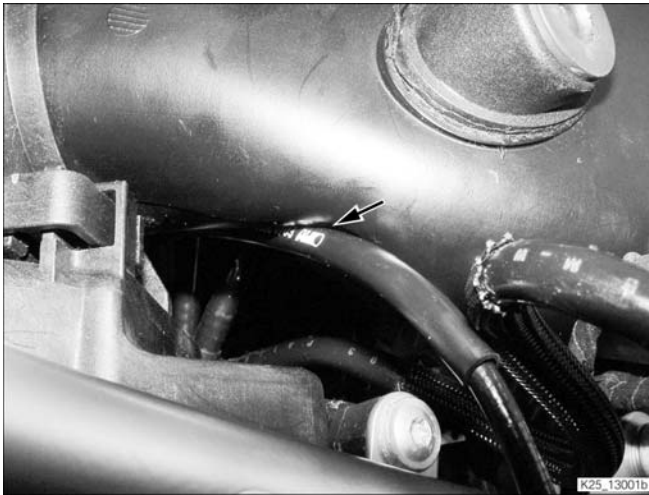
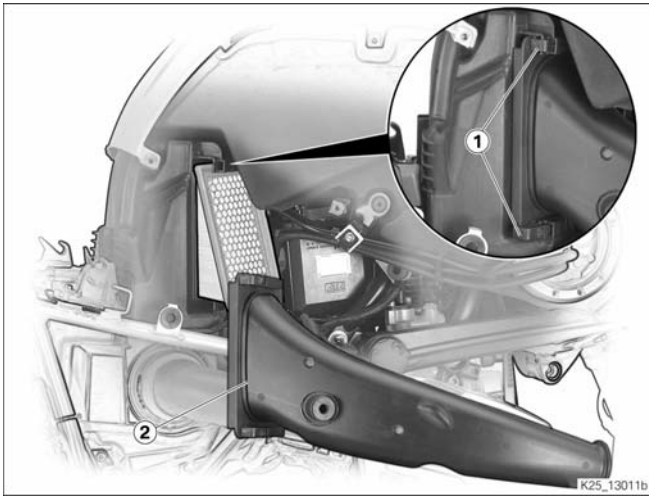
Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



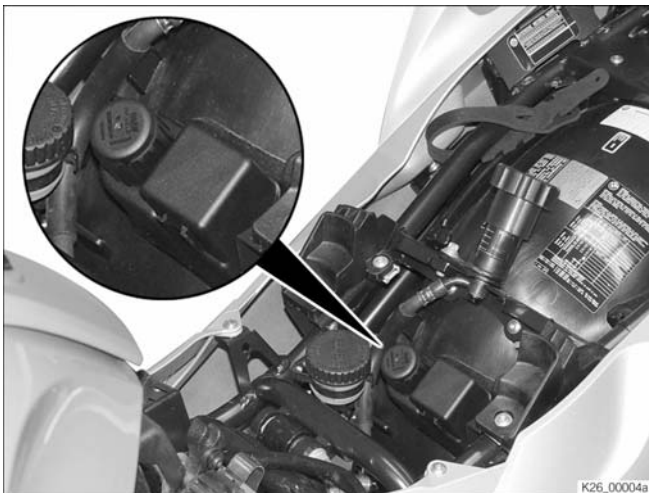
- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
---	--	------------	--

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

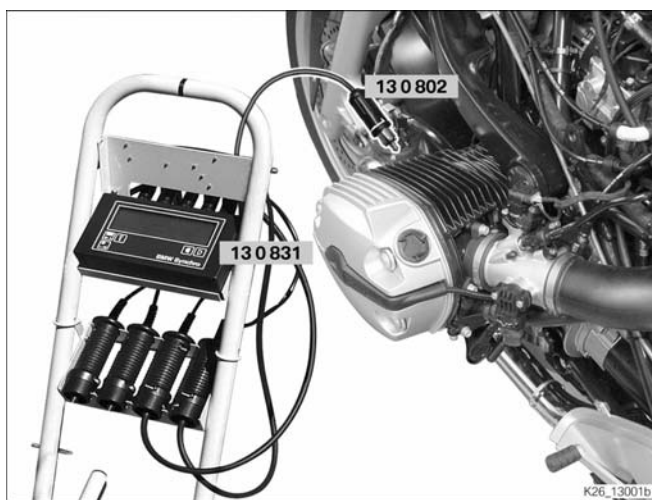
► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the



motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

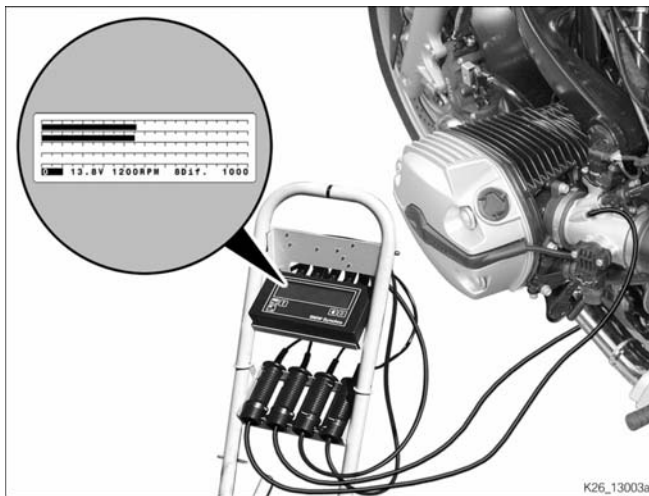
► 1. Checking idle

Test



Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the



system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

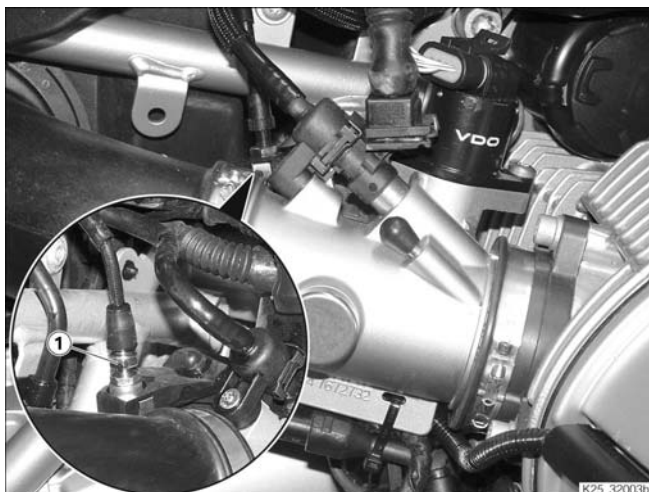
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not


change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

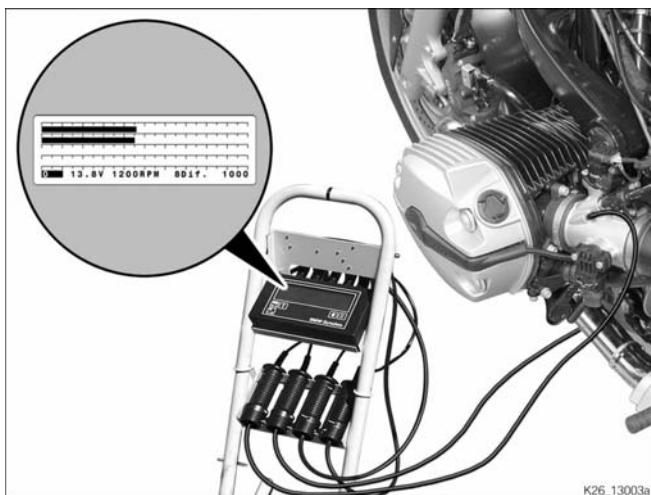
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 -	max. 15 mbar	

	1800 min ⁻¹		
--	---------------------------	--	--

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



▶ **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

-
- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

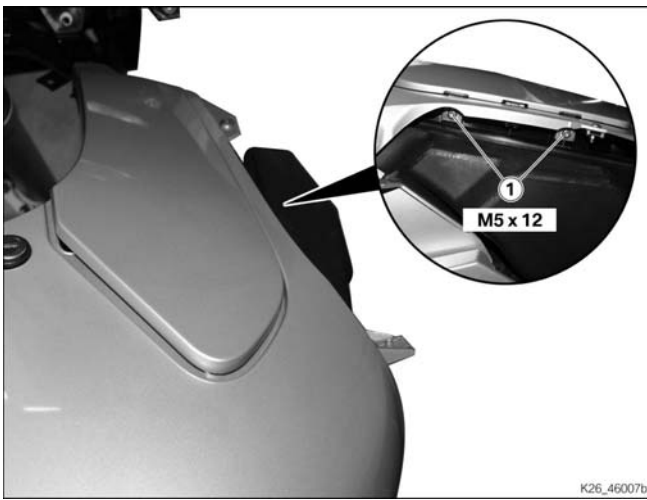
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



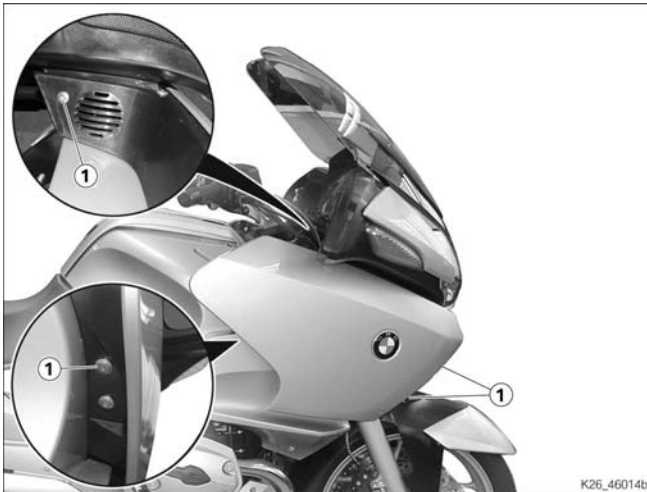
(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



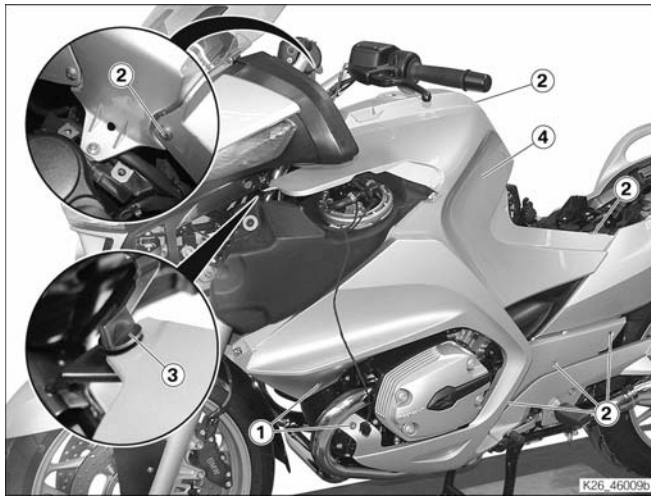
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

**32 73 507 Replacing throttle cable (throttle-cable divider/ throttle valve, right)
(associated work)**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

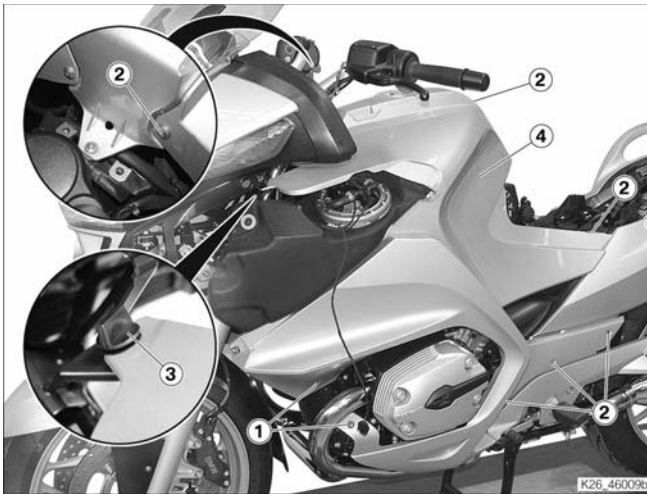


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

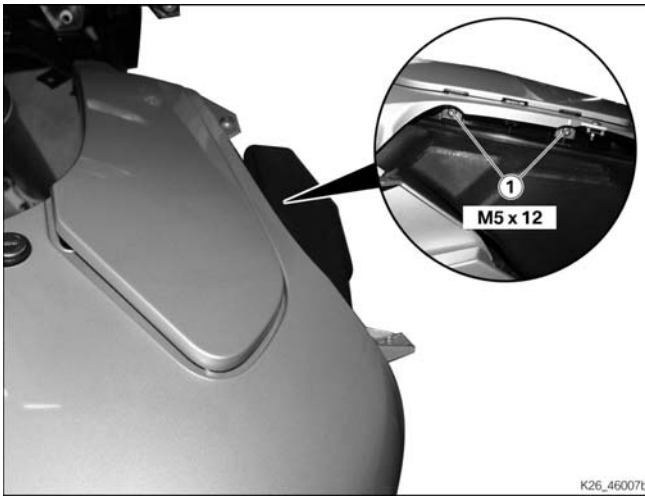
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



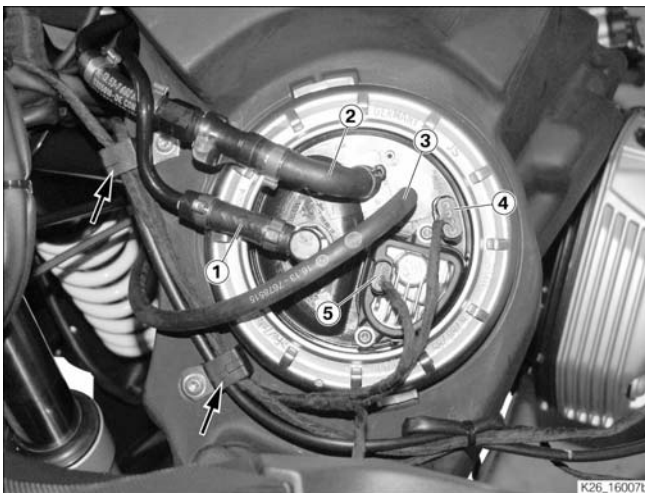
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

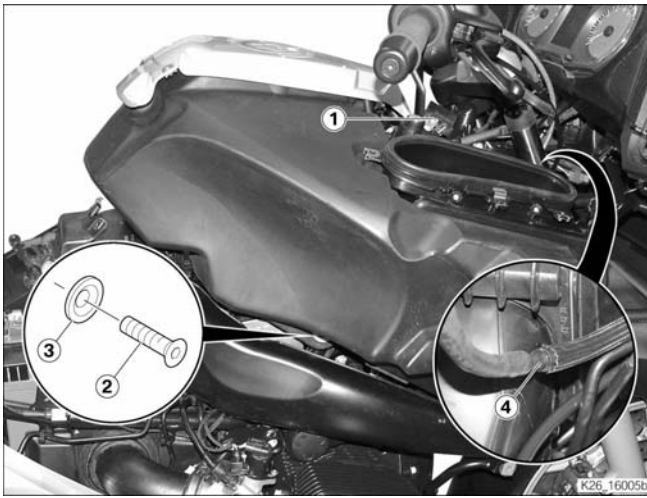


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

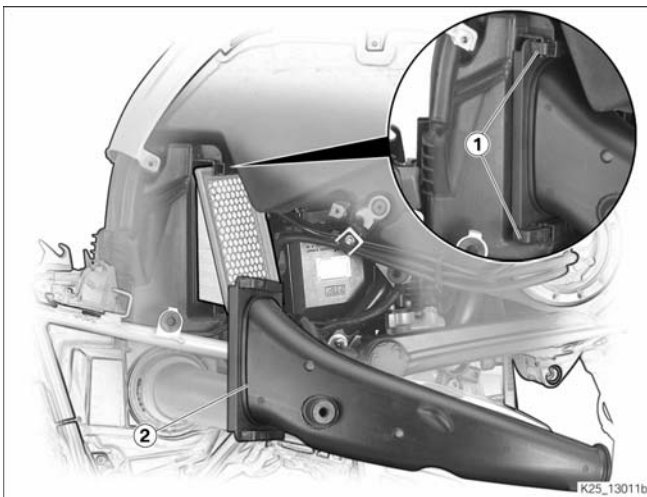


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing intake air pipe

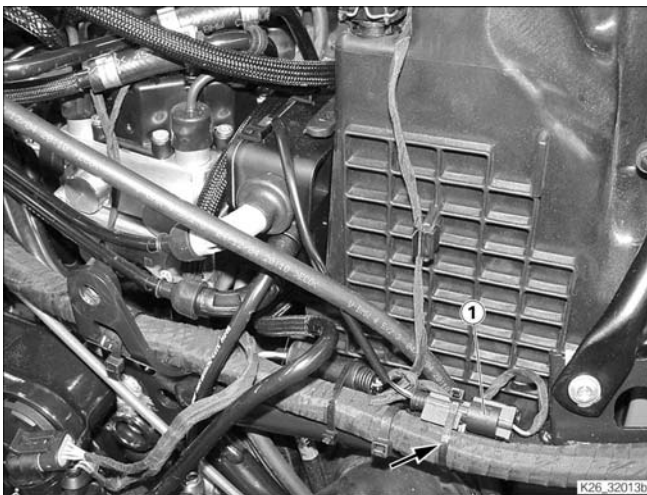
- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Releasing cable divider

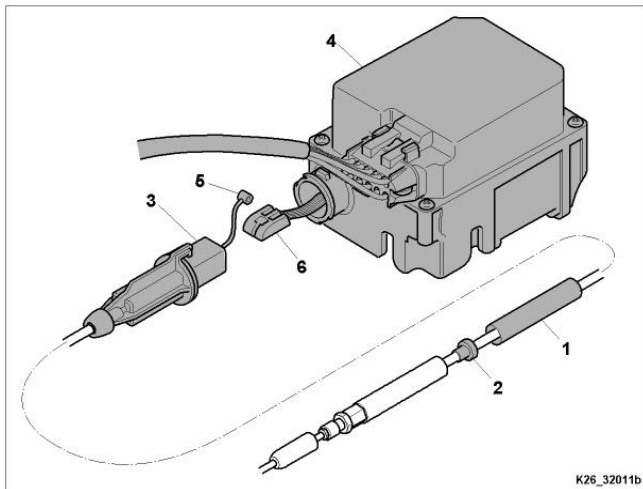
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).

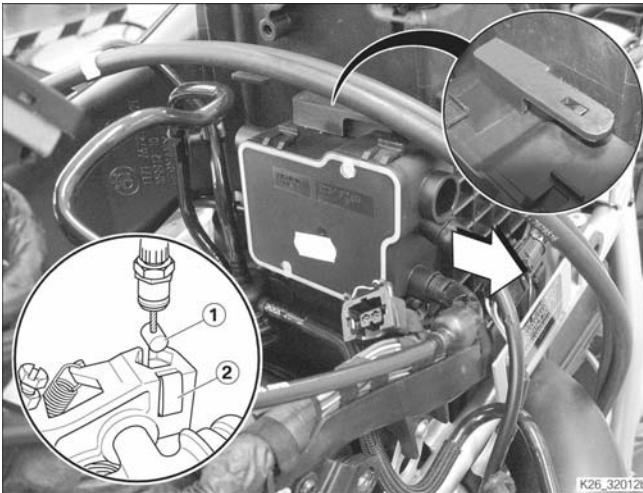


Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).



- Thread through Bowden cable (5) towards the rear.



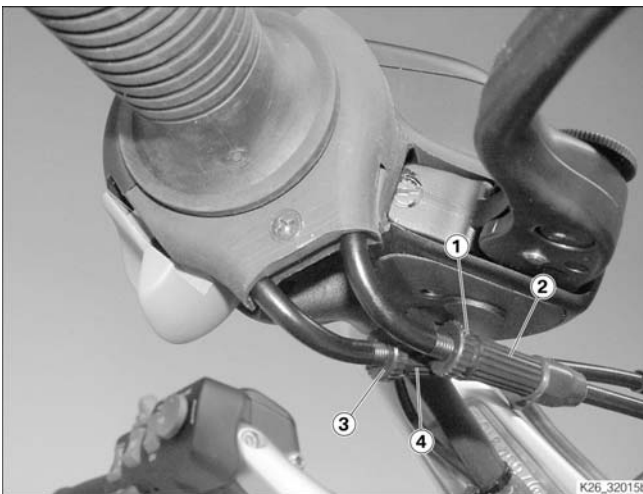
- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

(-) Removing throttle cable on right

- Remove the cap from the throttle-cable divider.

Variant, cruise control

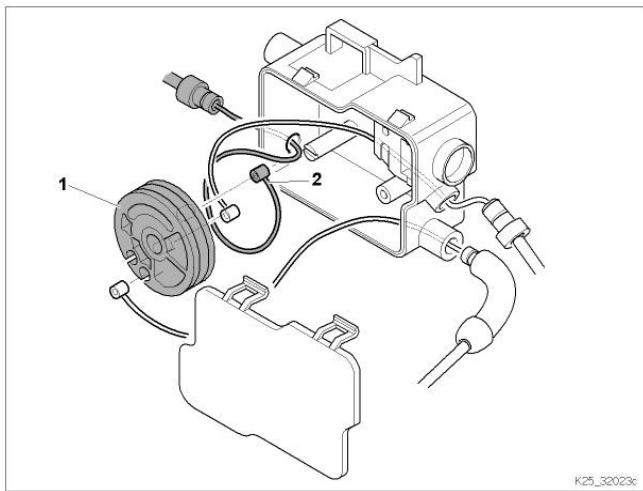
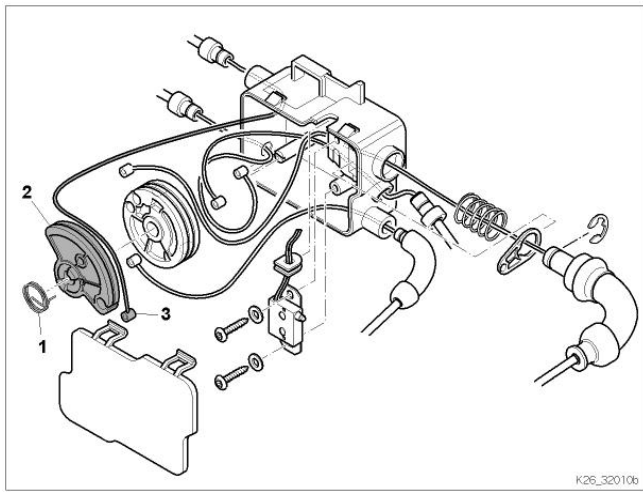
- Completely slacken off lock nut (3).
- Release adjusting screw (4).



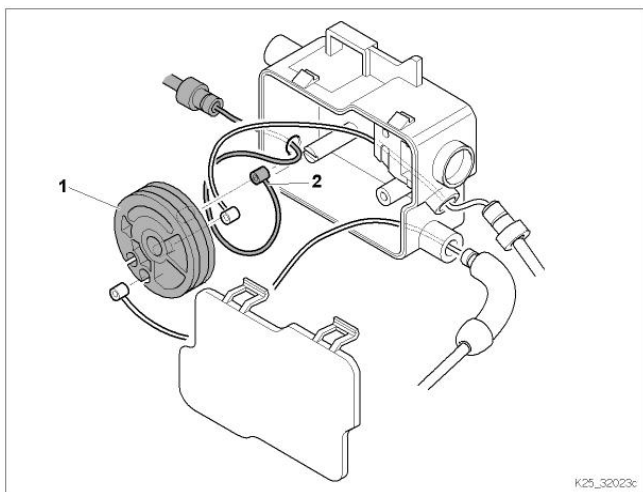
Variant, cruise control

► Removing Bowden cable for cruise control

- Remove spring (1).
- Remove pulley (2).
- Disengage Bowden cable (3) and remove.



- Remove pulley (1).
- Disengage throttle cable (2).
- Remove the throttle cable.



(-) Installing throttle cable on right

- Make sure that the other cable assemblies are engaged correctly.
- Engage throttle cable (2) on pulley (1).

! Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (1) into the cable divider, noting the locating pin.

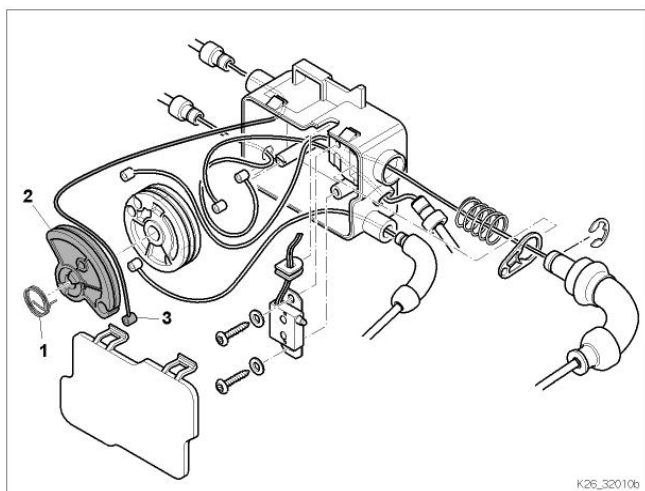
• Close cable divider with cover.

Variant, cruise control

► Installing Bowden cable for cruise control

- Engage Bowden cable (3) on pulley (2).

! Attention



Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

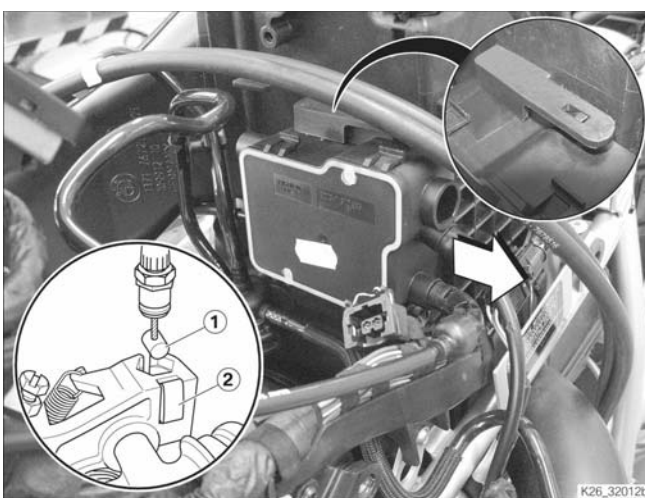
Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (2) into the cable divider, noting the locating pin.
- Fit spring (1).



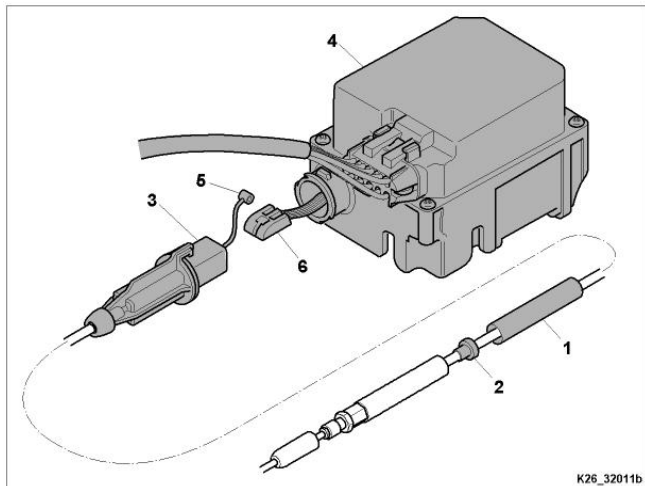
- Close cable divider with cover.

(-) Securing cable divider



- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.

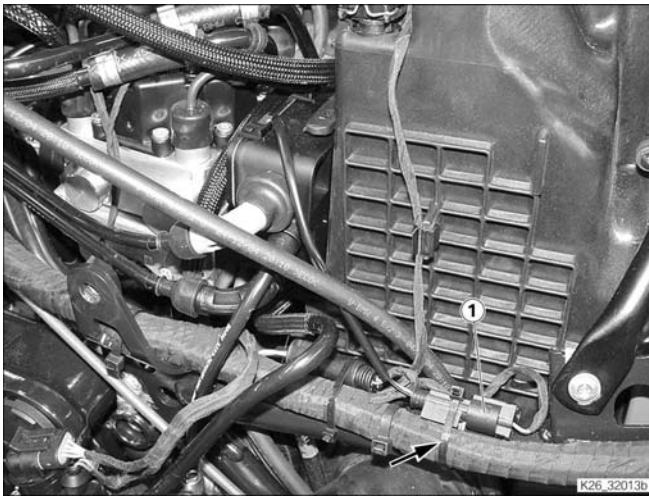
Variant, cruise control



- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).

Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).




- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

(-) Adjusting throttle cable

- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.




 Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten lock nut.

Test

- Check the play at the throttle twistgrip.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

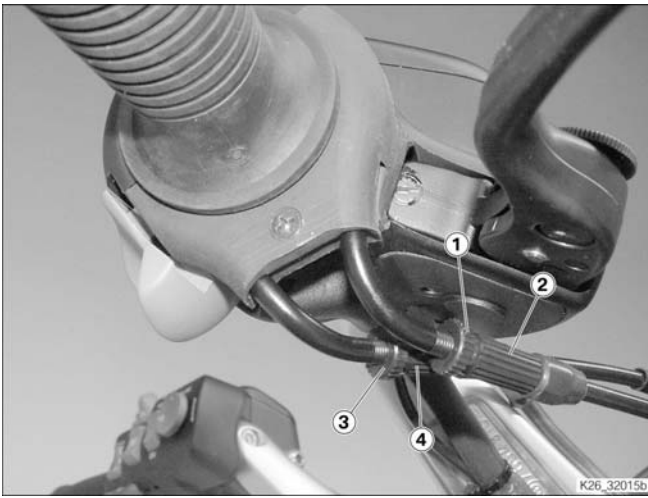
Result: Play at throttle twistgrip is not OK.

Measure:

- Repeat the procedure.


Variant, cruise control

- Completely slacken off lock nut (3).
- Fully tighten adjusting screw (4).
- Adjust Bowden cables.
-




Completely slacken off lock nut (1).

- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.

 Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten locknut (1).
- Completely slacken off lock nut (3).
- With the throttle twistgrip in the idle position, set the gap between locknut (3) and adjusting screw (4) as per specification by turning the adjusting screw.

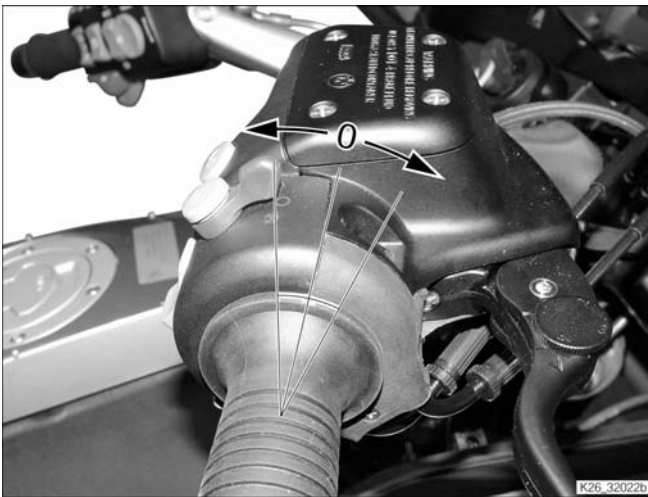
 Technical data			
Setting for throttle-cable play		4 - 5 mm	


- Tighten locknut (3).

Variant, cruise control

Test

- Turn the throttle twistgrip forward past its zero position.



 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play is correct at the throttle twistgrip and the microswitch in the throttle-cable divider trips with an audible click.

Measure:

- Setting is OK.

Result: Insufficient play or microswitch does not trip.

Measure:

- Adjust throttle-closer cable or check microswitch.

Test

- Turn the throttle twistgrip back from its zero position.



Technical data

Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
	At outer rubber grip Ø (transition to handlebar fitting)	4 - 5 mm	Variant, cruise control

Result: Play at the throttle twistgrip is correct.

Measure:

- Setting is OK.

Result: Insufficient play.

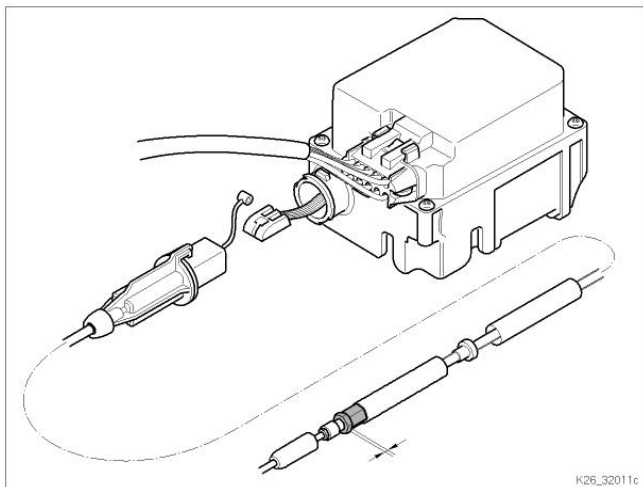
Measure:

- Adjust the throttle-opener cable.

Variant, cruise control

(-) Adjusting Bowden cable for cruise control

- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.



Technical data

Setting for Bowden cable, cruise control		2 - 3 mm	Variant, cruise control
--	--	----------	-------------------------

(-) Checking freedom of movement of throttle cable and checking for kinks and chafing




Note

The throttle cable must be correctly adjusted in order for the electronic engine management system to function correctly.

Test

- Check the throttle cable for kinks and chafing.
- » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
- » The throttle twistgrip returns to the closed position by itself.

- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
- » Slight play perceptible.

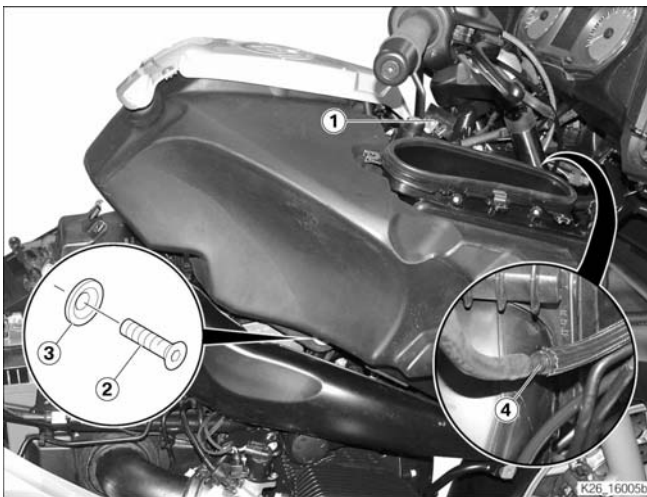
 Technical data			
Test criterion, throttle cable		Results of all test steps satisfied	

Result: Test criterion not satisfied.


Measure:

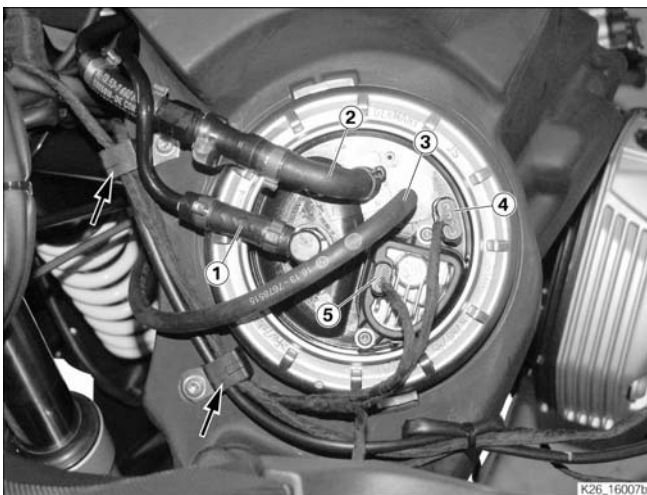
- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! **Attention**

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

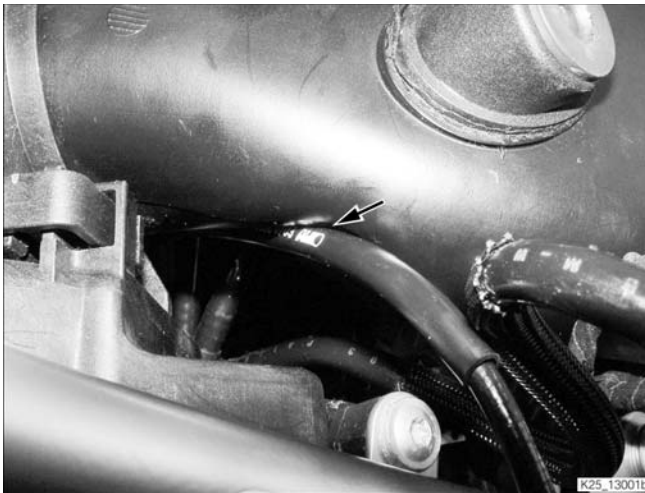
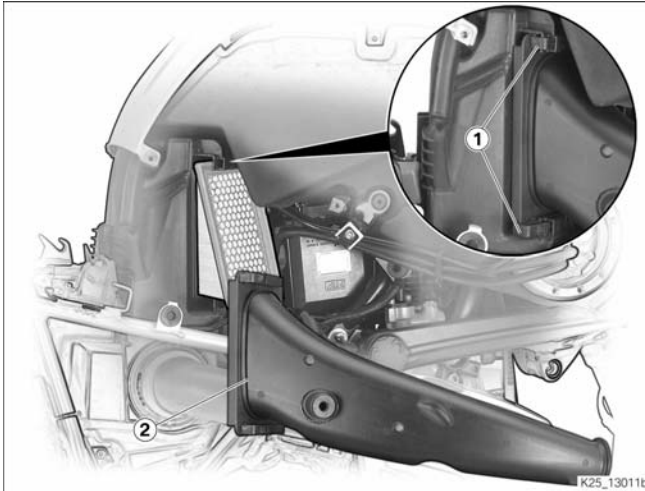
Avoidance: Make sure that the latch is open/pressed when you connect the two elements of

the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

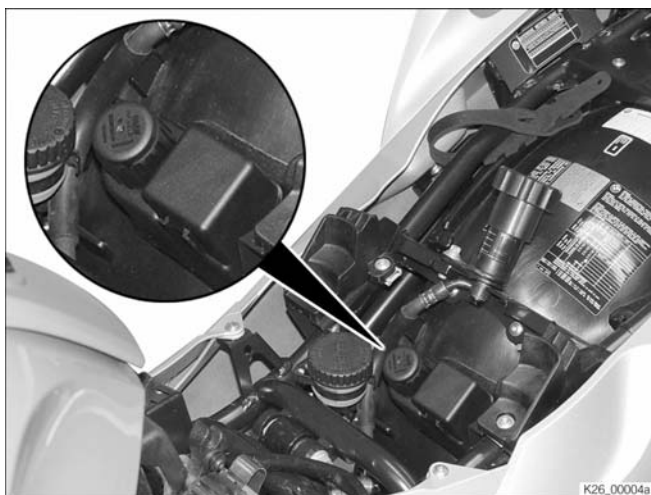
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.

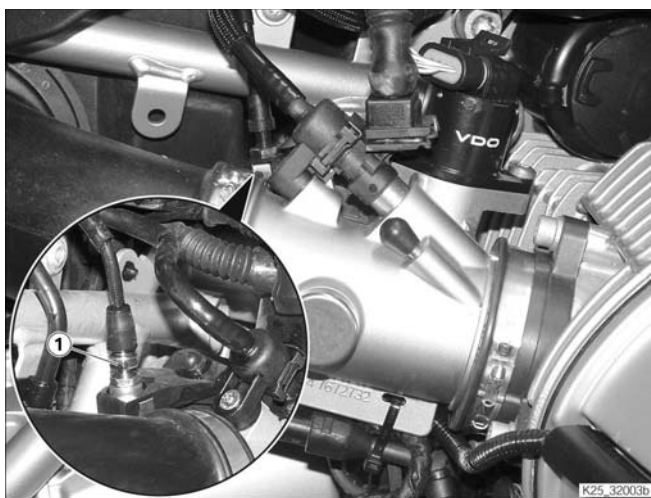


Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
---	--	------------	--

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the

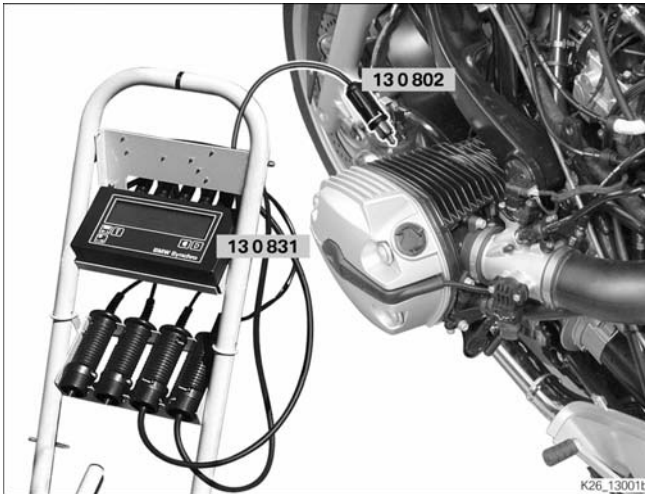
throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► Connecting BMW Synchro tester to the motorcycle

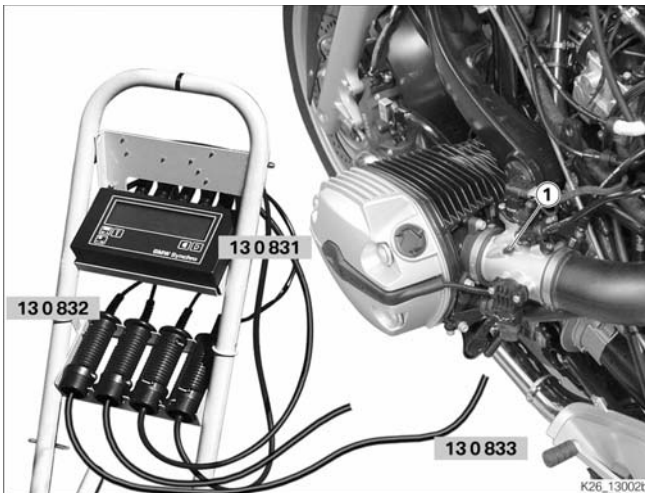
- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.



- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



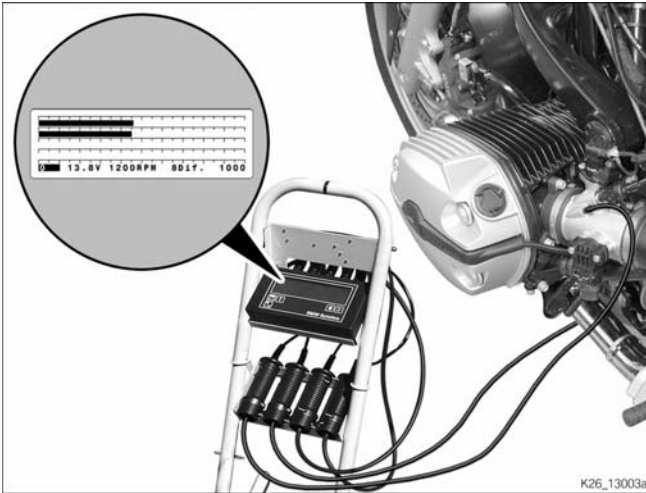
Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to

synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.



► **1. Checking idle**

Test



Attention


Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.

 Technical data			
Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► **2. Synchronising throttle-valve lift**

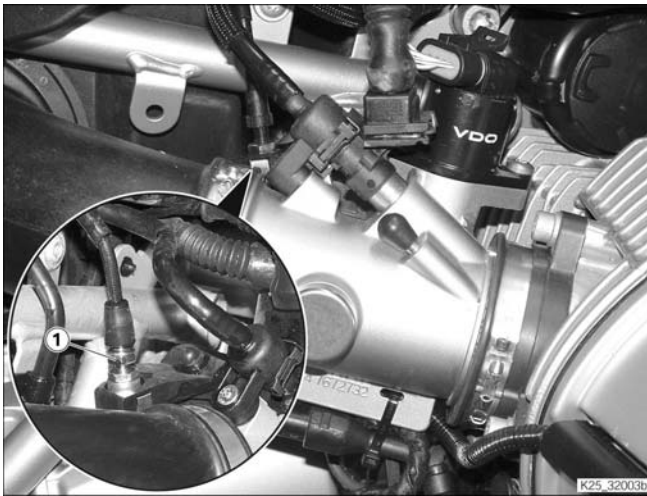
Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) check that the bar graphs for the average values (AVG) change



simultaneously as you slowly operate the throttle.
 » Throttle valves lift off the idle stops.


Result: Bar graphs for average values (AVG) do not change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

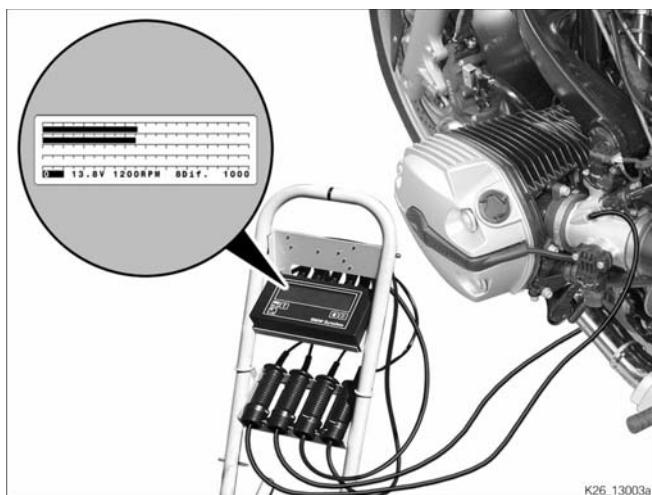
- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables


Precondition

- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.

 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).

► Disconnecting BMW Synchro tester from the motorcycle

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.

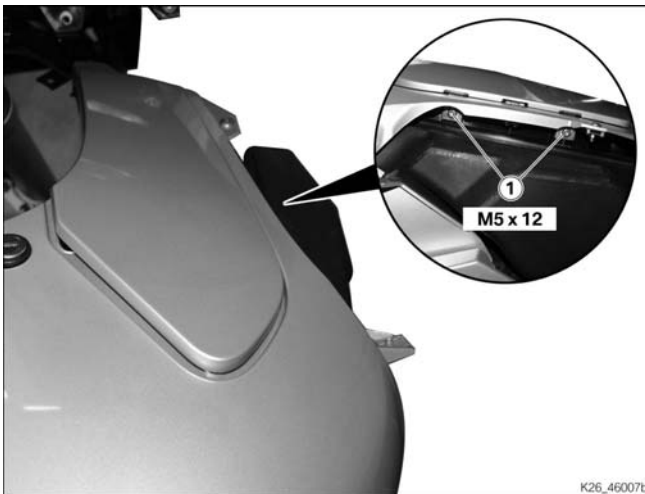
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover

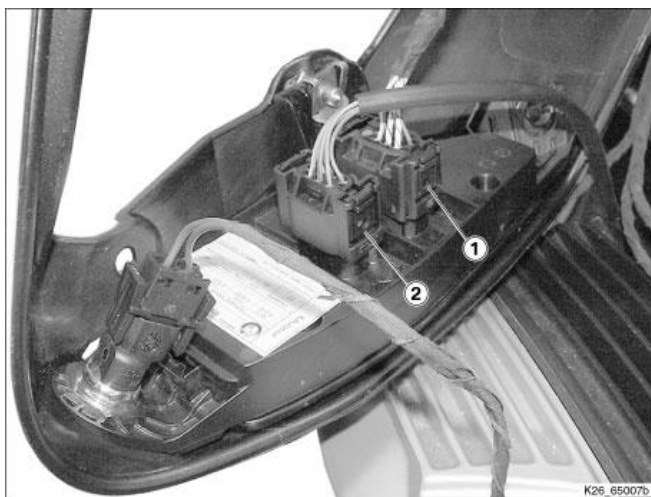
- Fit tank cover.
- Install screws (2).



- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **32 73 509 Replacing throttle cable to handlebar**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

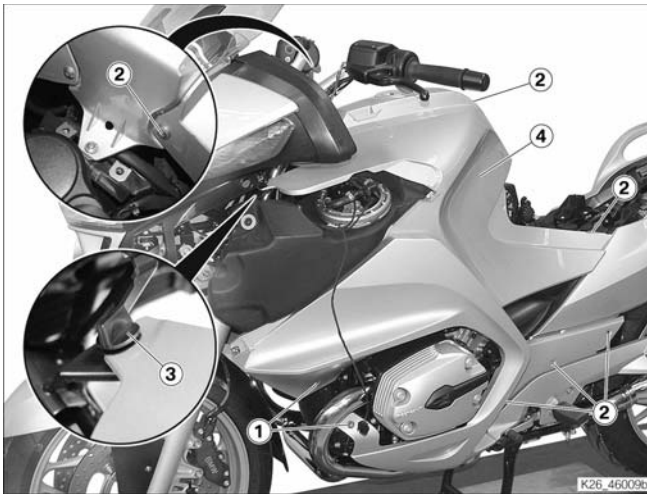


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

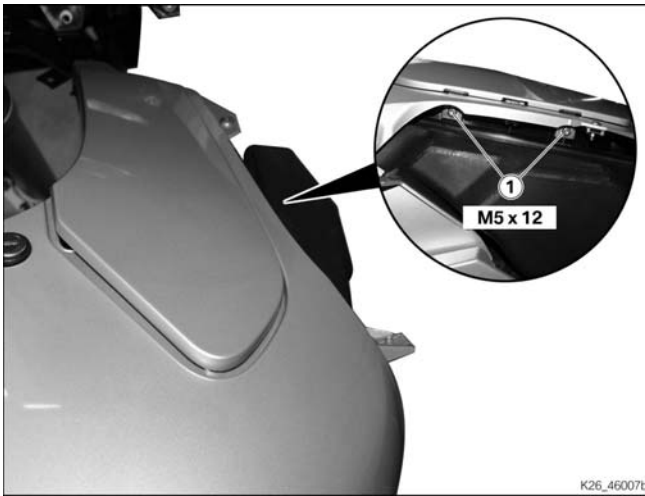
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



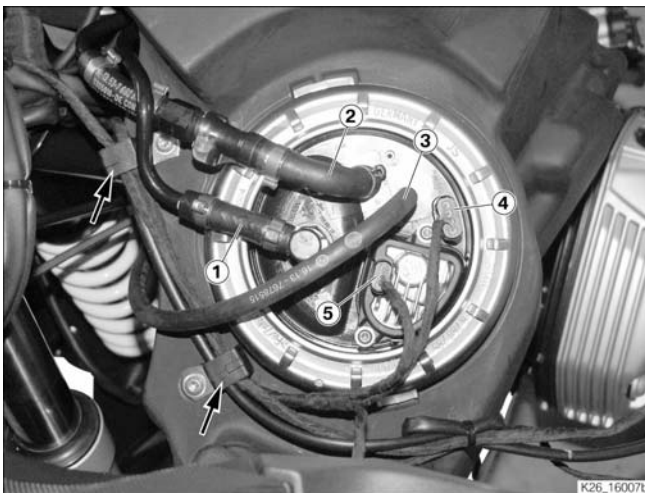
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

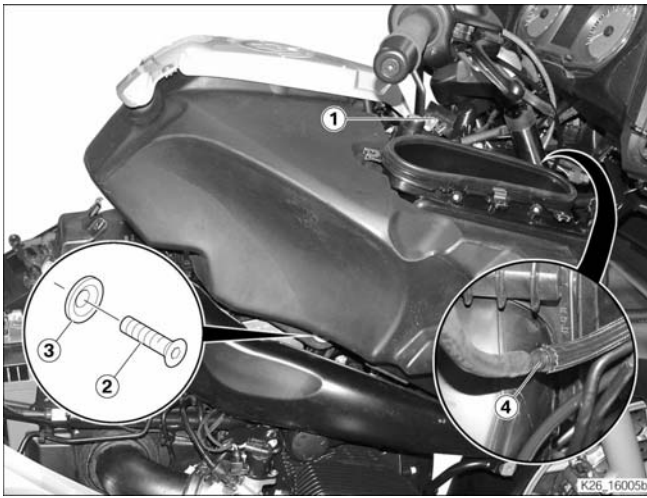


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

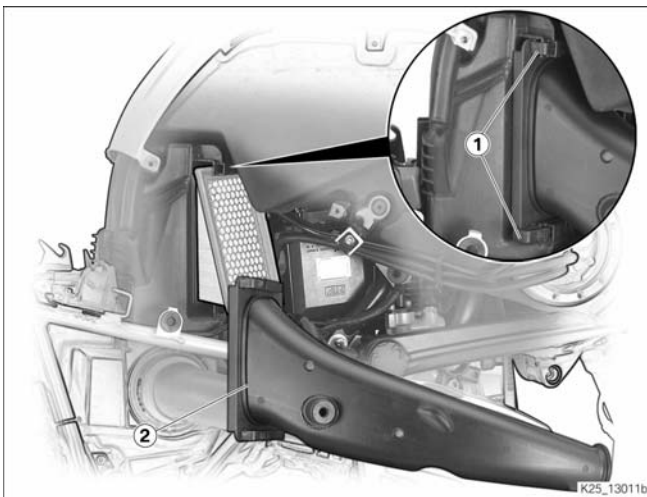


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing intake air pipe

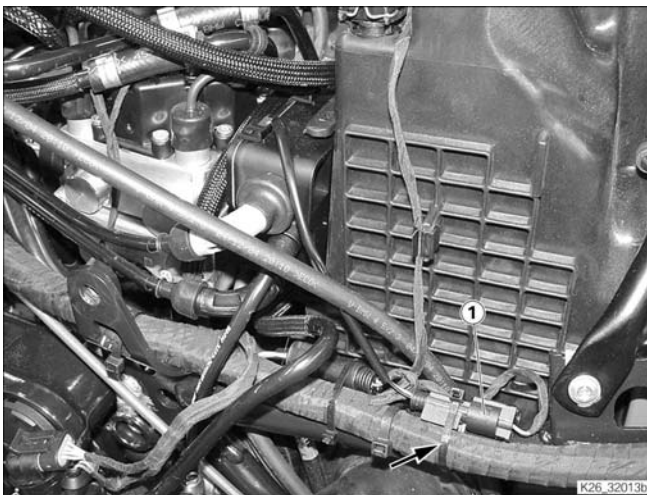
- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Releasing cable divider

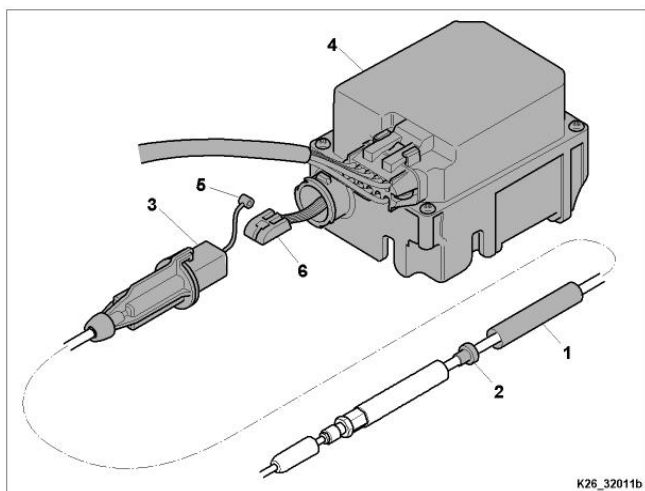
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).

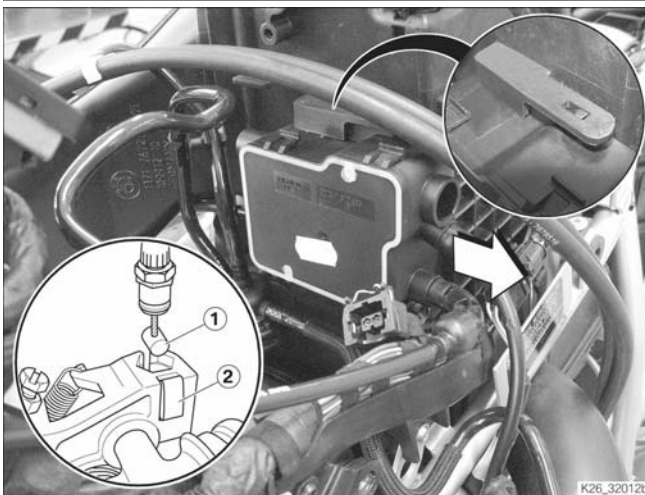


Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).

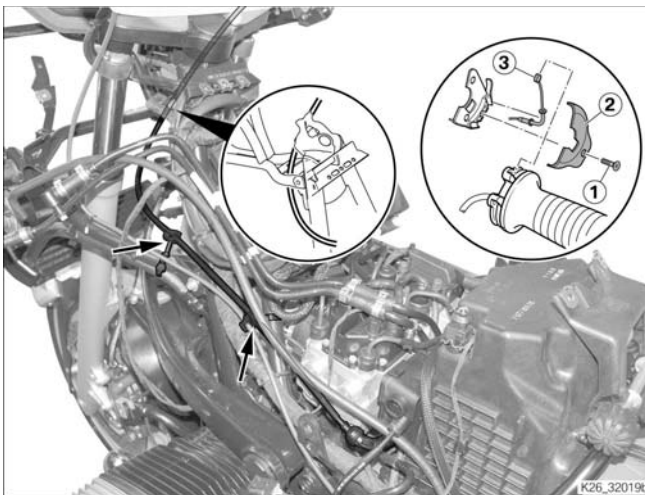


- Thread through Bowden cable (5) towards the rear.



- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

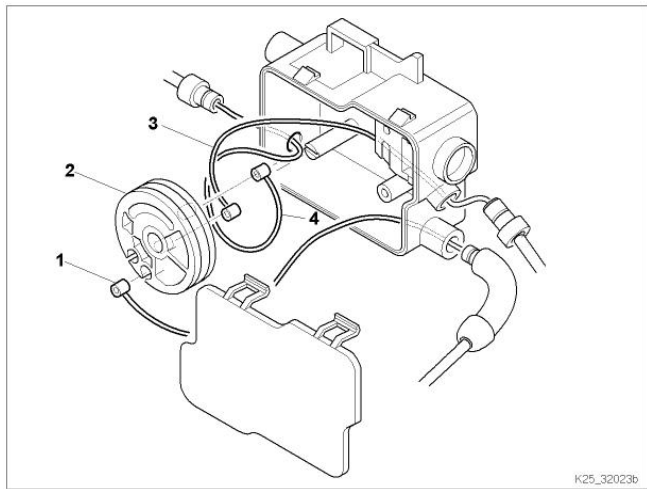
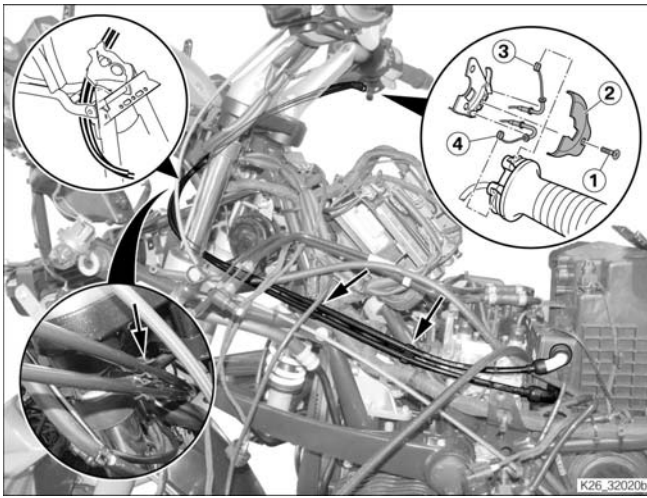
(-) Removing throttle cable to handlebar



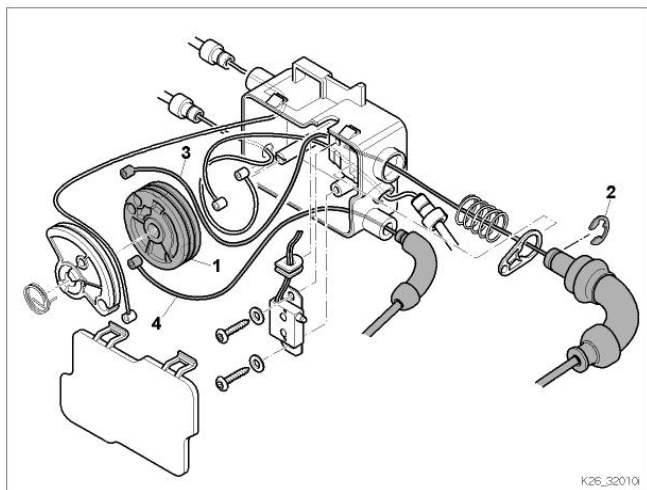
- Remove screw (1).
- Remove cover (2) from throttle twistgrip.
- Disengage Bowden cable (3).
- Unclip Bowden cable (3) from retainers (arrows) on frame.

Variant, cruise control

- Remove screw (1).
- Remove cover (2) from throttle twistgrip.
- Disengage Bowden cables (3) and (4).
- Unclip Bowden cables (3) and (4) from retainers (arrows) on frame.



- Remove the cap from the throttle-cable divider.
- Remove pulley (2).
- Disengage Bowden cables (1).
- Remove Bowden cable.

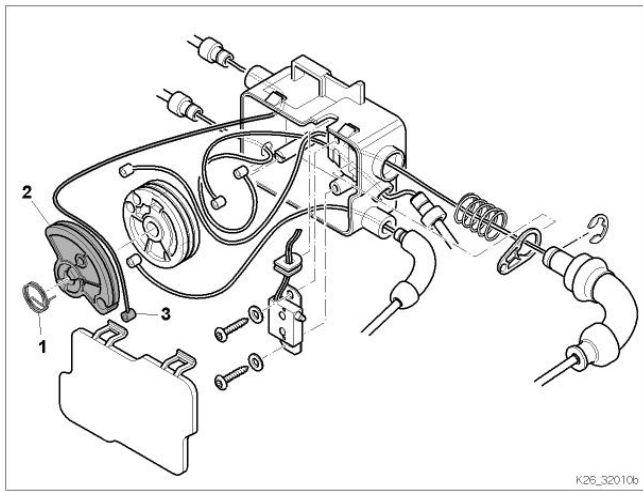


Variant, cruise control

- Remove the cap from the throttle-cable divider.

► Removing Bowden cable for cruise control

- Remove spring (1).
- Remove pulley (2).
- Disengage Bowden cable (3) and remove.

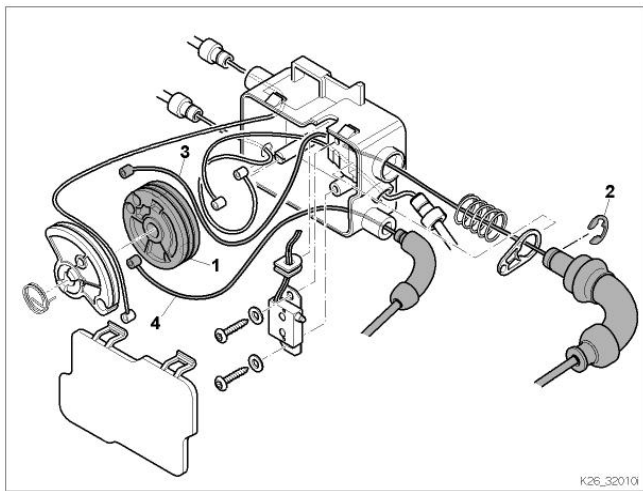


K26_32010a



Variant, cruise control

- Remove pulley (1).
- Removing lock washer (2)
- Disengage Bowden cables (3) and (4).
- Unclip Bowden cables (3) and (4) from retainers on frame.
- Remove Bowden cables while paying attention to the gaiter.



K26_32010a

(-) Installing throttle cable to handlebar

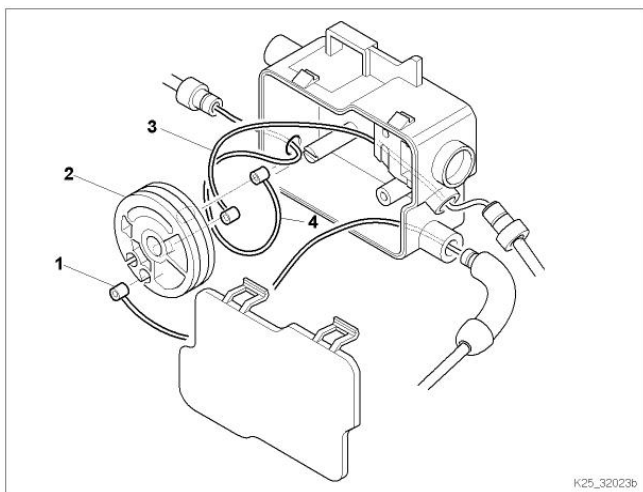
- Engage Bowden cable (1) on pulley (2).
- Make sure that the other cable assemblies are engaged correctly.



Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

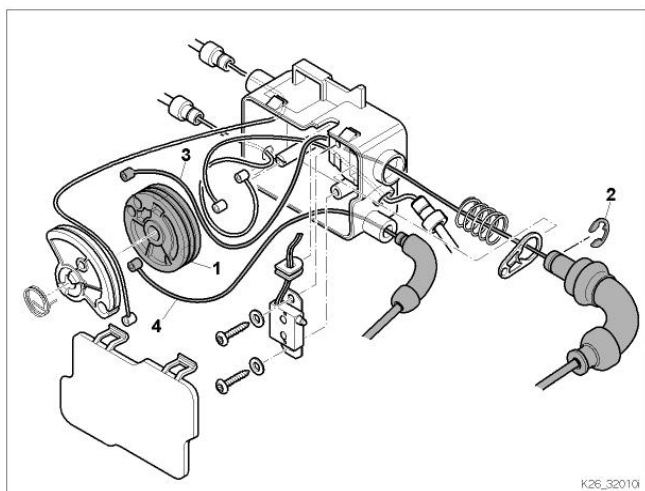


K25_32023b

- Fit cable pulley (2) into the cable divider, noting the locating pin.
- Close cable divider with cover.

Variant, cruise control

- Fit Bowden cables (3) and (4) in the cable divider while paying attention to the gaiter.
- Engage Bowden cables (3) and (4) on cable pulley (1).
- Install lock washer (2).
- Make sure that the other cable assemblies are



engaged correctly.

⚠ Attention

Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (1) in cable divider, paying attention to the locator pin.

Variant, cruise control

► Installing Bowden cable for cruise control

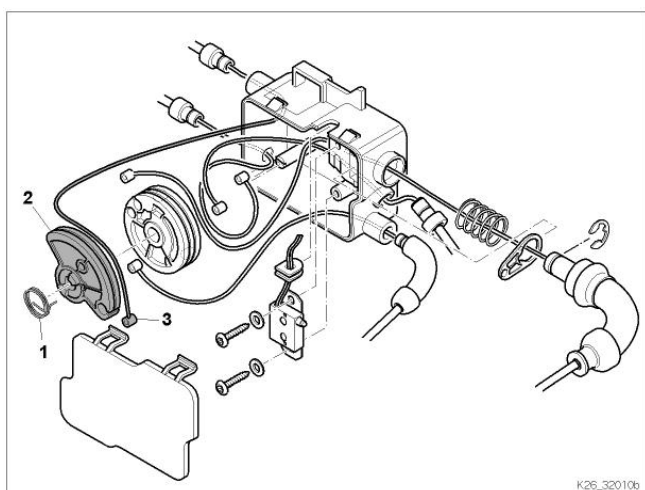
- Engage Bowden cable (3) on pulley (2).

⚠ Attention

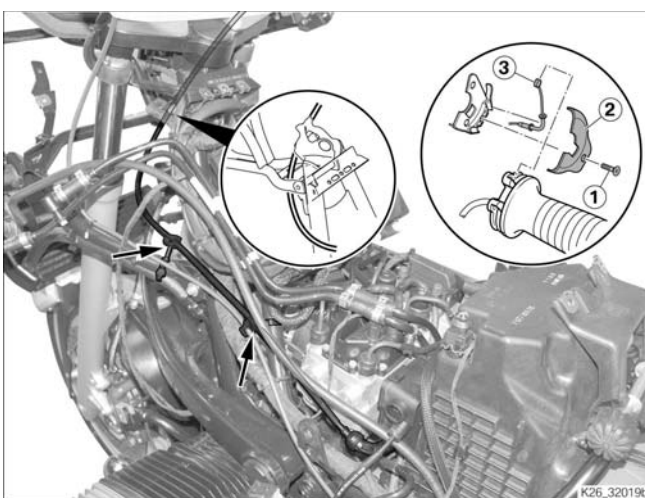
Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.

Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (2) into the cable divider, noting the locating pin.
- Fit spring (1).

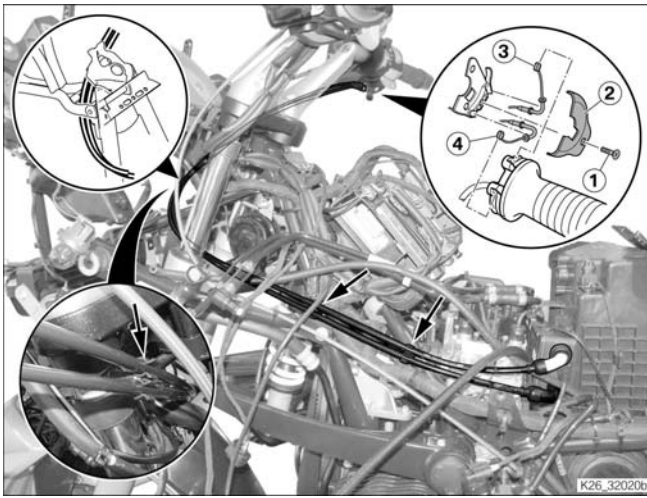


- Close cable divider with cover.
- Clip Bowden cable (3) into retainers (arrows) on frame.
- Engage Bowden cable (3) on the throttle twistgrip.
- Fit cover (2) on throttle twistgrip and secure with screw (1).



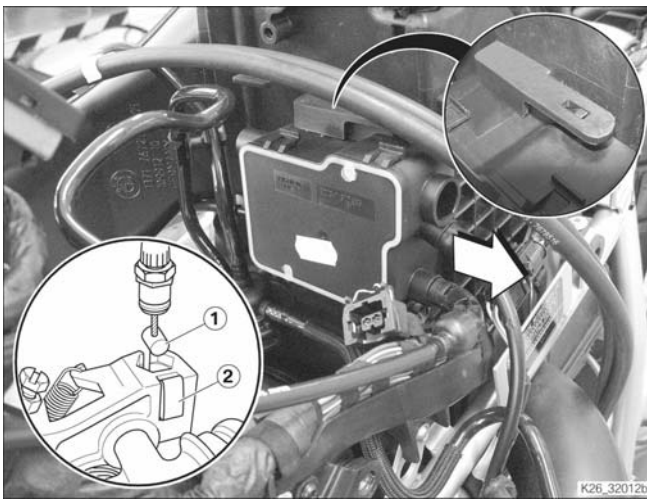
Variant, cruise control

- Clip Bowden cables (3) and (4) into retainers on frame.
- Engage Bowden cables (3) and (4) on the throttle twistgrip.
- Fit cover (2) on throttle twistgrip and secure with screw

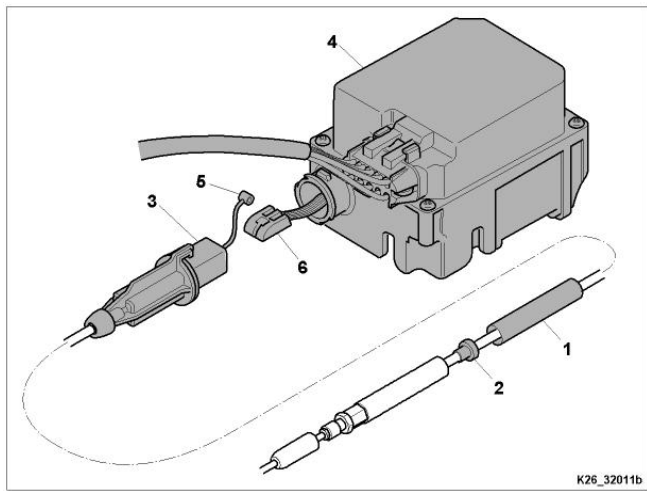


(1).

(-) Securing cable divider



- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.

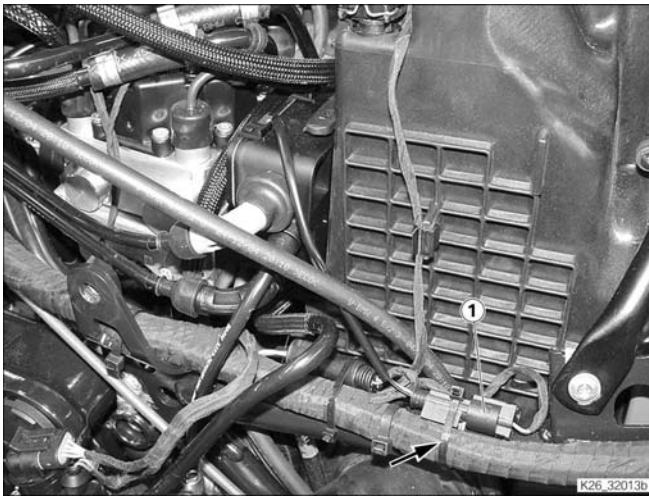


Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).

Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).




- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

(-) Adjusting throttle cable

- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.




 Technical data			
Setting for throttle-cable play		4 - 5 mm	

- Tighten lock nut.

Test

- Check the play at the throttle twistgrip.

 Technical data			
Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	

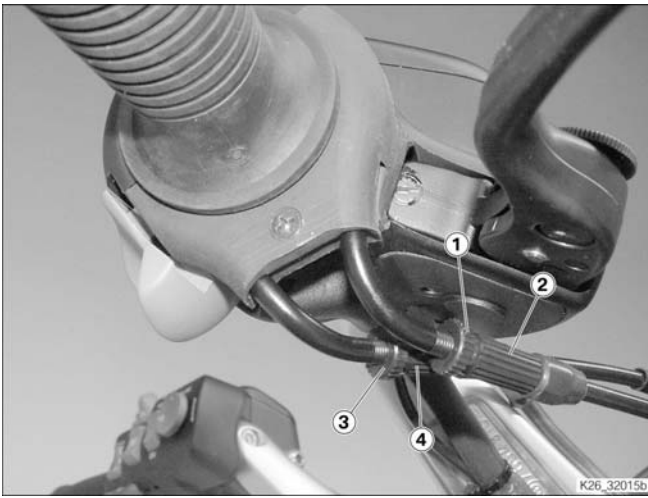
Result: Play at throttle twistgrip is not OK.

Measure:

- Repeat the procedure.

Variant, cruise control

- Completely slacken off lock nut (3).
- Fully tighten adjusting screw (4).
- Adjust Bowden cables.
- Completely slacken off lock nut (1).
- With the throttle twistgrip in the idle position, set the gap between locknut (1) and adjusting screw (2) as per specification by turning the adjusting screw.



Technical data

Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

- Tighten locknut (1).
- Completely slacken off lock nut (3).
- With the throttle twistgrip in the idle position, set the gap between locknut (3) and adjusting screw (4) as per specification by turning the adjusting screw.



Technical data

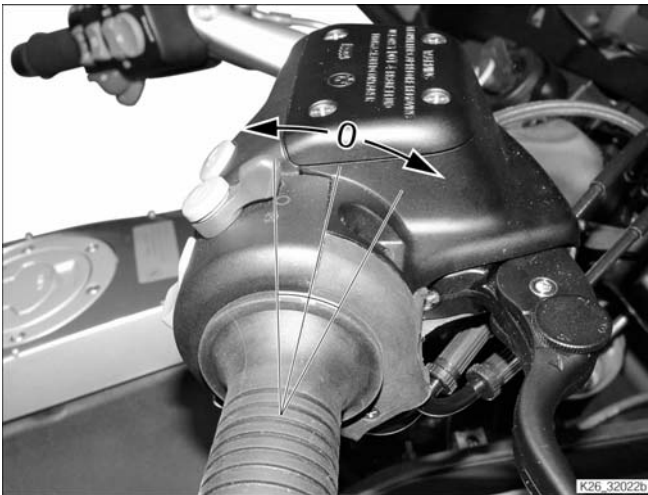
Setting for throttle-cable play		4 - 5 mm	
---------------------------------	--	----------	--

- Tighten locknut (3).

Variant, cruise control

Test

- Turn the throttle twistgrip forward past its zero position.



Technical data

Setting, play for Bowden cable of throttle twistgrip		max. 0.5 mm	
--	--	-------------	--

Result: Play is correct at the throttle twistgrip and the microswitch in the throttle-cable divider trips with an audible click.

Measure:

- Setting is OK.

Result: Insufficient play or microswitch does not trip.

Measure:

- Adjust throttle-closer cable or check microswitch.

Test

- Turn the throttle twistgrip back from its zero position.



Technical data

Setting, play for Bowden cable of throttle		max. 0.5 mm	
--	--	-------------	--

twistgrip			
-----------	--	--	--

Result: Play at the throttle twistgrip is correct.

Measure:

- Setting is OK.

Result: Insufficient play.

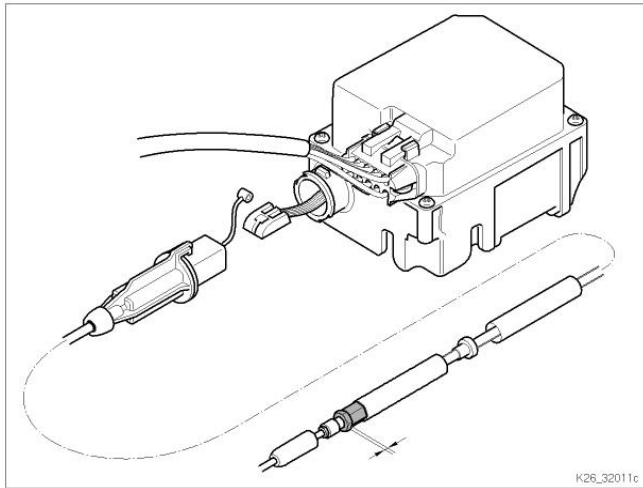
Measure:

- Adjust the throttle-opener cable.

Variant, cruise control

(-) Adjusting Bowden cable for cruise control

- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.



(-) Checking freedom of movement of throttle cable and checking for kinks and chafing



Note

The throttle cable must be correctly adjusted in order for the electronic engine management system to function correctly.

Test

- Check the throttle cable for kinks and chafing.
 - » No signs of kinks or chafing.
- Fully open the throttle twistgrip at different handlebar positions and then release.
 - » The throttle twistgrip returns to the closed position by itself.
- Turn the handlebars to the full-lock positions and check the play at the throttle twistgrip.
 - » Slight play perceptible.



Technical data

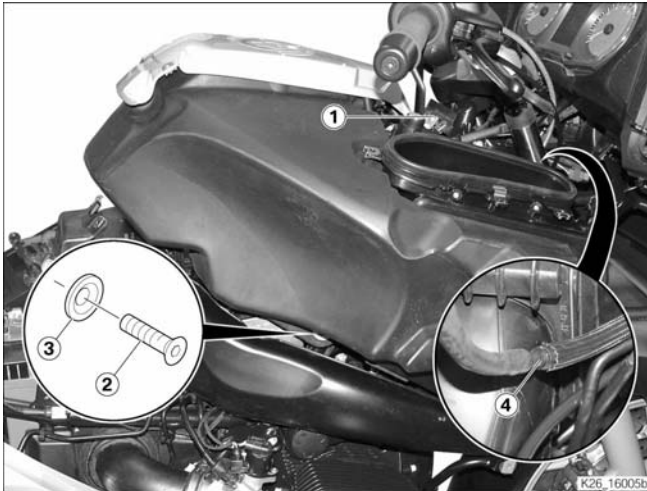
Test criterion, throttle cable		Results of all test steps satisfied	
--------------------------------	--	-------------------------------------	--

Result: Test criterion not satisfied.

Measure:

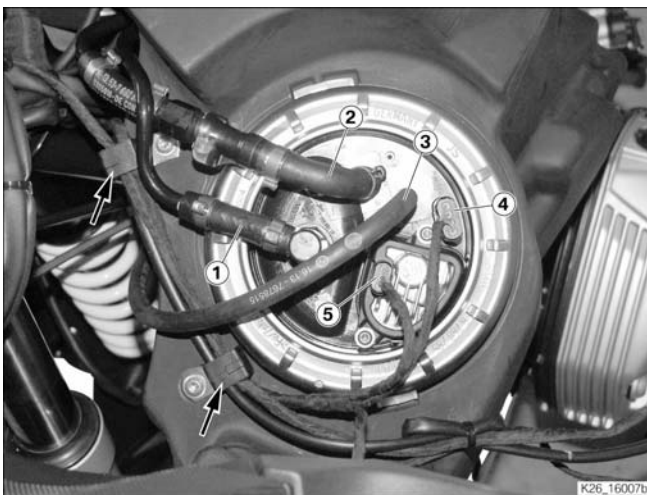
- => 32 73 509, Replacing throttle cable to handlebar
- => 32 73 506, Replacing throttle cable (throttle-cable divider/ throttle valve, left) (associated work)
- => 32 73 507, Replacing throttle cable (throttle-cable divider/ throttle valve, right) (associated work)

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

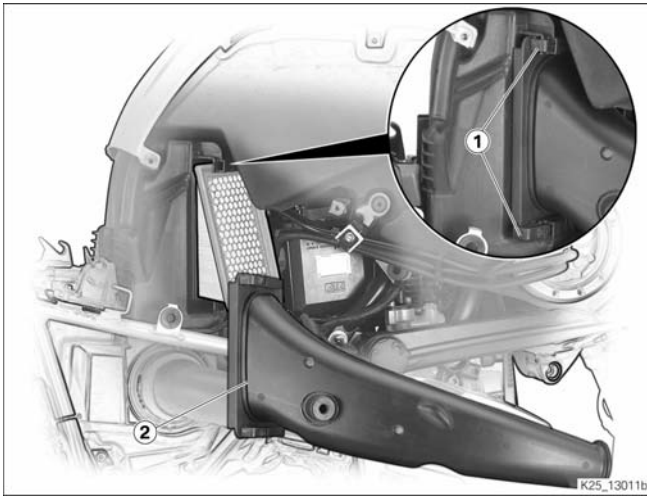
Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

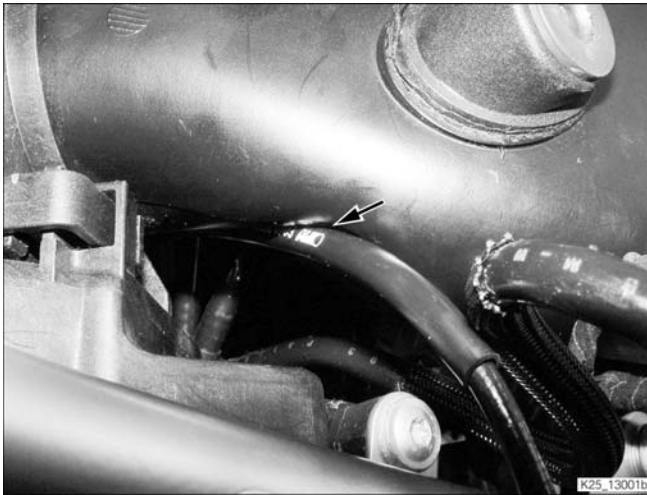
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter



- housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



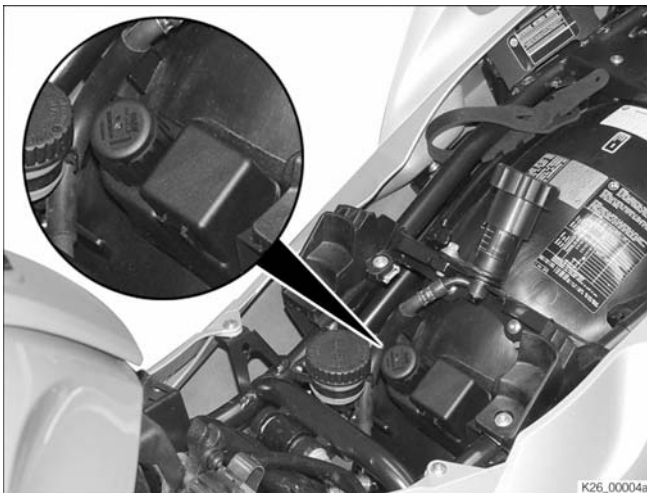
- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.



Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.



Technical data

Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	
---	--	------------	--

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

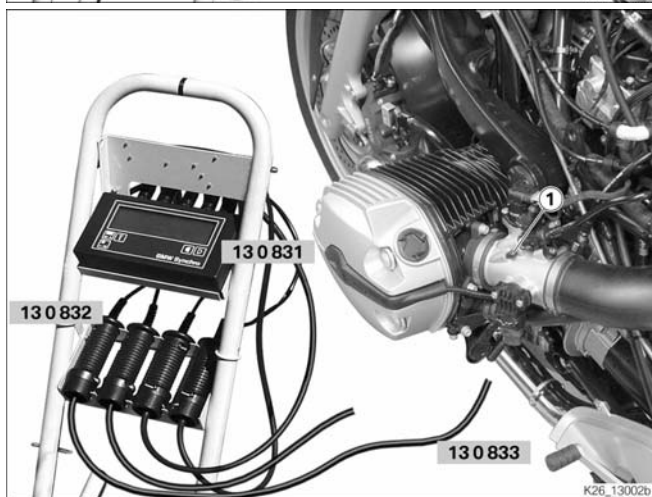
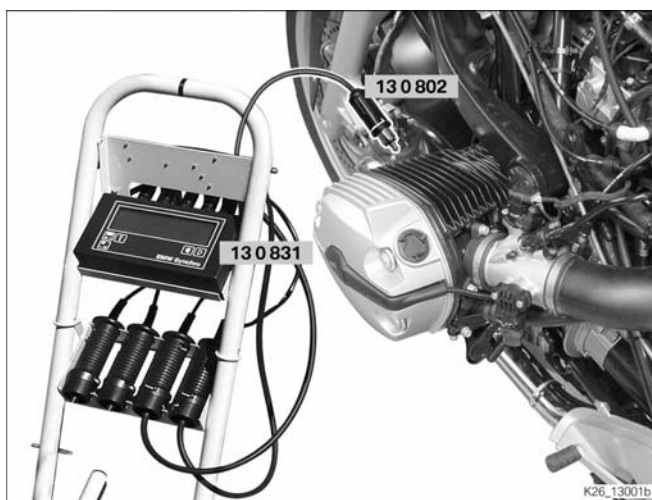
► Connecting BMW Synchro tester to the motorcycle

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.



Note

Do not connect the hoses of the pressure sensors to the



motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

» The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

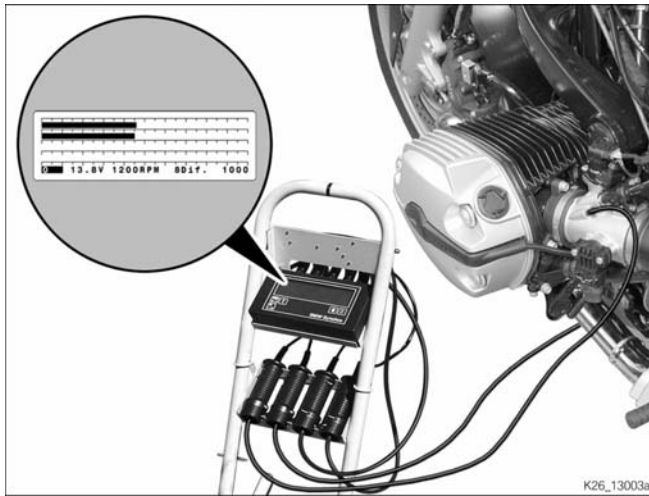
► 1. Checking idle

Test



Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the



system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not


change simultaneously.

Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

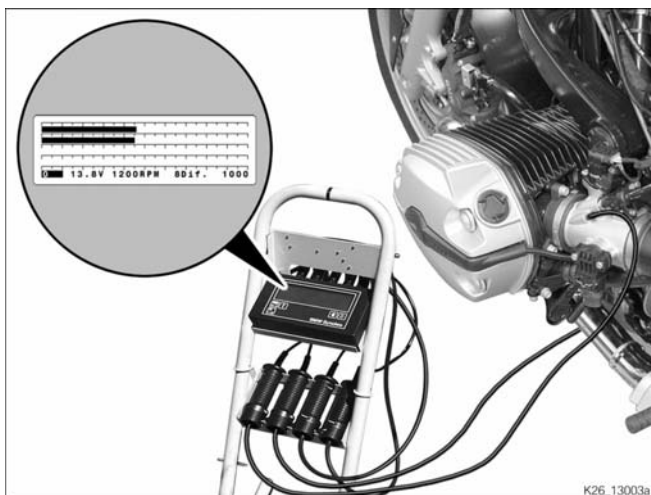
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 -	max. 15 mbar	

	1800 min ⁻¹		
--	---------------------------	--	--

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.
- » If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



▶ **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmeasured air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

-
- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

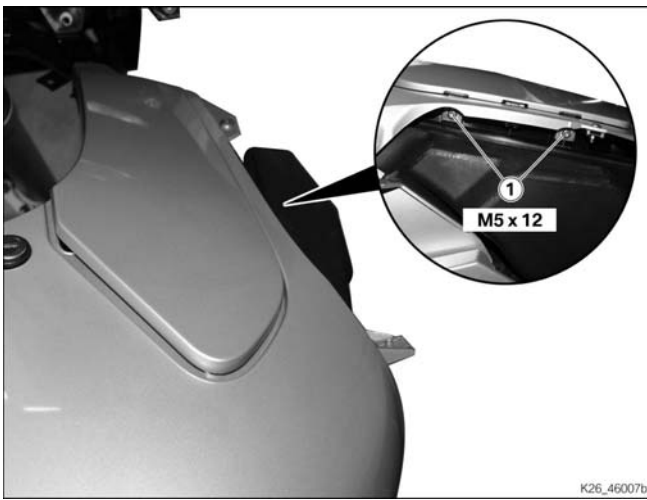
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



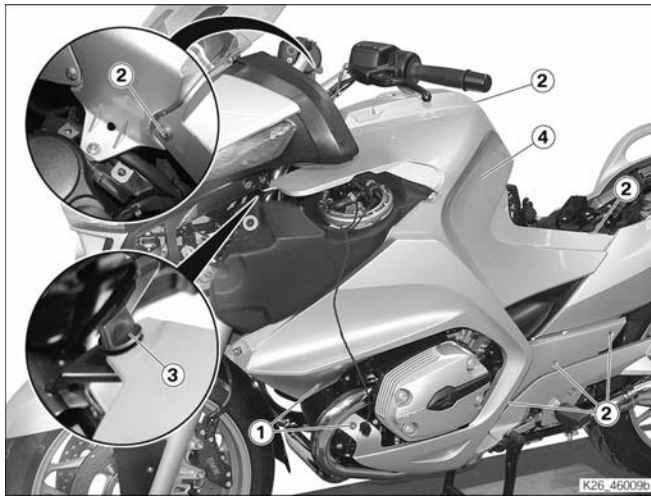
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **32 73 550 Replacing Bowden cable for cruise control**

Variant, cruise control

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

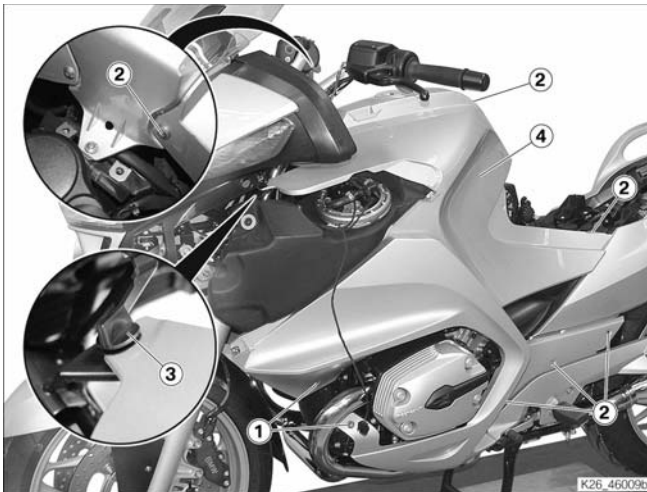


- Disconnect plug (1) from socket.



- Remove trim panel.

(-) Removing entire left side tank cover



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

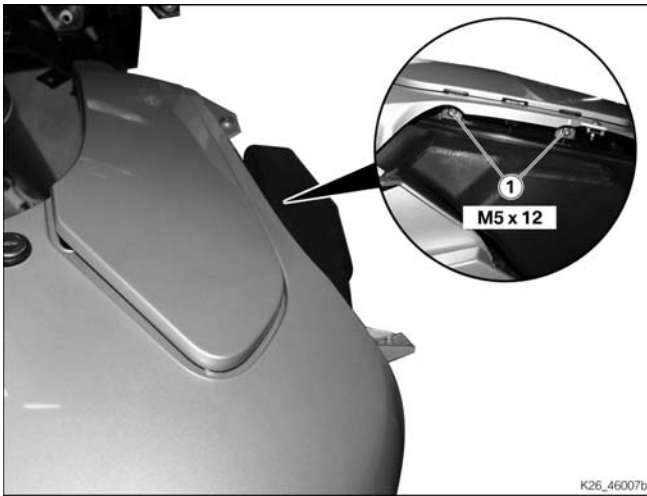
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



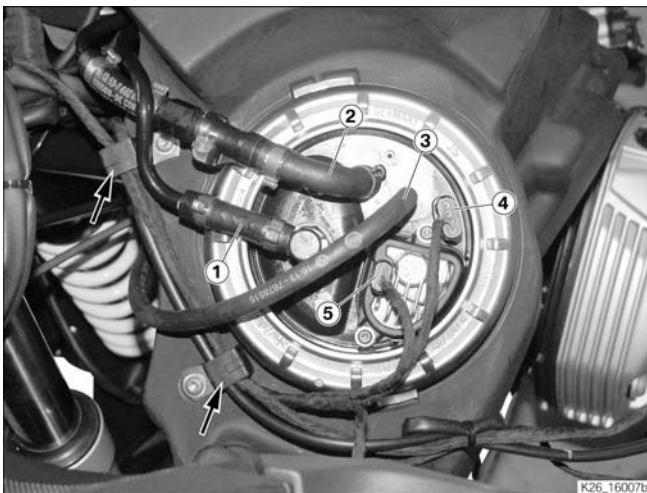
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

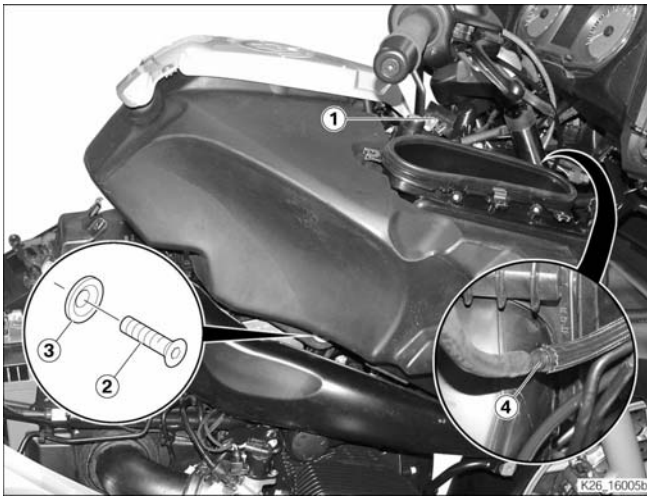


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

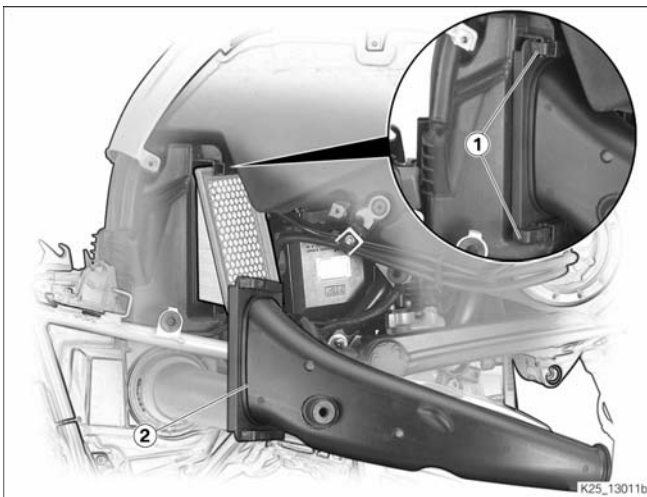


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing intake air pipe

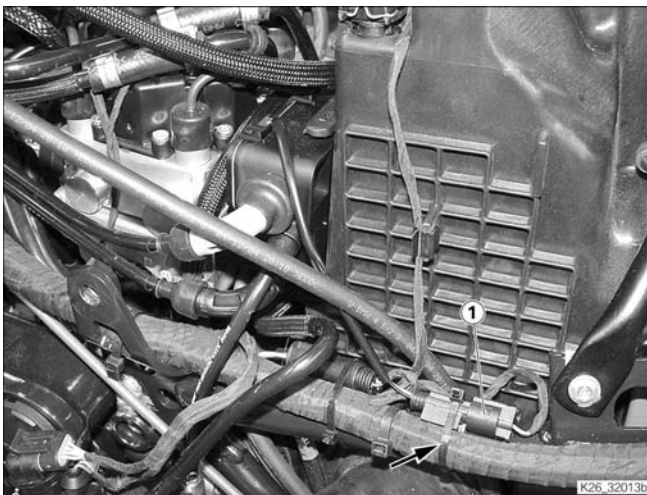
- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Releasing cable divider

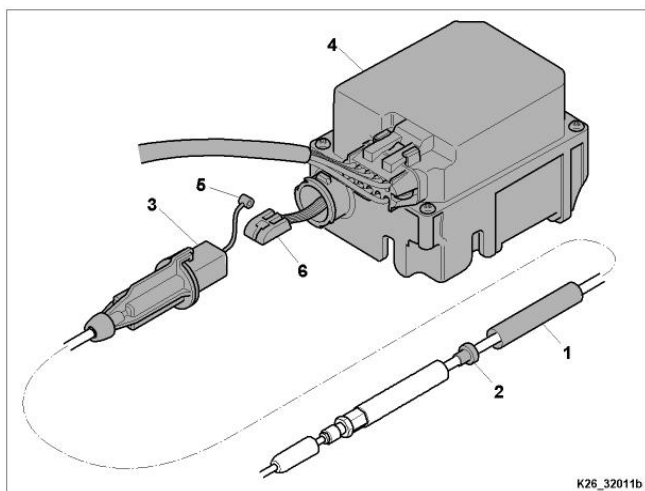
Variant, cruise control

- Disconnect plug (1) and open cable tie (arrow).

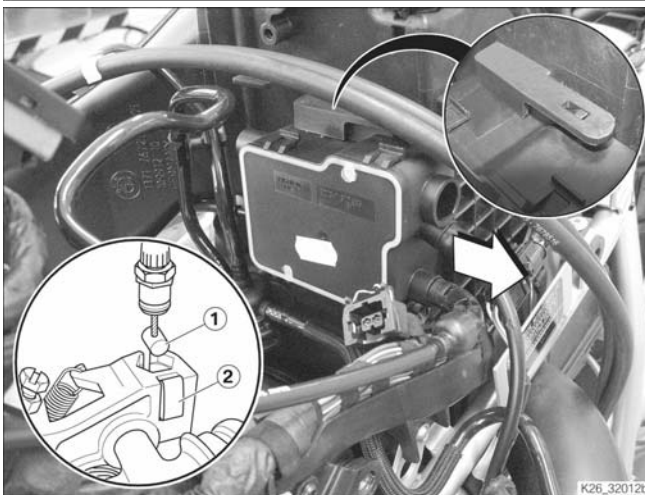


Variant, cruise control

- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).

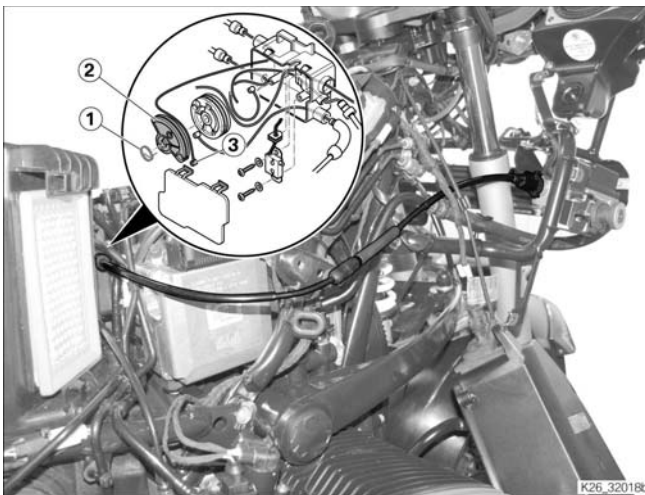


- Thread through Bowden cable (5) towards the rear.



- Disengage Bowden cable (1) at right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow Bowden cable (1) to be removed.
- Push up the retainer on the intake air silencer.
- Pull cable divider to the left to remove together with the Bowden cables.

(-) Removing Bowden cable for cruise control



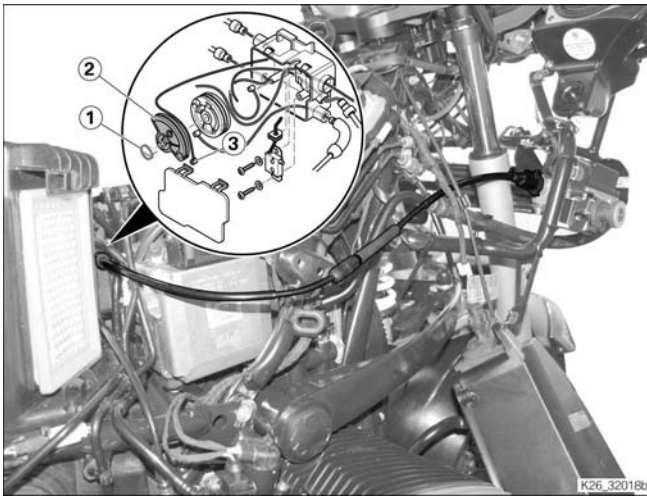
- Remove the cap from the throttle-cable divider.
- Remove spring (1).
- Remove pulley (2).
- Disengage Bowden cable (3) and remove.

(-) Installing Bowden cable for cruise control

- Engage Bowden cable (3) on pulley (2).

Attention

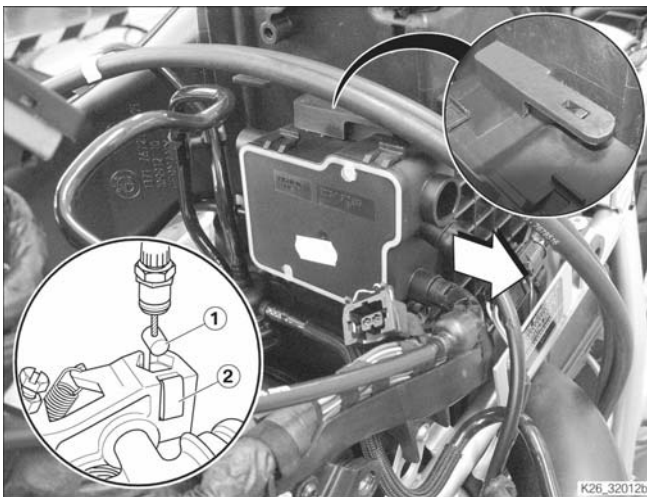
Nature: Operation of the cable divider will be impaired if the cable pulley is installed incorrectly.



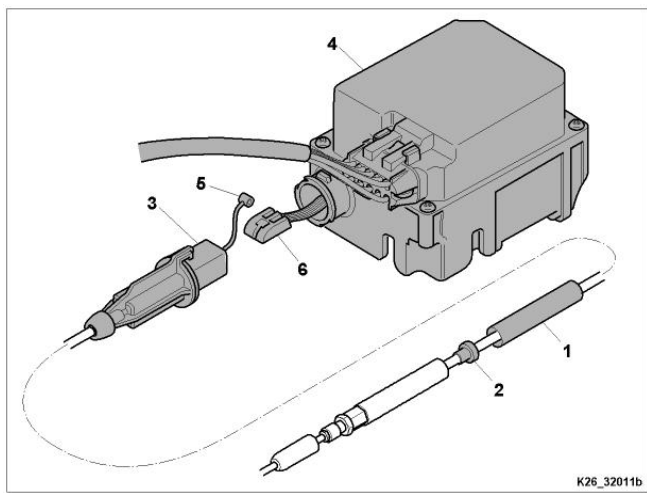
Avoidance: Install the cable pulley such that the guide pin engages in the guide groove on the cable pulley.

- Fit cable pulley (2) into the cable divider, noting the locating pin.
- Fit spring (1).
- Close cable divider with cover.

(-) Securing cable divider



- Thread through Bowden cables to the right and clip cable divider in the holders on the intake silencer.
- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) on the right-hand throttle valve.

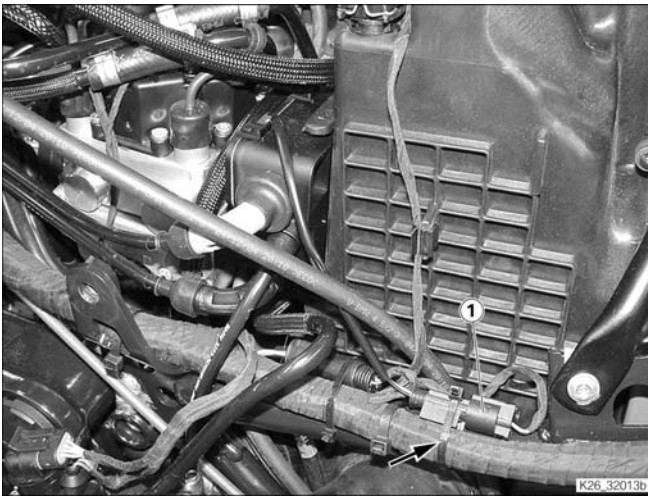


Variant, cruise control

- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).

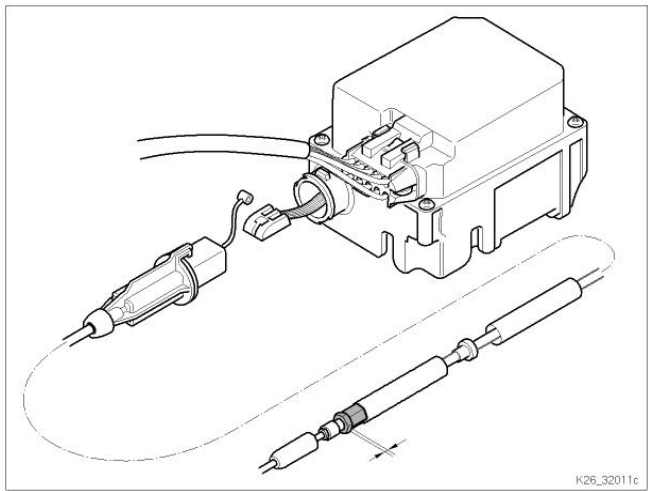
Variant, cruise control

- Connect plug (1) and secure cable tie (arrow).




- Before synchronising the cylinders, turn the throttle twistgrip 3 times to its limit of travel to allow the throttle cables to settle.

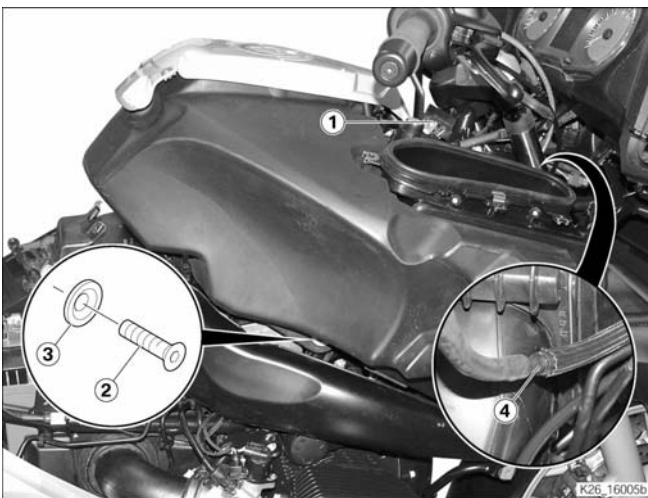
(-) Adjusting Bowden cable for cruise control




- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.

 Technical data			
Setting for Bowden cable, cruise control		2 - 3 mm	Variant, cruise control

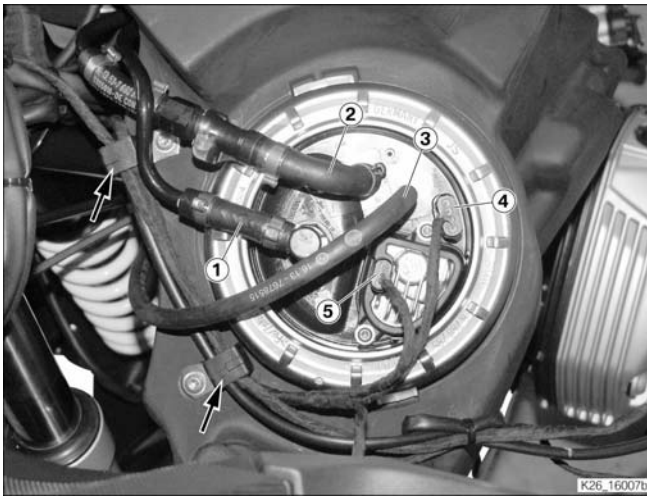
(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).



- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

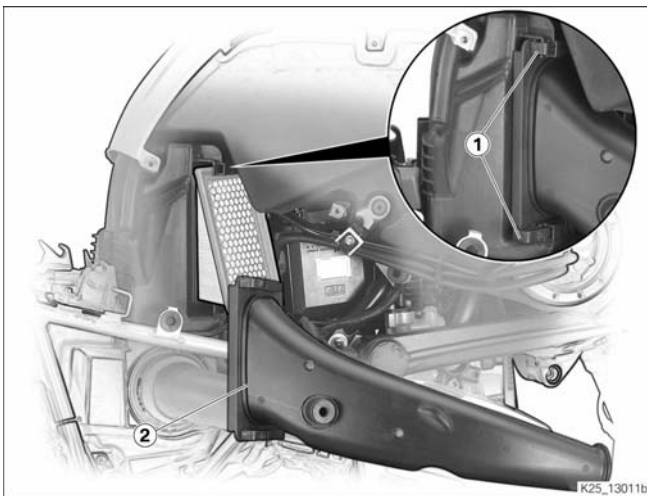
⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

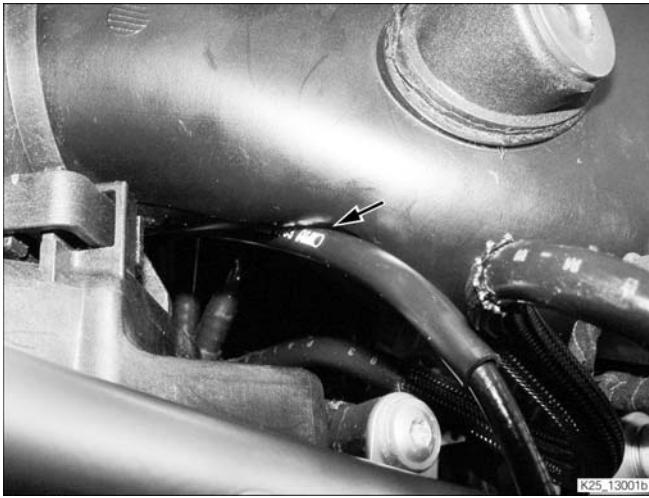
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing intake air pipe



- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

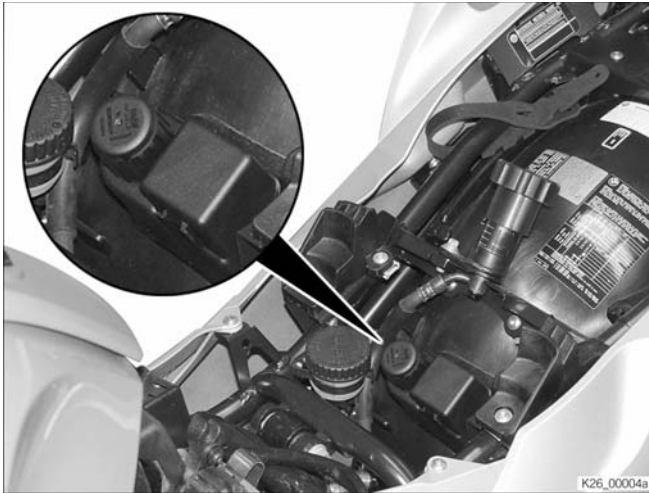


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.

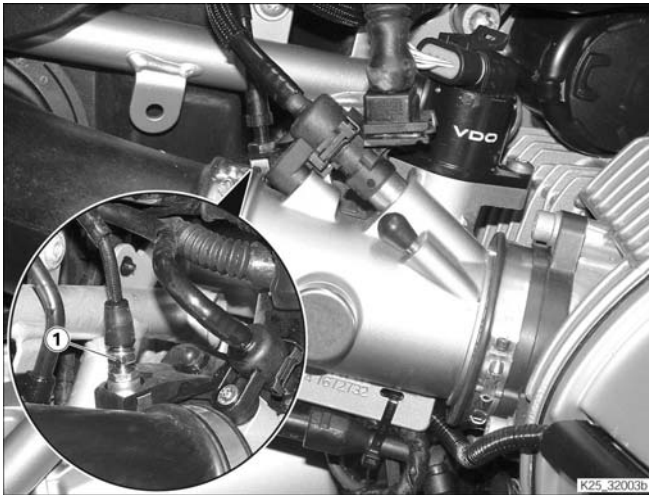


Note

Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.


In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.

In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.



Test

- Check that when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

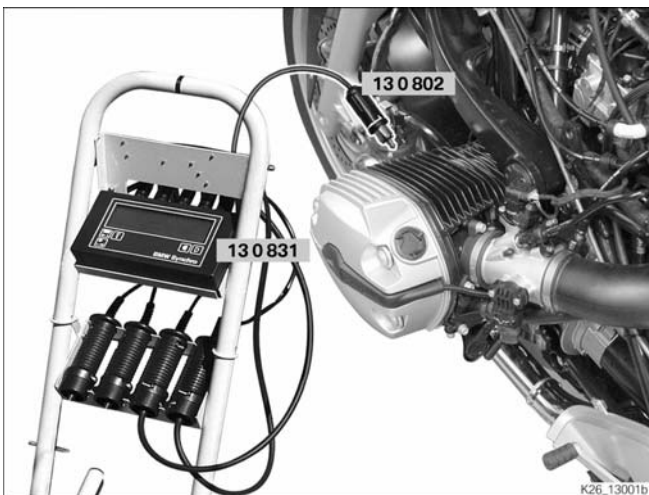
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

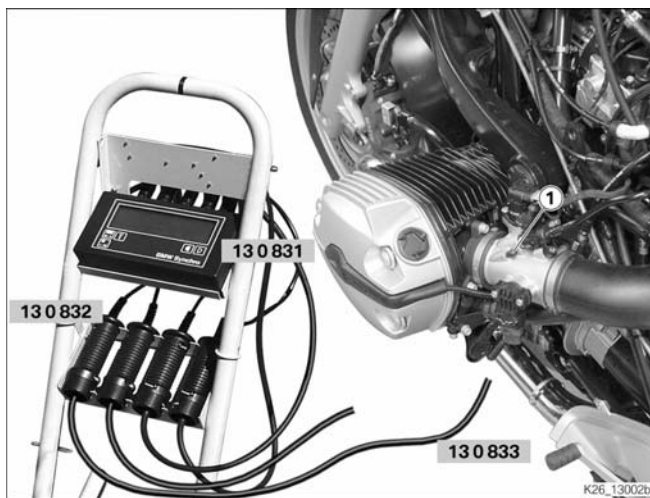


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- » The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



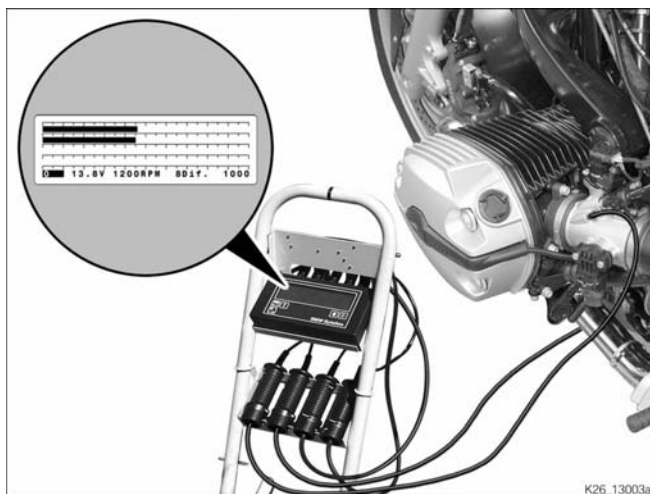
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► **3. Checking synchronisation of throttle-valve cables**

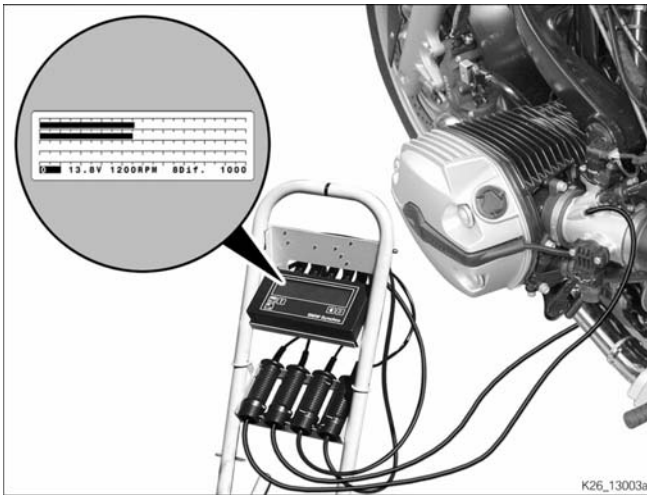
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmetered air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

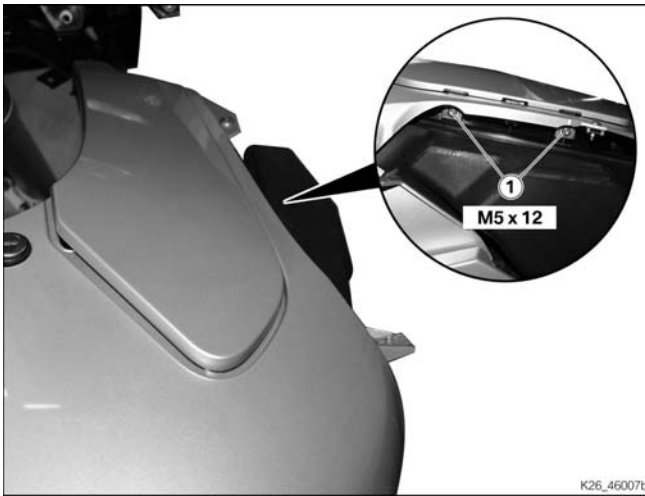
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).

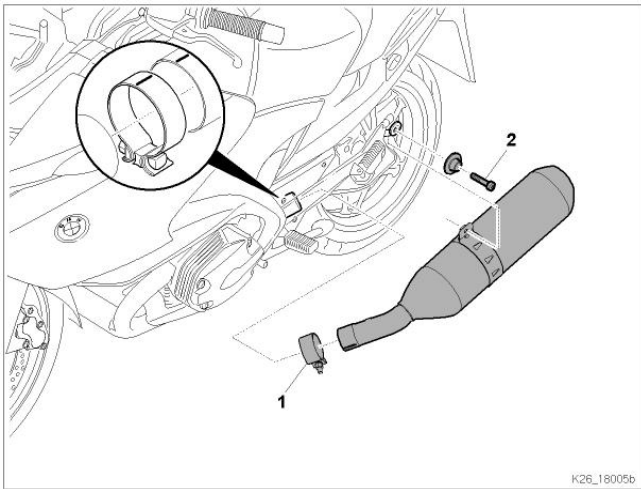


(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



 **33 00 001 Rear wheel drive, changing oil**



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Remove rear wheel.



(-) Removing brake-hose cover

- Remove the screws and lift off the cover.



(-) Removing brake calliper

- Remove screws (1).

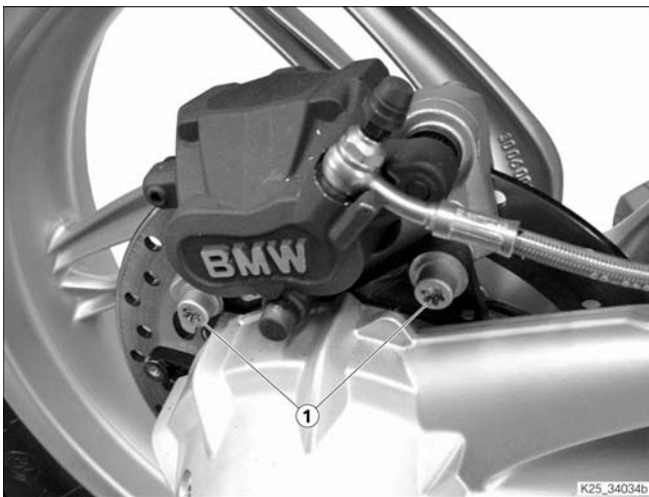


Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

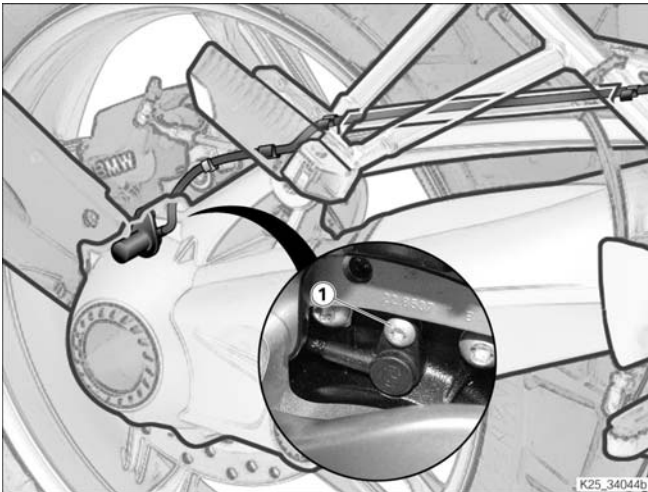
Install the brake caliper with brake pads or insert the piston resetting device.



- Remove the brake calliper.

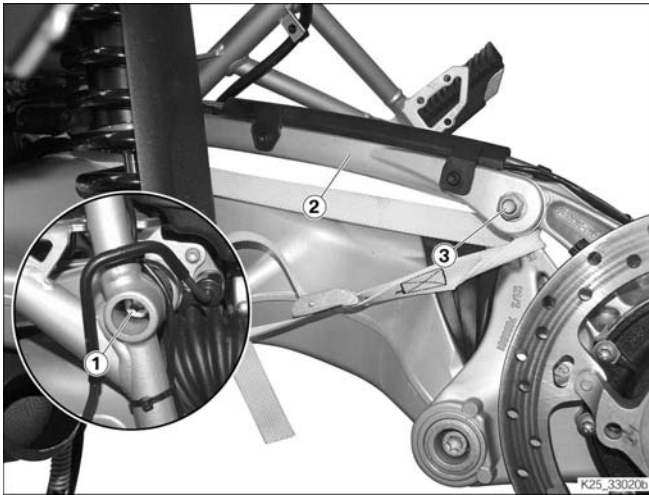
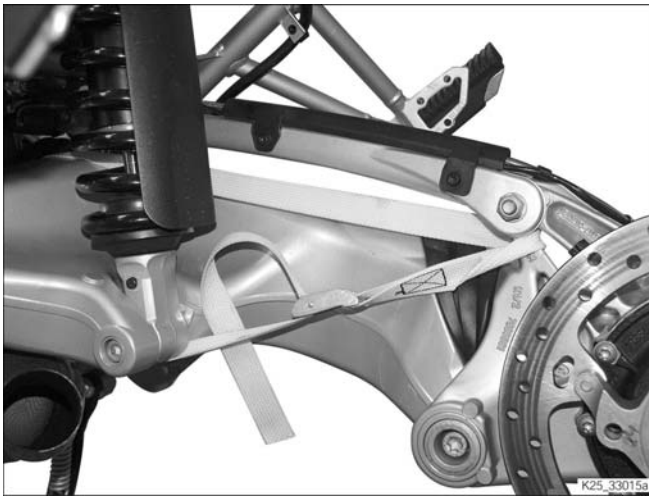
(-) Removing rear speed sensor

- Remove screw (1).
- Carefully pull out the speed sensor.
- Unclip the sensor cable.
- Lay the speed sensor on the footrest.
- Insert plug (No. 33 1 591) to seal the bore for the speed sensor.



(-) Releasing Paralever link at rear

- Use a strap to secure the rear-wheel drive so that it cannot drop.




- Remove nut (3) with washer and bolt.
- Use a cable tie to hold the brake caliper up and let it dangle at the rear frame.



(-) Draining oil from rear wheel drive

- Release the retaining strap, pull the pinion shaft out of the universal shaft and pivot the rear-wheel drive down through 90°.
- Remove oil drain plug (1) and drain off the oil.
- Pivot the rear-wheel drive up through 90° and introduce the pinion shaft into the universal shaft. Turn the universal shaft gently back and forth if necessary to facilitate this operation.
- Use a strap to secure the rear-wheel drive so that it cannot drop.
- Install oil drain plug (1).

 Tightening torques		
Oil filler plug in rear wheel drive, M12 x 1, with O-ring 11.2 x 1.8	20 Nm	


(-) Filling rear-wheel drive with oil (oil change).


- Remove plug (No. 33 1 591) from the bore for the speed sensor.
- Using a funnel of similar instrument, pour the correct quantity of gearbox oil into the bore for the speed

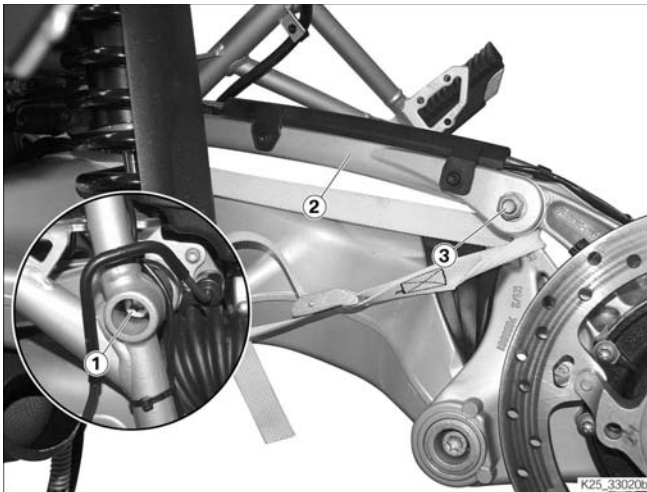


K25_33002a

sensor.

 Technical data			
Oil capacity, rear wheel drive	Oil change	0.23 l	
	Consumables/lubricants		
	Castrol SAF-XO		


 Consumables/lubricants		
Castrol SAF-XO	Gear oil	



K25_33020b


(-) Installing Paralever link at rear

- Release the brake caliper from the rear frame.
- Introduce link (2) into the rear-wheel drive and align it.
- Push the stud through toward the motorcycle side and tighten nut (3).


 Tightening torques		
Link to final drive housing, M10 x 55, Replace nut	43 Nm	

(-) Securing rear speed sensor

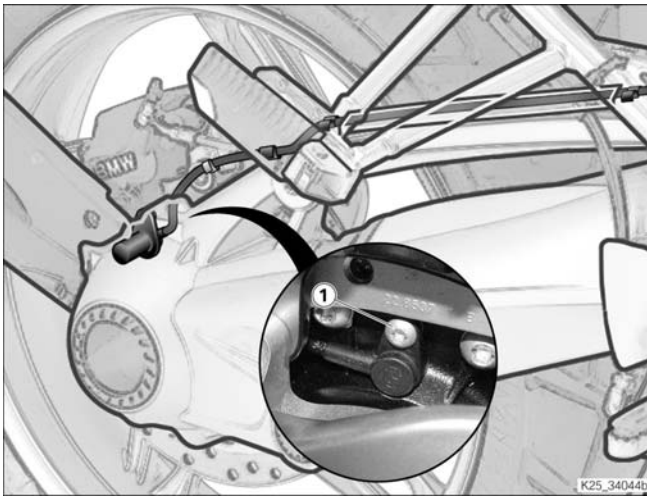
- Fit new O-ring on speed sensor.
- Grease speed sensor and O-ring.

 Consumables/lubricants		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

- Carefully fit speed sensor with O-ring in final drive unit.
- Install screw (1).

 Tightening torques		
Speed sensor to final drive housing cover, M5 x 10	4 Nm	


- Seat the sensor cable in the clip.



(-) Installing rear brake caliper

- Hold the brake caliper in position and secure with screws (1).



 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning


Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Installing brake hose cover

- Hold the cover in position and secure it with screws.

 Tightening torques		
Brake hose cover to strut, M6 x 16	8 Nm	



(-) Installing rear wheel

- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.


 **Attention**

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.




- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.

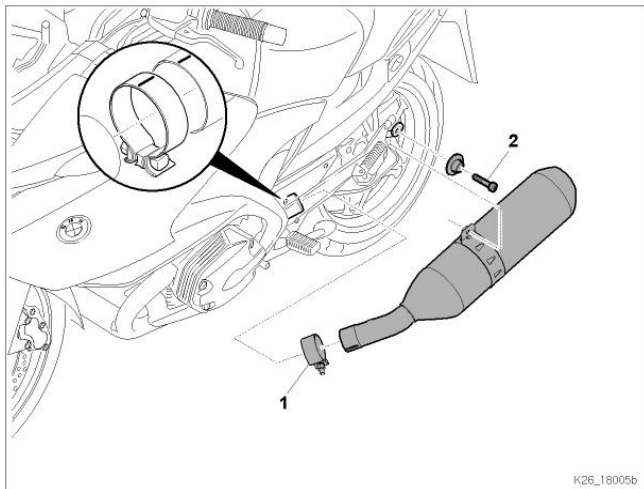
 Tightening torques		
Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite sequence	60 Nm	
Wheel flange with cut thread, M10 x 40 x 1.25, in diagonally opposite sequence	60 Nm	

(-) Installing silencer

- Grease the inner face of Torca clamp (1).

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the



K26_18005b

manifold and fit screw (2) in position.


- Tighten screw (2).

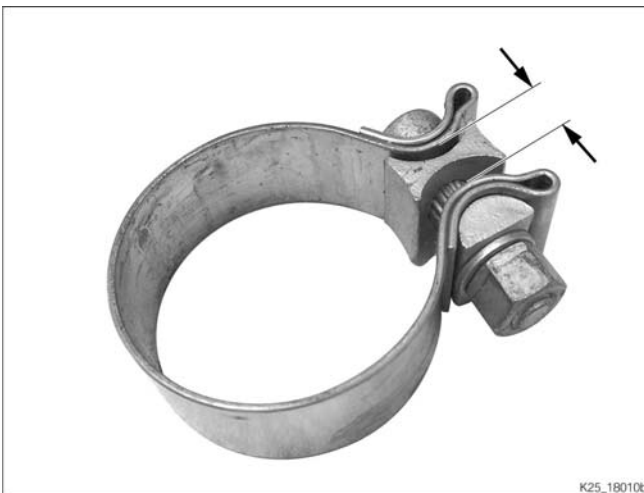
 Tightening torques		
End silencer to footrest support, M8	19 Nm	



K28_18007d

- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




K25_18010b

► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

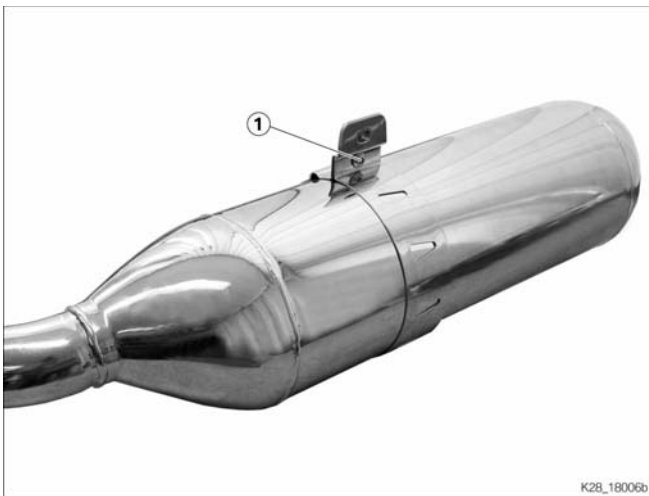
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




 **Attention**


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.


- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




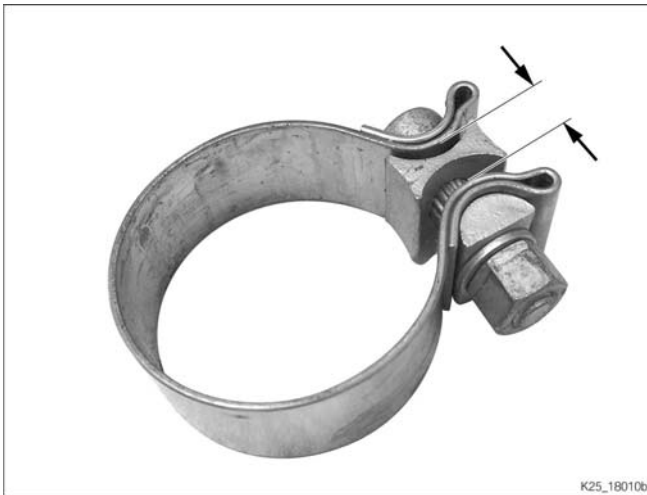
▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



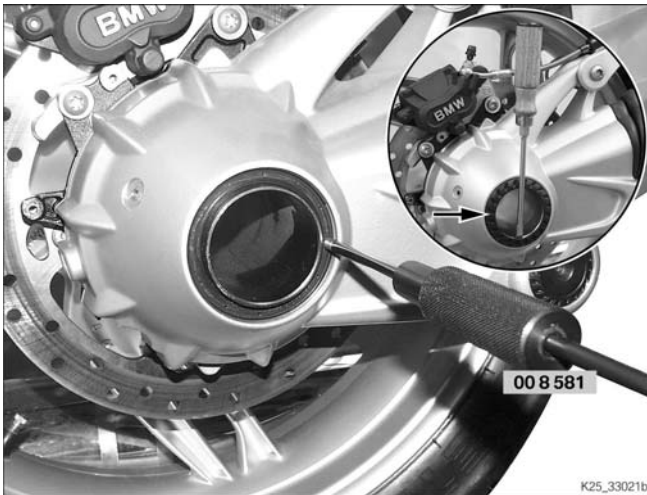
- Once again check distance ([arrows](#)) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



 **33 11 060 Replacing shaft sealing ring of wheel axle in housing**

(-) [Removing shaft sealing ring of wheel axle from housing]



- Remove the cover.
- Remove the circlip.
- Using drill-bit stop (No. 00 8 586) and a 2.5 mm drill bit, drill a recess into the Simmer-ring seal at the bottom.



Attention

Nature: Drilling too deeply into a shaft sealing ring can result in damage to the components behind the ring.

Avoidance: Always use a stop to prevent the twist drill from drilling too deep.

- Set the drill-bit stop (No. 00 8 586) to a depth of 3mm.
- Use pull rod (No. 00 8 581) to pull out the Simmer-ring seal.
- » Check that the bearing is completely free of metal chips!

(-) [Installing shaft sealing ring of wheel axle in housing]



- Drive in the shaft sealing ring with drift (No. 33 1 892) .
- Install the circlip.
- » Make sure it is correctly seated.
- Install the cover.

 **33 53 000 Replacing rear spring strut**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

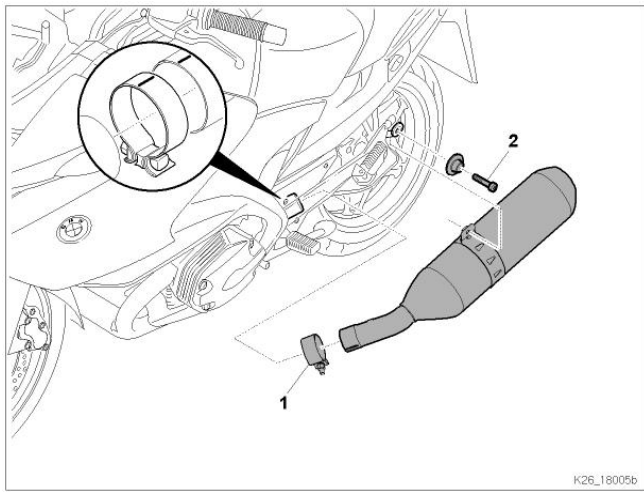


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).

Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Remove rear wheel.



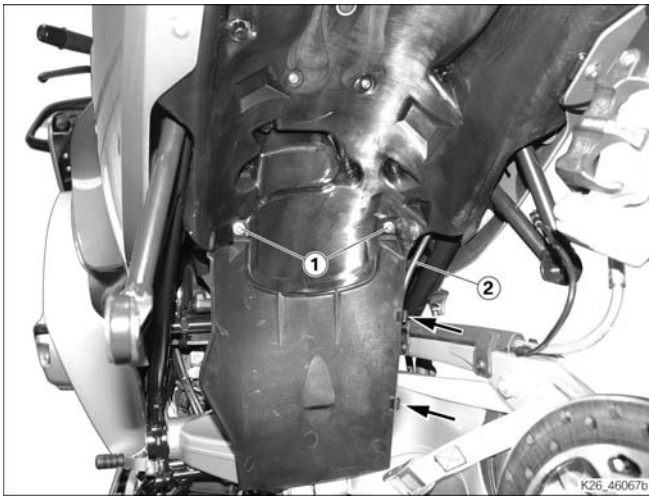
(-) Removing rear mudguard, front section

- Remove screws (1).
- Disengage and remove the front section of the rear mudguard.



Variant, ESA

- Release cable (2) from cable holders (arrows).
-



Remove screws (1).

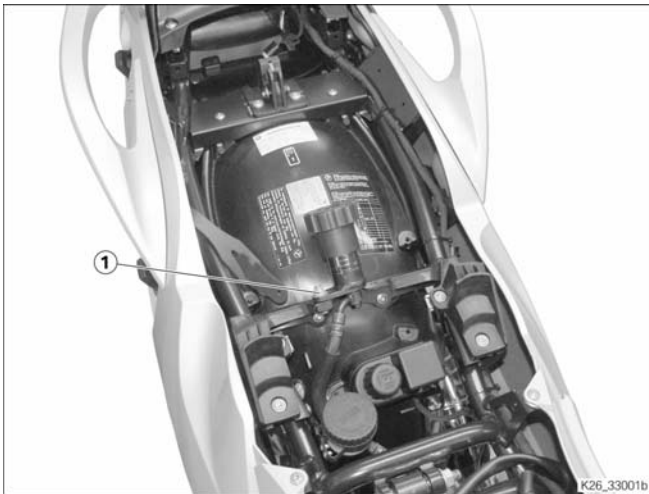
- Disengage and remove the front section of the rear mudguard.

(-) Removing rear spring strut

- Apply masking tape to the lower part of the rear-wheel drive unit.
- Support the rear-wheel drive unit with scissor-type lifter (No. 00 1 571) .

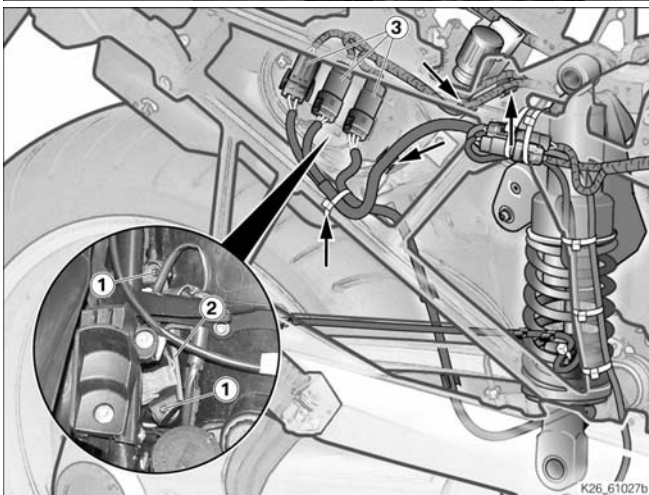
Variant, not for ESA

- Remove screw (1) and remove the spring-strut adjuster knob.

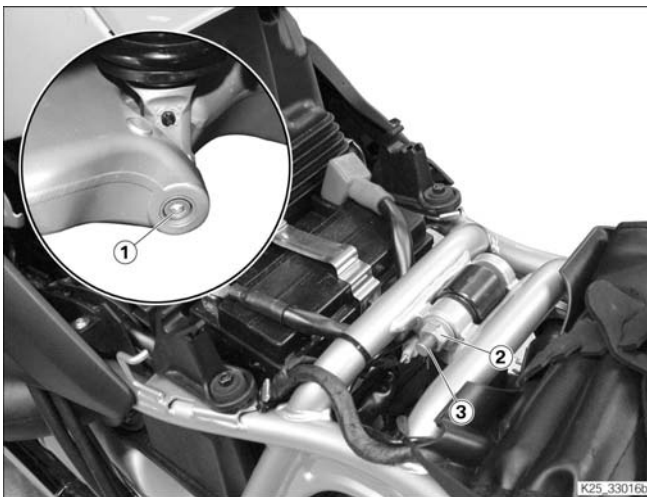
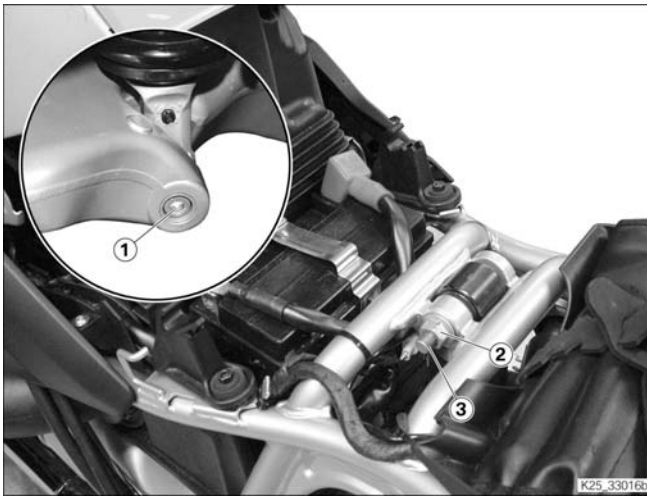


Variant, ESA

- Remove screws (1) and manoeuvre the holder clear.
- Disconnect plug (2).
- Cut through the cable ties (arrows) at the frame and guide the cable down until clear.




- Remove screw (1).
- Remove nut (2).
- Lift the spring strut and remove screw (3).
- Remove the spring strut.




(-) Installing rear spring strut


- Clean the threads.
- Grease screw heads (1) and (3).

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Hold the spring strut in position and install screw (3).
- Align the swinging arm, install screw (1) and tighten.

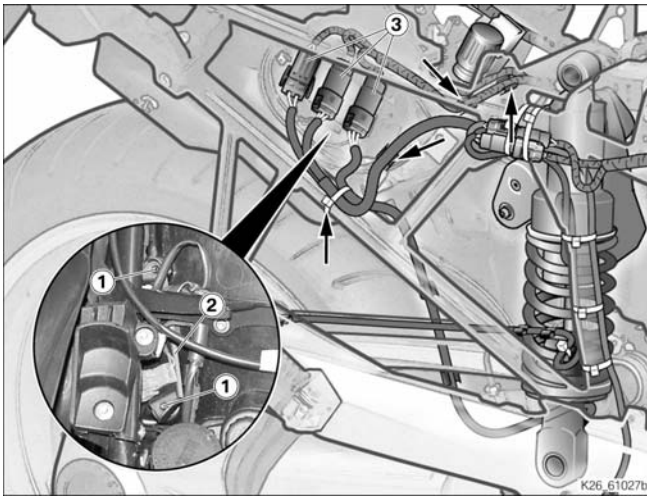
 <p>Tightening torques</p>		
Spring strut to rear swinging arm, M10 x 80 - 10.9 Loctite 243	Initial torque, 20 Nm	
	Final torque, 58 Nm	

- Install new nut (2) and tighten.

 <p>Tightening torques</p>		
Spring strut to main frame, M10 x 1.25, Replace nut Mechanical thread lock	50 Nm	

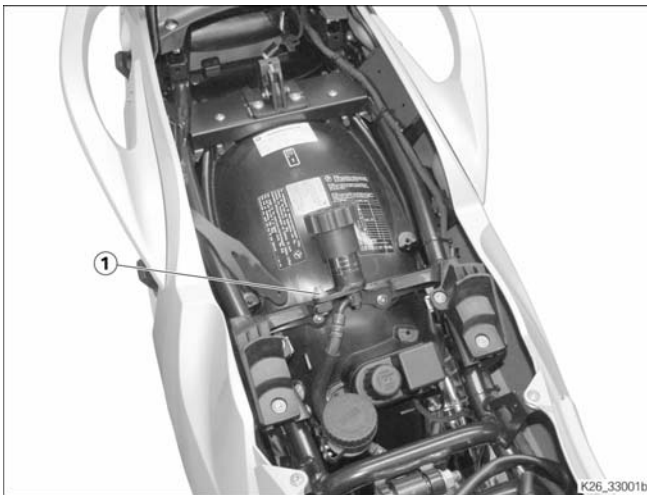
Variant, ESA

- Pass the cable through from below and secure it to the frame ([arrows](#)).
- Connect plug (2).
- Insert the holder and secure it with screws (1).



Variant, not for ESA

- Secure the adjuster knob to the holder with screw (1).



- Remove scissor-type lifter (No. 00 1 571) .
- Remove the masking tape from the bottom part of the rear-wheel drive unit.

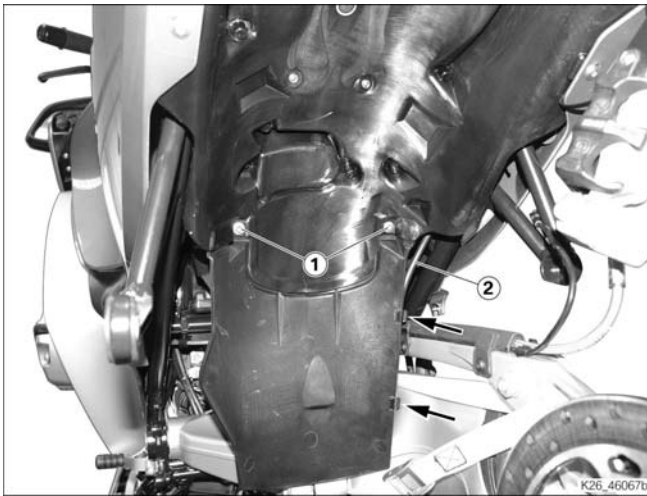
(-) Installing rear mudguard, front section

- Engage the front section of the rear mudguard.
- Install screws (1).



Variant, ESA

- Engage the front section of the rear mudguard.
- Install screws (1).
- Secure cable (2) in cable holders (arrows).



(-) Installing rear wheel


- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.

Attention

Nature: Components can be damaged by hard or sharp-edged objects.


Avoidance: Avoid scratching the components; use masking tape if necessary.

- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.

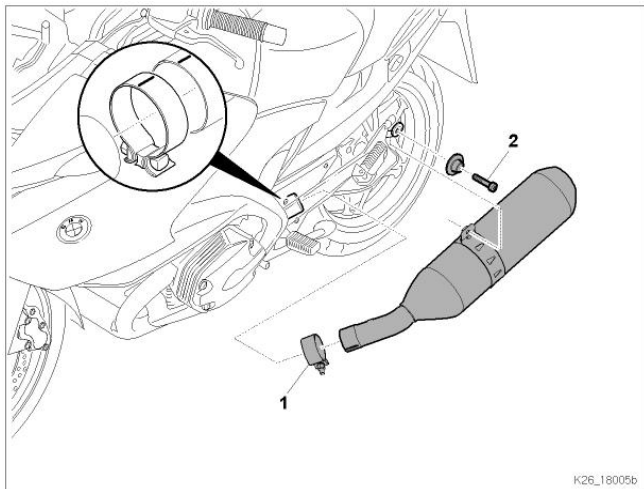
 Tightening torques		
Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite sequence	60 Nm	
Wheel flange with cut thread, M10 x 40 x 1.25, in diagonally opposite sequence	60 Nm	

(-) Installing silencer

- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the




manifold and fit screw (2) in position.

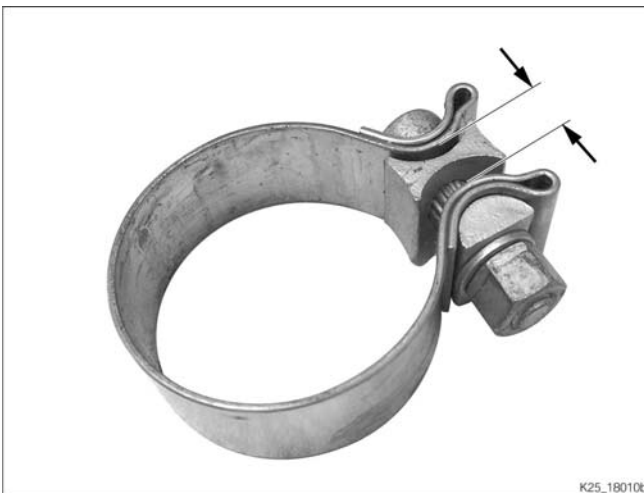
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	



- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

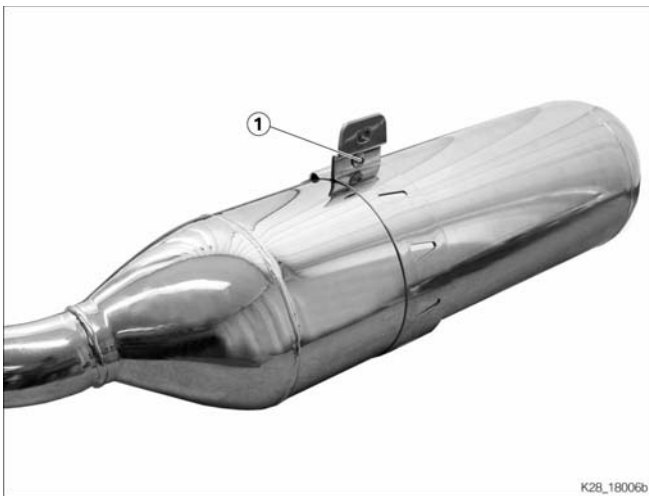
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




 **Attention**


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.


- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




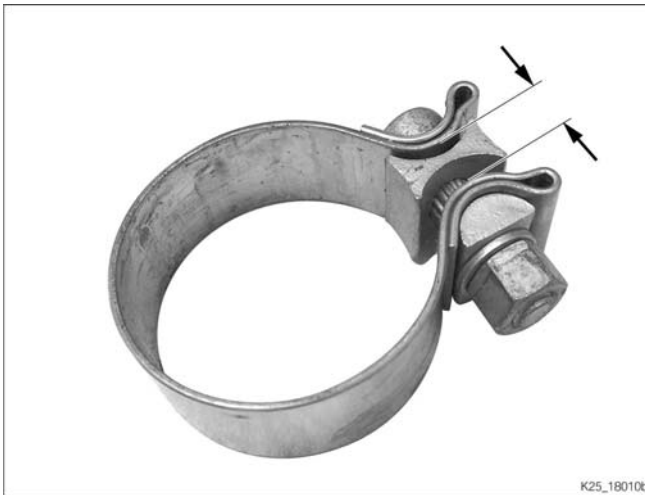
▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	



K25_18010b


Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance ([arrows](#)) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



K26_18001b



Variant, ESA

(-) Preparation for initialising/calibrating new parts

Precondition

- Engine switched off.
- Prop the motorcycle in such a way that it cannot move

while initialisation/calibration is in progress.

- Motorcycle's battery is fully charged.



Note

Do not attempt to perform work of any other kind on the motorcycle while programming/coding are in progress.

- Switch off all electrical consumers.



Attention

Nature: Programming/coding is aborted if the voltage in the on-board system drops below 12.6 volts.

Avoidance: Connect the charger to the battery.

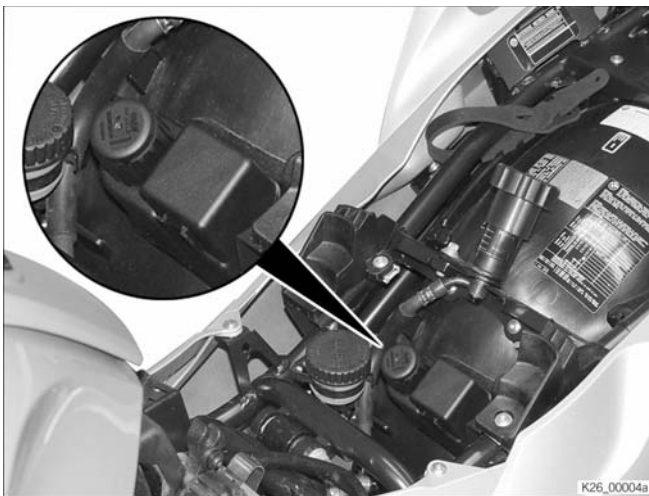
- Connect charger (No. 61 1 581) with cables (No. 61 1 582) to the battery. While initialisation/calibration is in progress, **do not** connect or disconnect the charger.

▶ **Connecting BMW Motorrad diagnostic system to motorcycle**



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



- Perform diagnosis. Rectify faults, if found, **before** starting initialisation/calibration.
- Start initialisation/calibration with the CIP program and follow the instructions issued by the BMW Motorrad diagnostic system.

Variant, ESA

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **33 53 009 Spring strut, ESA function test**

Variant, ESA

(-) Checking damping

Precondition

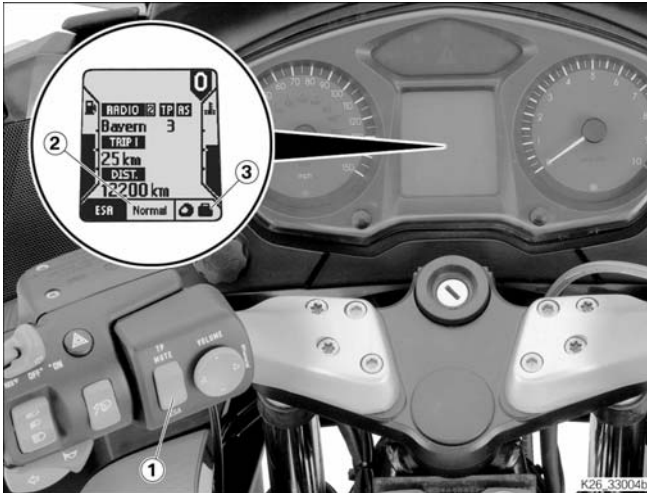
- Tester seated on the motorcycle with all stands retracted.



- Switch on the ignition.
- Press ESA button (1) and step through the modes until 'Comfort' (2) is selected.
- Switch off the ignition.

Test

- While sitting on the motorcycle, move your weight forward and start a seesaw effect.
- Switch on the ignition.



Result: When the ignition is switched on the ESA spring strut resets to a reference position and there is a clearly perceptible increase in the damping effect.

Measure:

- ESA spring strut is OK.

Result: No perceptible increase in damping effect.

Measure:

▶ **Checking damping with diagnostic system**

Variant, ESA

▷ **Removing seat**

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



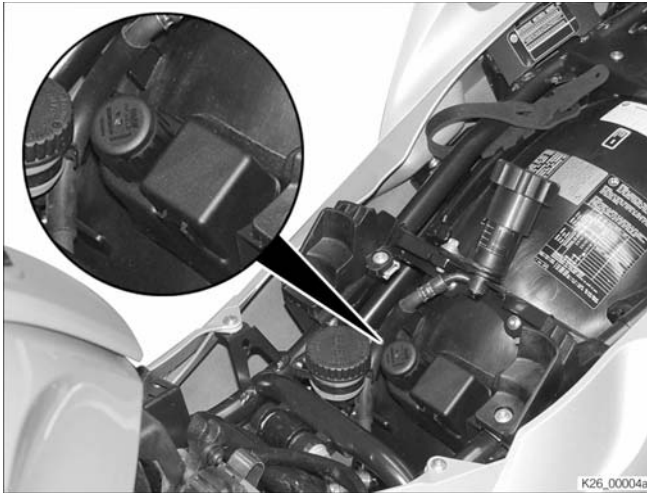
▷ **Connecting BMW Motorrad diagnostic system to**

motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



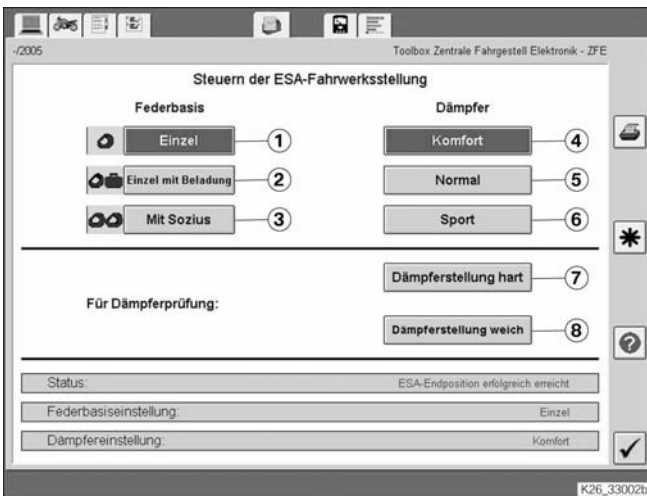
- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



- Select "Toolbox ZFE" on the diagnostic system.
- Select "Control the ESA suspension settings".
- Explanation of the screen:

- » (1) - One-up
- » (2) - One-up with luggage
- » (3) - Two-up
- » (4) - Comfort
- » (5) - Normal
- » (6) - Sport
- » (7) - Damper setting 'hard'
- » (8) - Damper setting 'soft'

- The ESA spring-strut setting you select is displayed on the screen.
- On the screen, select the 'soft' setting (8).



Test

- While sitting on the motorcycle, move your weight forward and start a seesaw effect.
- On the screen, select the 'hard' setting (7).

Result: There should be a clearly perceptible increase in damping effect.

Measure:

- ESA spring strut is OK.

Result: No perceptible increase in damping effect.

Measure:

=> 31 31 001, Replacing front spring strut

Test

- On the screen, select the 'soft' setting (8).

- While sitting on the motorcycle, move your weight back and start a seesaw effect.
- On the screen, select the 'hard' setting (7).

Result: There should be a clearly perceptible increase in damping effect.

Measure:

- ESA spring strut is OK.

Result: No perceptible increase in damping effect.

Measure:

=> 33 53 000, Replacing rear spring strut

▷ Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.



▷ Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



- Repeat the test step for the rear spring strut, but this time move your weight to the rear while sitting on the motorcycle and start a seesaw effect.

(-) Checking basic spring setting

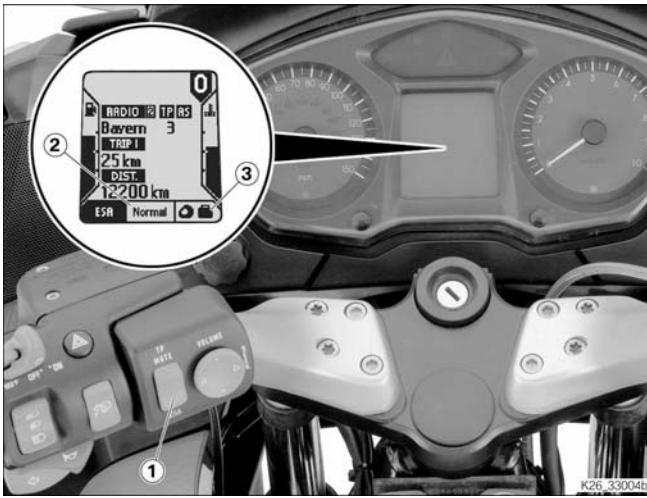
Precondition

- Tester seated on the motorcycle with all stands retracted.



Test

- Switch on the ignition.
- Press ESA button (1) and hold it down for approx. 2 seconds, then change the mode (3).



Result: The motorcycle perceptibly lifts/drops at the rear.

Measure:

- ESA spring strut is OK.

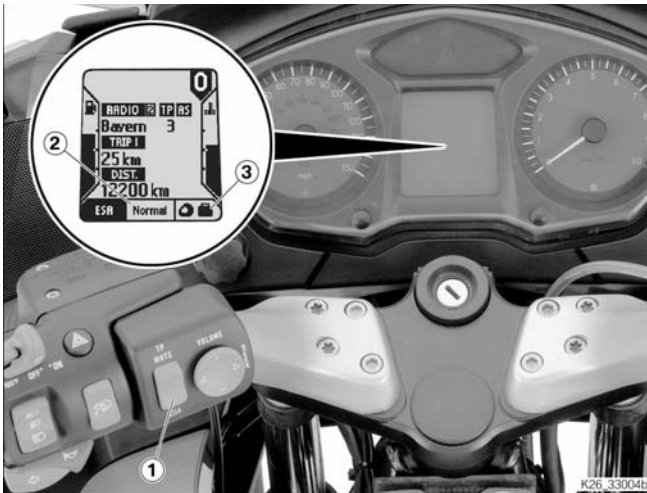
Result: Virtually no perceptible lift/drop at the rear.

Measure:

► **Measuring range of adjustment of ESA spring strut**


Variant, ESA

- Switch on the ignition.
- Press ESA button (1) and hold it down for approx. 2 seconds, then change the mode (3).



Test

- Measure the distance between the damper housing and the top spring mount.

 Technical data			
Spring base check dimension	Indicator in instrument cluster: Rider (one helmet)	0 mm	Variant, ESA
Value definition: Between shock absorber	Indicator	4 - 6 mm	Variant,

housing and spring seat, top	in instrument cluster: Rider with luggage (one helmet and case)		ESA
	Indicator in instrument cluster: Rider with pillion (two helmets)	9 - 10 mm	Variant, ESA

Result: Values out of tolerance.

Measure:

=> 33 53 000, Replacing rear spring strut



 **34 00 010 Changing brake fluid**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

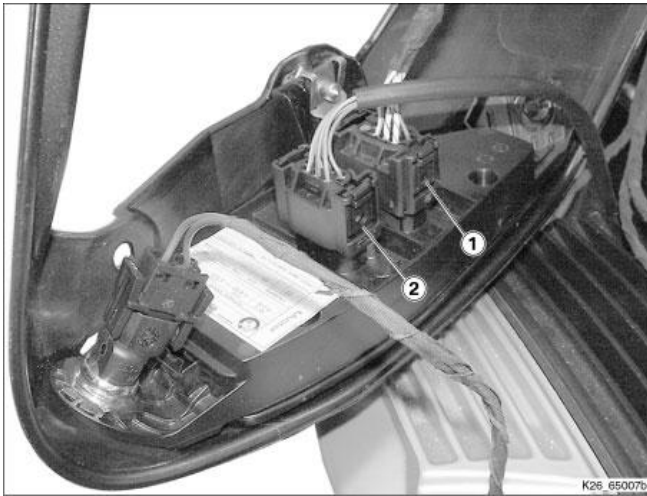


- Disconnect plug (1) from socket.

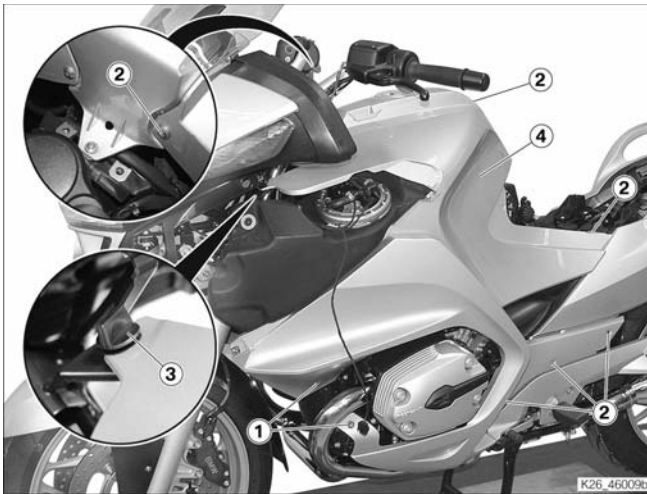


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

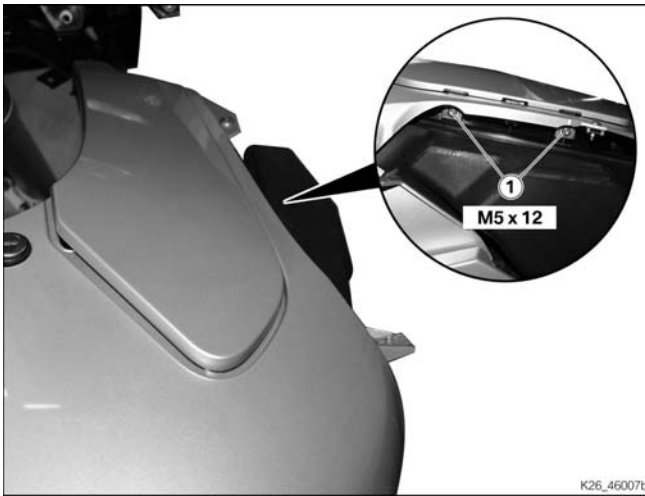
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



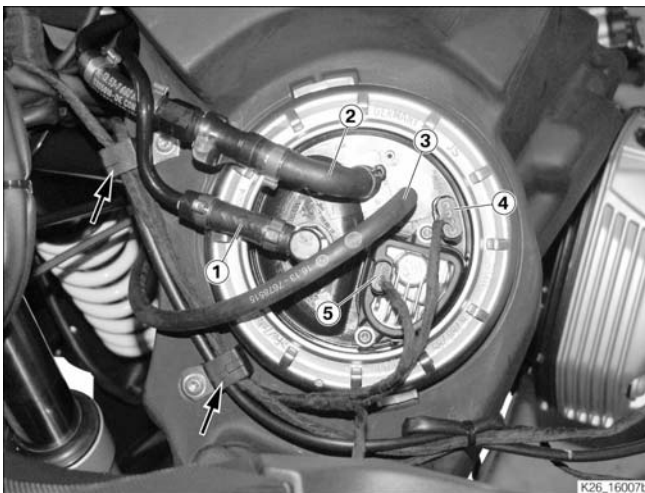
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

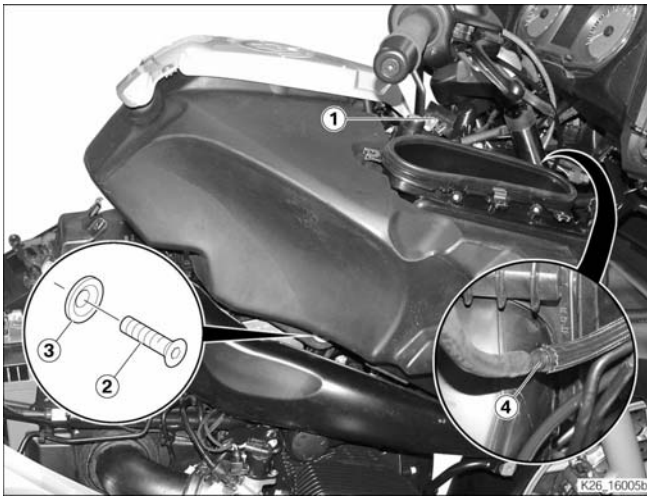


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



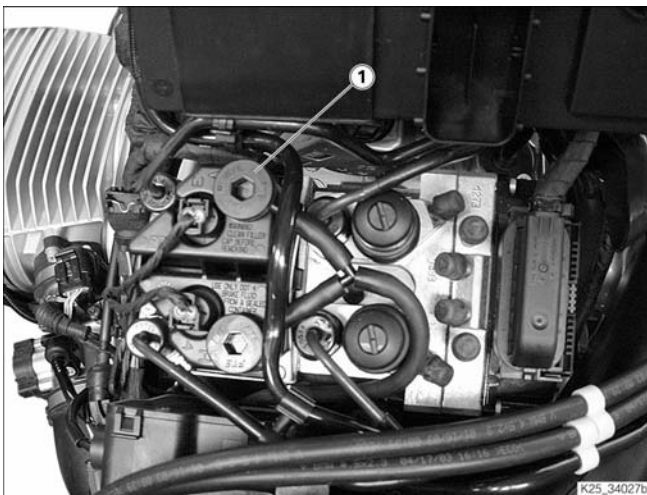
(-) Changing brake fluid in wheel circuit, front

► Removing front brake pads

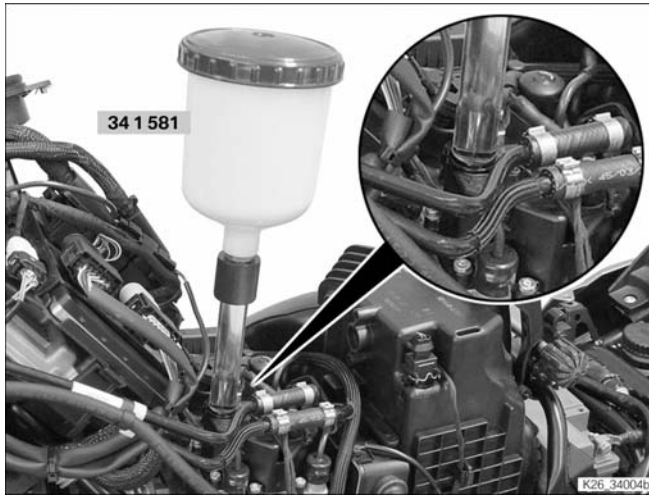
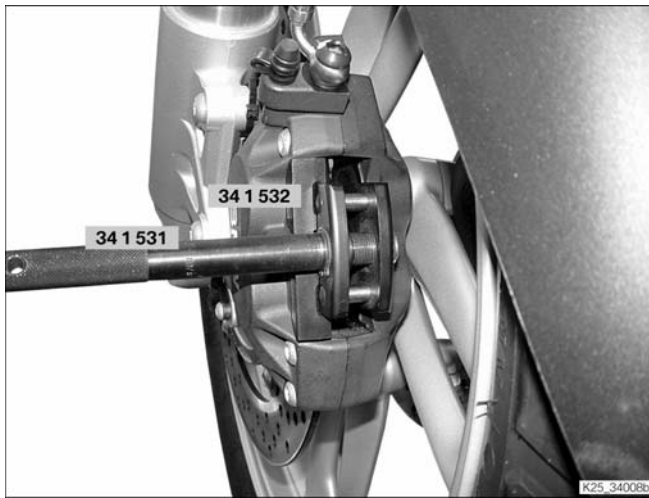
- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.




- ◄
- Open front wheel-circuit reservoir (1).



- Wrap cloths around the left and right brake calipers.
- Use piston resetting device (No. 34 1 531) and locator (No. 34 1 532) to force the pistons in the left and right brake calipers all the way back and hold them in this position.



- Screw container (No. 34 1 581) onto front wheel circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/2 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw of the right brake caliper, but **do not switch on**.
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.




Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.


- Continue pumping off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

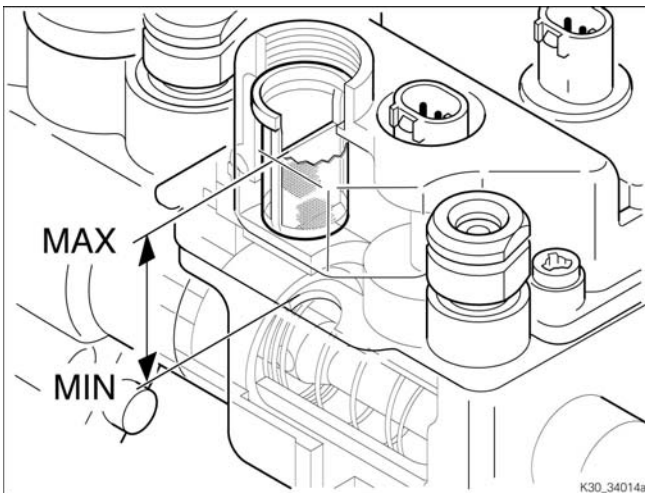
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Connect the brake bleeding device to the bleed screw of the left brake caliper, but **do not switch on**.
- If necessary, use a cable tie to secure the hose of the brake bleeding device to the bleed screw.
- The procedure for changing the brake fluid in the left brake caliper is the same as that for the right caliper.
- When the fluid exits clear and free of bubbles,

continue pumping until the fluid in the container just disappears from view.

- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

- Release the brake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.

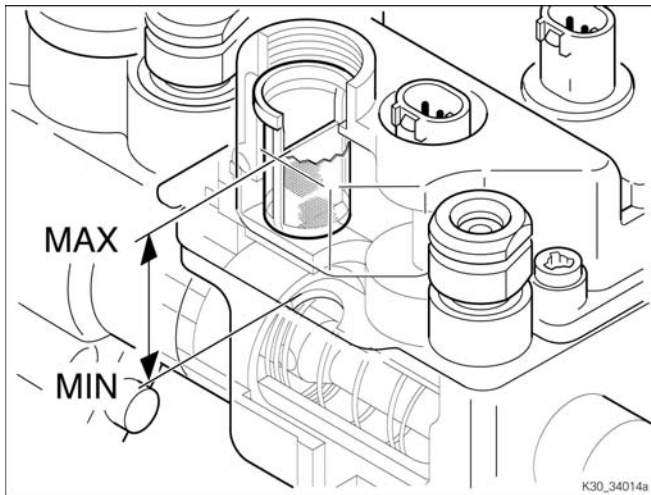
► **Instructions for filling front wheel circuit reservoir**

Attention


Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Make sure that the front wheel-circuit reservoir is topped up to the "MAX" mark.
- Install adapter 22 (No. 34 1 533) in piston resetting device (No. 34 1 531) and locator (No. 34 1 532) in both front brake callipers and **fully compress** them until the adapter cannot move.
- Switch on the ignition.
- Pull handbrake lever until the pistons of the front brake callipers are in contact with piston resetting device (No. 34 1 531) .



- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Hand-tighten the cap of the wheel-circuit reservoir.
- Using piston resetting device (No. 34 1 531) , force the brake pistons all the way back and remove, together with adapter 22 (No. 34 1 533) .
- Replace the front brake pads after removal, if necessary.

▷ **Installing front brake pads**




Warning

Nature: Greasing the backing plate can allow grease to make its way onto the friction pad and the brake disc.

Avoidance: Take care to grease only the rear and the trailing end face of the backing plate.


- Grease the rear and the trailing end face of the backing plate.

 Consumables/lubricants		
Never Seez compound	Protective grease	83 23 9 407 830

- Install the brake pads.



- Install spring (1) with the arrow pointing in the forward direction of travel.
- Install screw (3).
- Install retainer (2).

 Tightening torques		
Grub screw, brake pads	7 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



(-) Changing brake fluid in control circuit

- Turn the handlebars all the way to the left.
- Repeatedly and slowly pull front brake lever lightly to expel air from brake master cylinder.
- Turn the front wheel to a position in which the brake fluid reservoir is horizontal and secure the front wheel in this position.




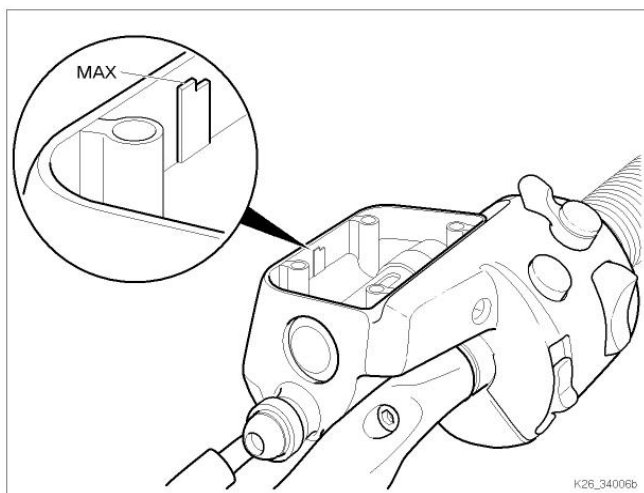
Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap cloths around the reservoir.
- Remove front reservoir cap with diaphragm, draw off the old brake fluid and clean the reservoir.
- Top up the brake fluid level to the (MAX) mark.

 Consumables/lubricants		
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DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.

- Set the handbrake lever to the position for maximum span.

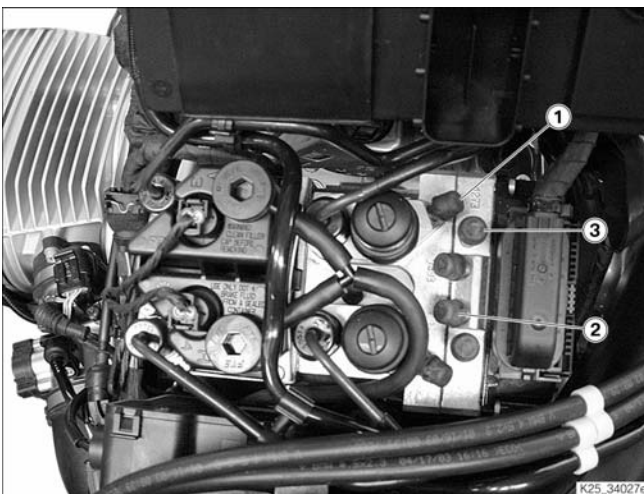


Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) of the front metering cylinder, but **do not switch on**.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

- In the following sequence, bleed:
 - front metering cylinder (1)
 - front integral circuit (2)
 - front control circuit (3) and
 - front metering cylinder (1) again in accordance with

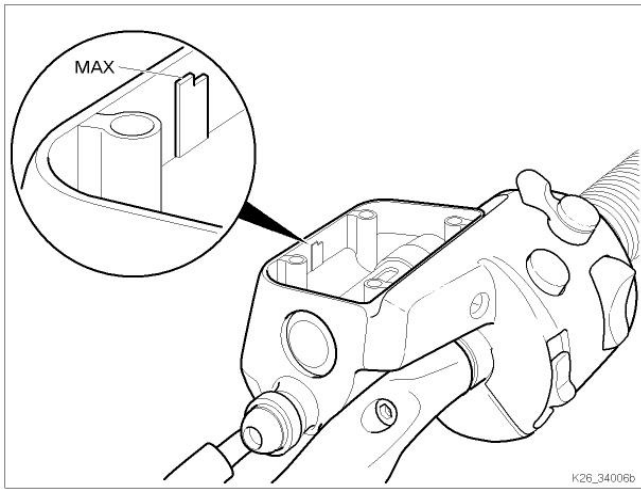
instructions for bleeding and using special ring spanner (No. 34 2 532)

► **Instructions for bleeding**

- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.

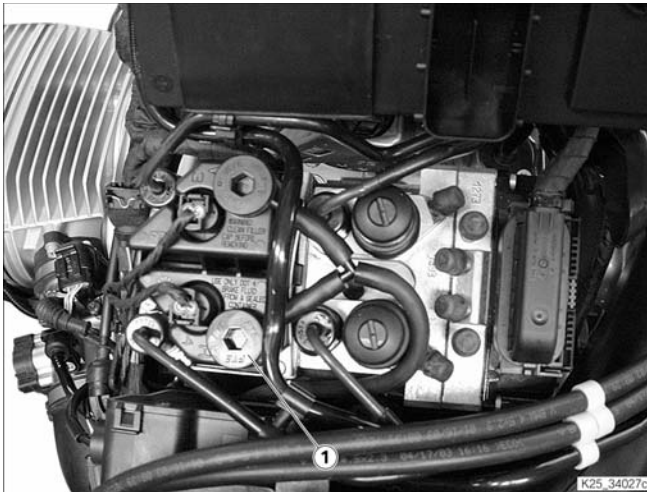


- Fit the protective caps on the bleed screws.
- Top up the brake fluid to the **(MAX)** mark.
- Wipe the rim of the reservoir, the diaphragm and the cover to remove brake fluid, and carefully re-assemble the components.



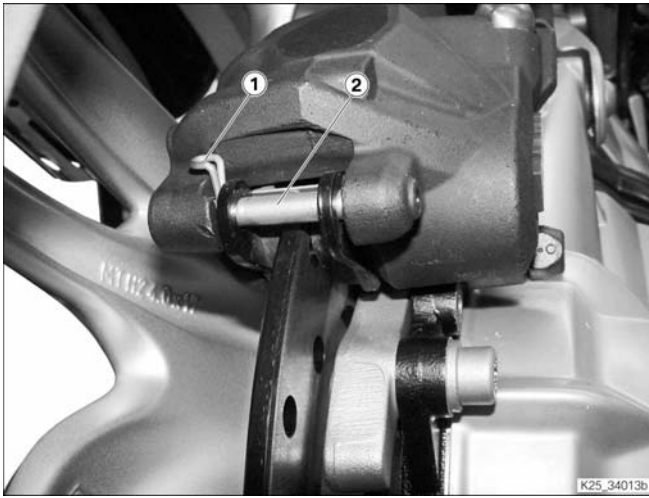
(-) Changing brake fluid in wheel circuit, rear

- Open rear wheel-circuit reservoir (1).



► **Removing rear brake pads**

- Remove retainer (1).
- Drive retaining pin (2) out toward the wheel side.
- Remove the brake pads.



▷ **Removing brake calliper**

- Remove screws (1).

 **Attention**

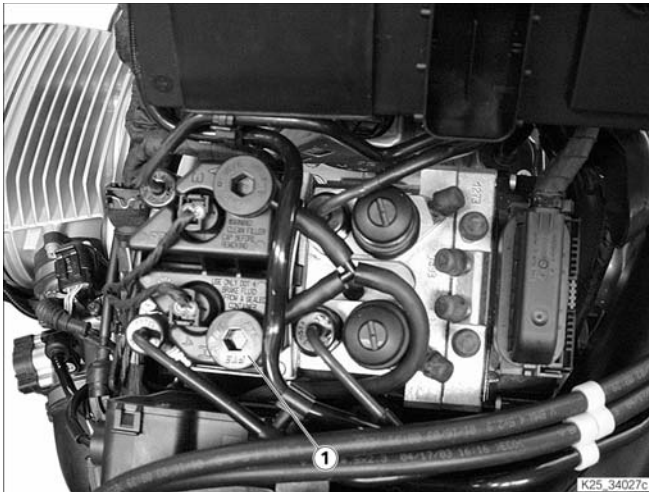
Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

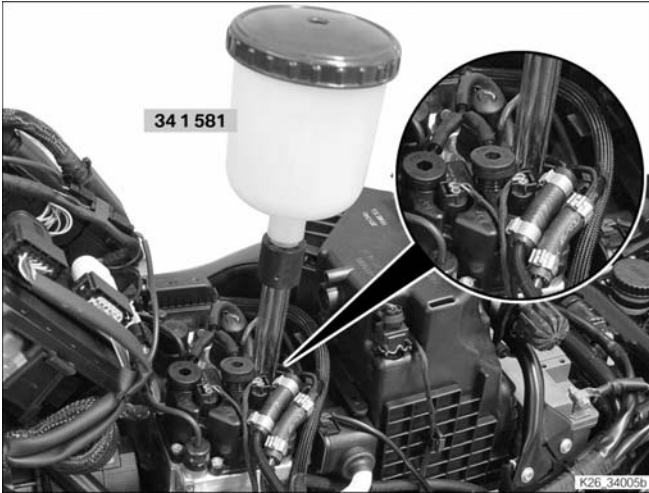
Install the brake caliper with brake pads or insert the piston resetting device.




- Remove the brake calliper.



- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		

DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.

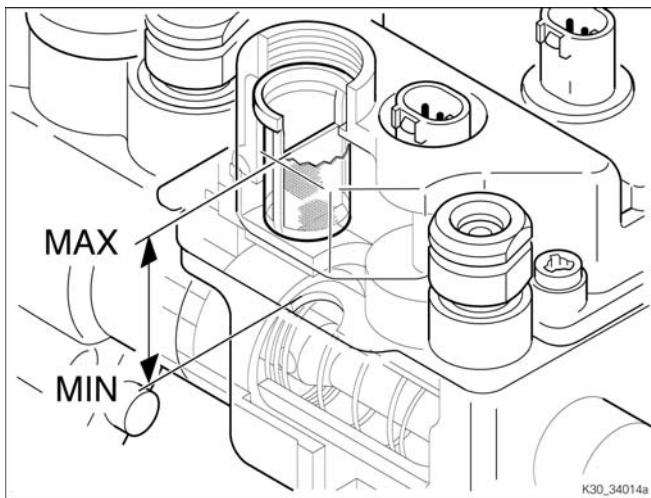


Warning

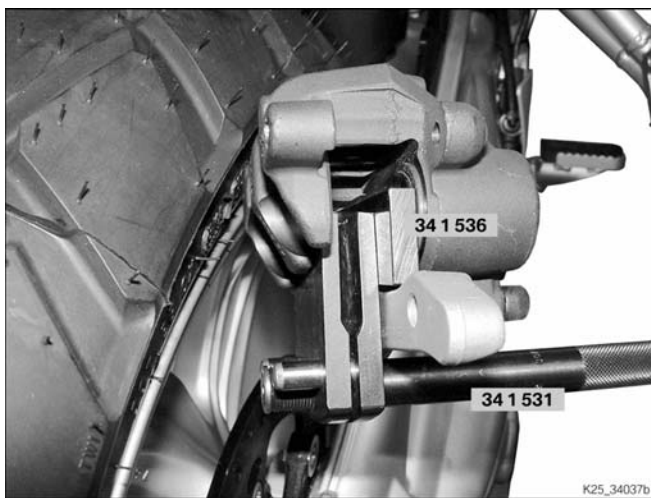
Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the



(MAX) mark.



► **Instructions for filling rear wheel circuit reservoir**

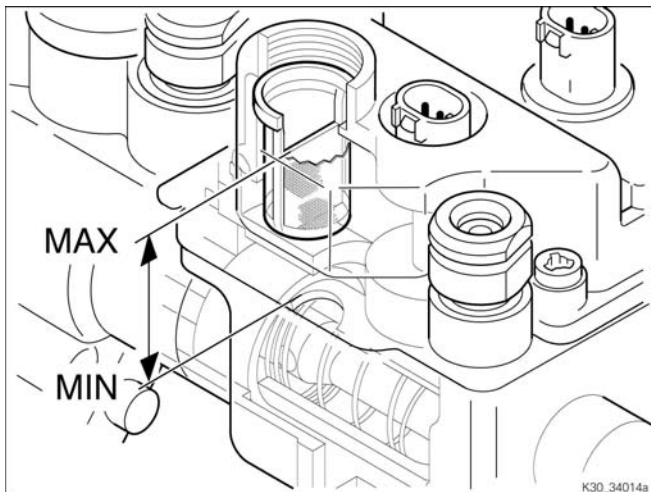
- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536) , in the rear brake caliper.




Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.



- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

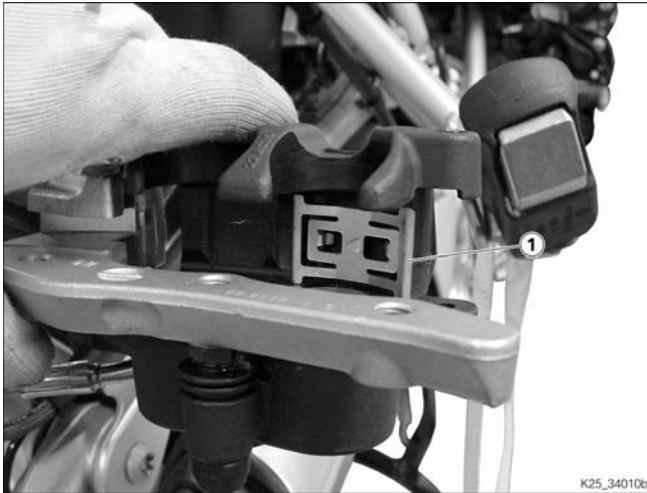
 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Hand-tighten the cap of the rear wheel-circuit reservoir.

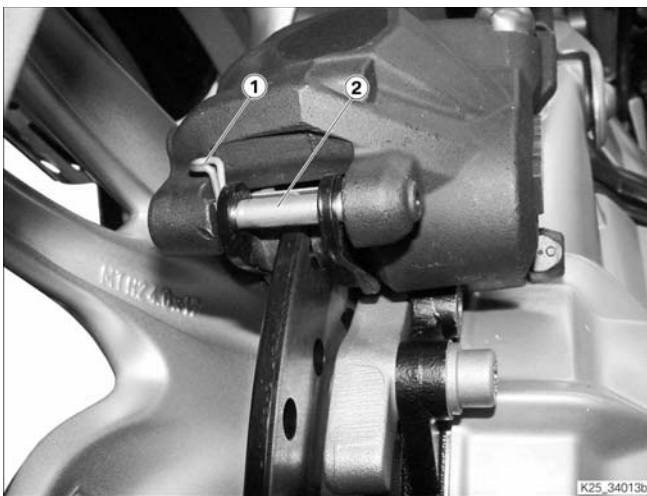
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary

▷ **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.
- » Arrow points in direction of travel.



K25_34010b



K25_34013b


- Install the brake pads.
- Manually install retaining pin (2).

▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).



K25_34034b

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



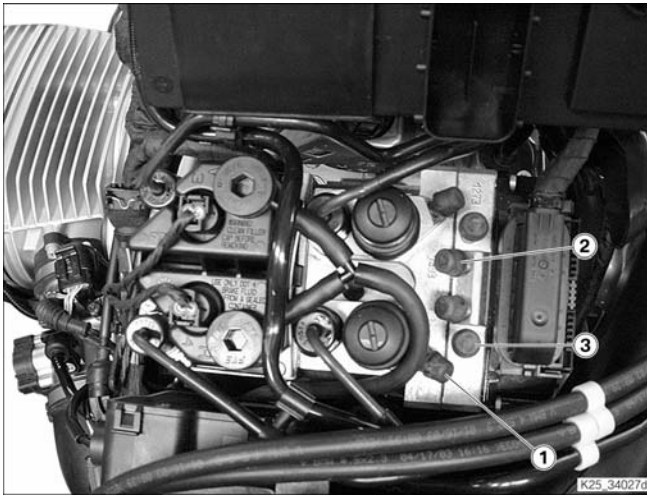
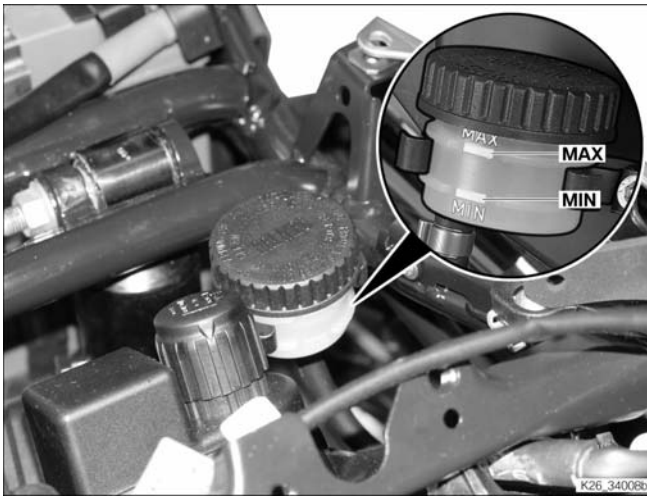
(-) Changing brake fluid in rear control circuit

- Remove rear reservoir cap with diaphragm, draw off the old brake fluid and clean the reservoir.
- Top up the brake fluid level to the (MAX) mark.



Consumables/lubricants

DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0
------------------	-------------------	--------------------------------



	139 896, 83 13 0 139 897
--	--------------------------------



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) of the rear metering cylinder, but **do not switch on**.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

- In the following sequence, bleed:
 - bleed screw (1) rear metering cylinder
 - bleed screw (2) rear integral circuit
 - bleed screw (3) rear control circuit, and
 - for the second time, bleed screw (1) rear metering cylinder in accordance with instructions for bleeding and using special ring spanner (No. 34 2 532) .

► Instructions for bleeding

- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



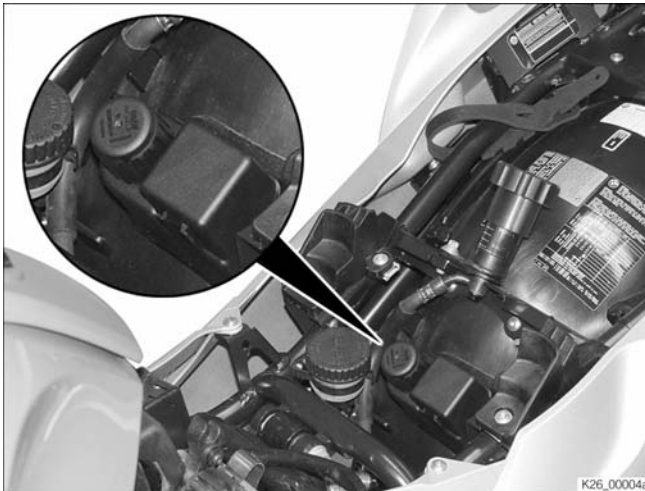
- Fit the protective caps on the bleed screws.
- Top up the brake fluid level to the (MAX) mark.
- Wipe the rim of the reservoir, the diaphragm and the cap to remove brake fluid, and carefully re-assemble the components.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

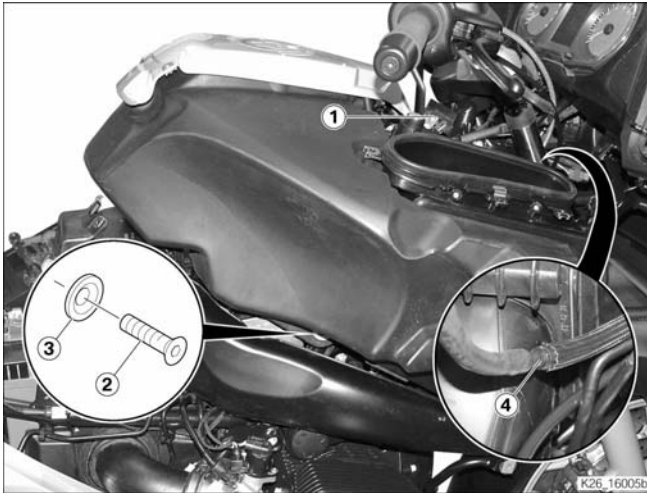
Avoidance:

When performing maintenance and repair

work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

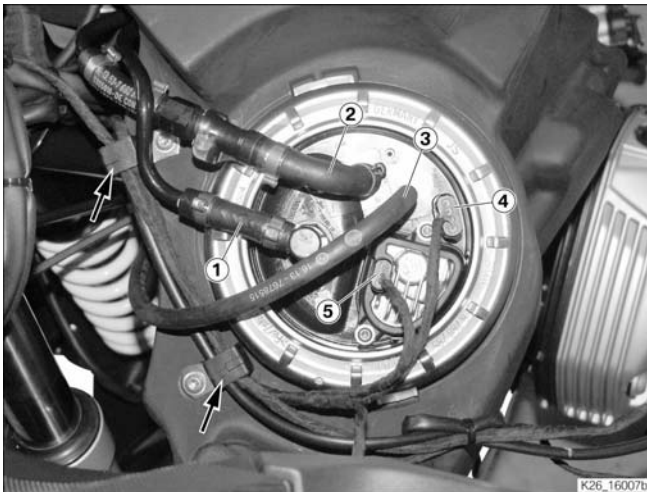
(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW

Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

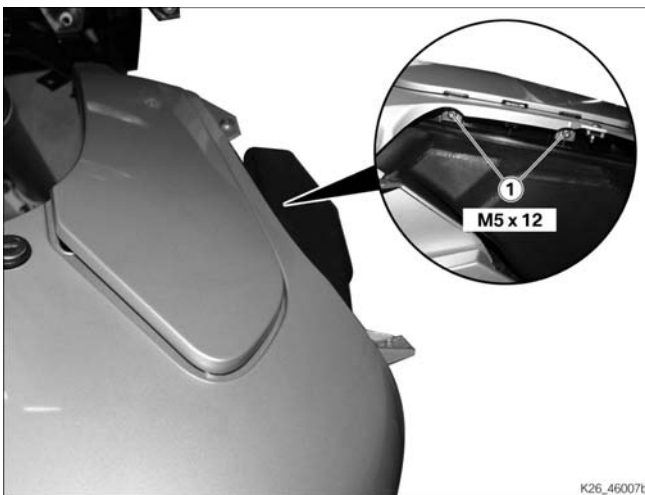
- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

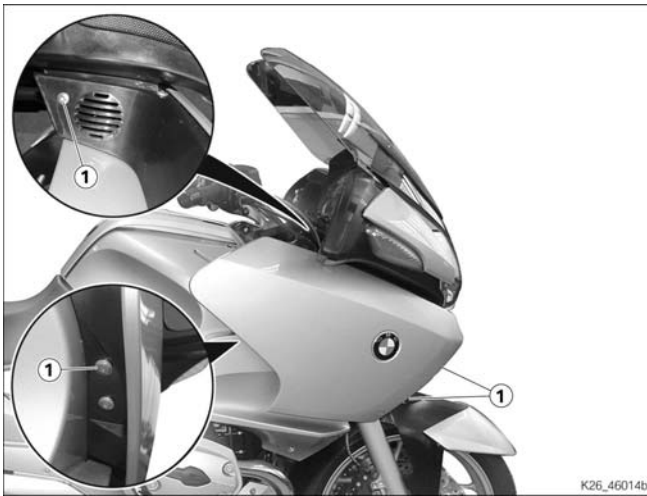
(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

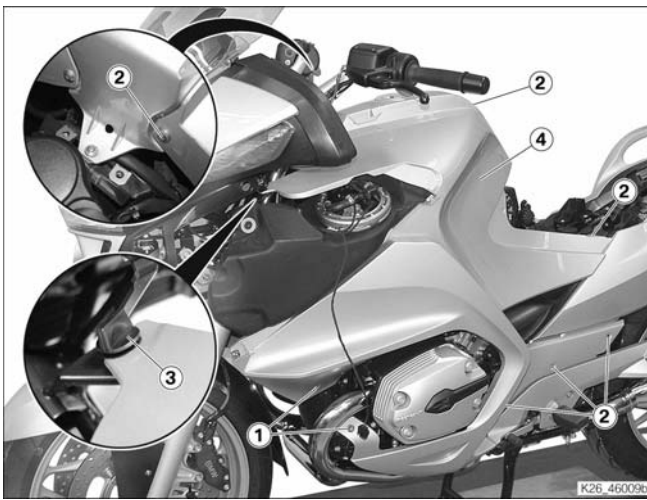
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

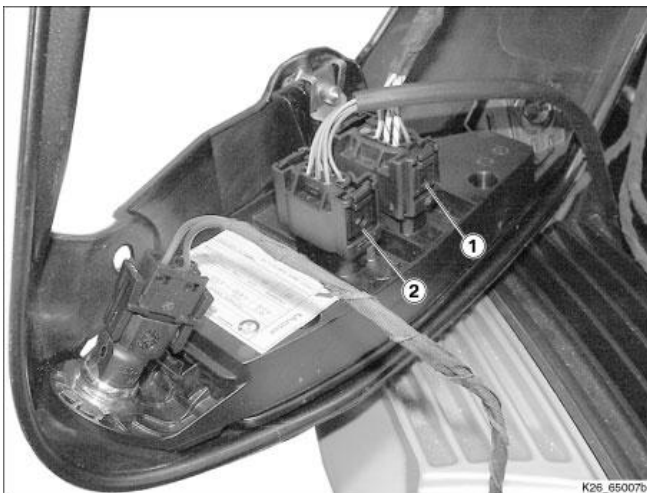
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



K26_46012b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **34 00 570 Integral ABS: Bleeding front wheel circuit**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

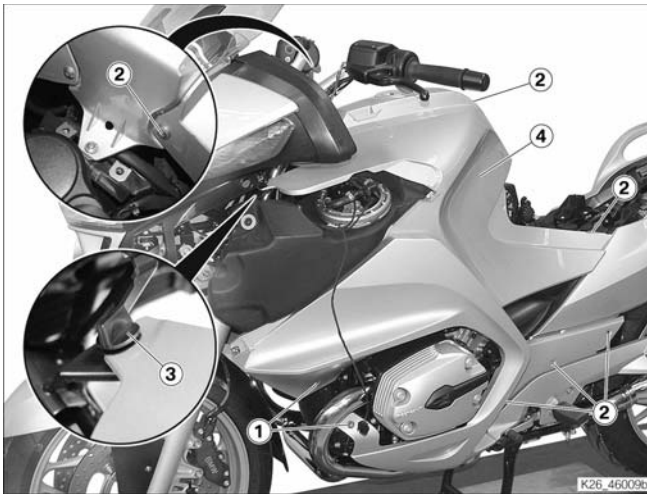


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

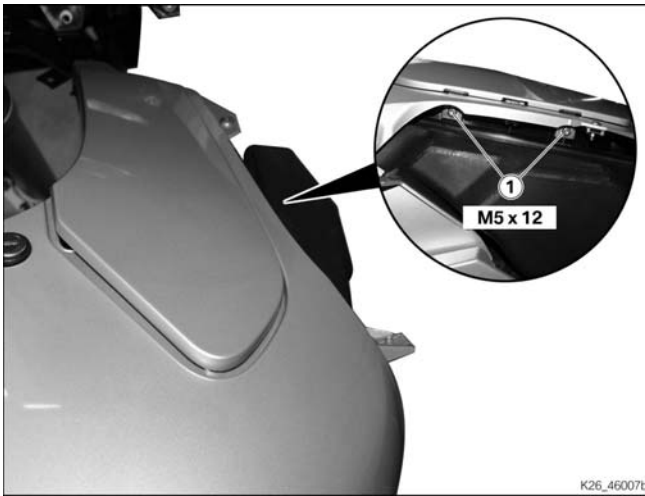
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



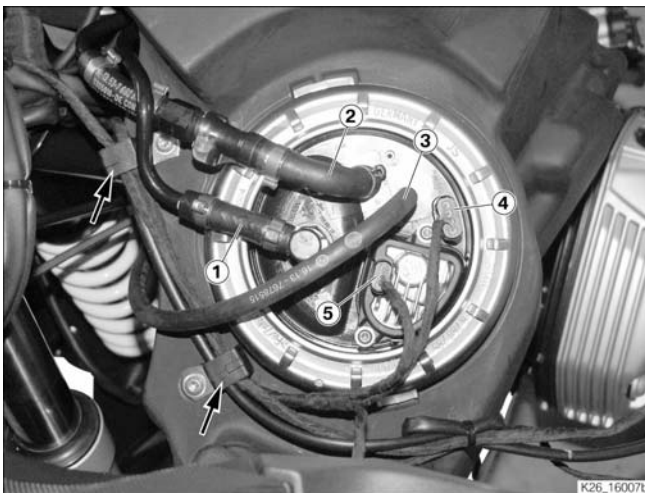
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

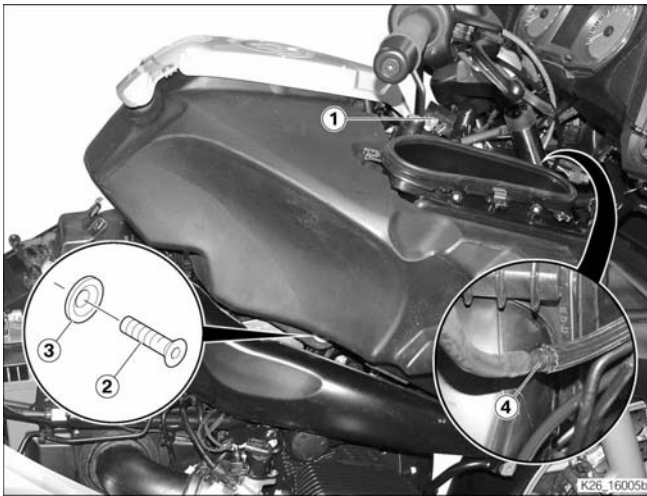


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Filling front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

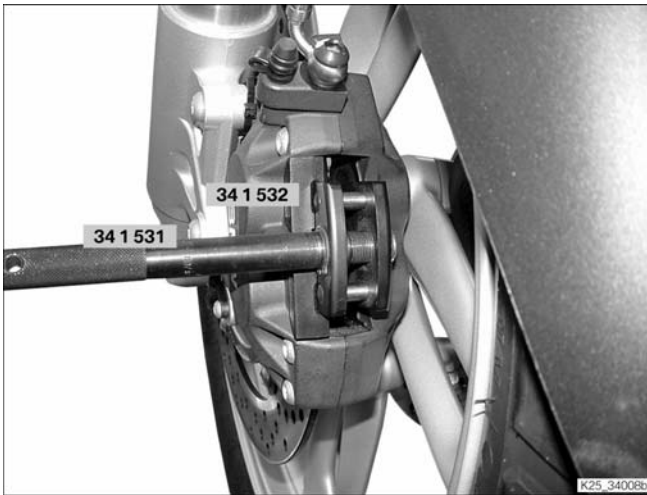
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



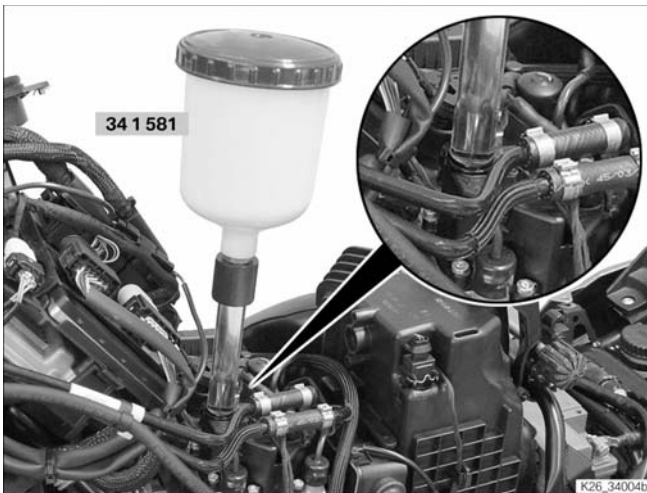
Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.



- Wrap cloths around the left and right brake callipers.
- Use piston resetting device (No. 34 1 531) and locator (No. 34 1 532) to force the pistons in the left and right brake callipers all the way back and hold them in this position.



- Screw container (No. 34 1 581) onto front wheel circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/2 full.



Consumables/lubricants

DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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- Connect the brake bleeding device to the bleed screw of the right brake calliper, but **do not switch on**.
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.



Warning

Nature: Self-diagnosis is not performed unless

both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.


- Switch on the ignition.

 **Attention**

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

 **Warning**

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.

- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.


 **Note**

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.


- Continue pumping off brake fluid until it emerges clear

and free from air bubbles.

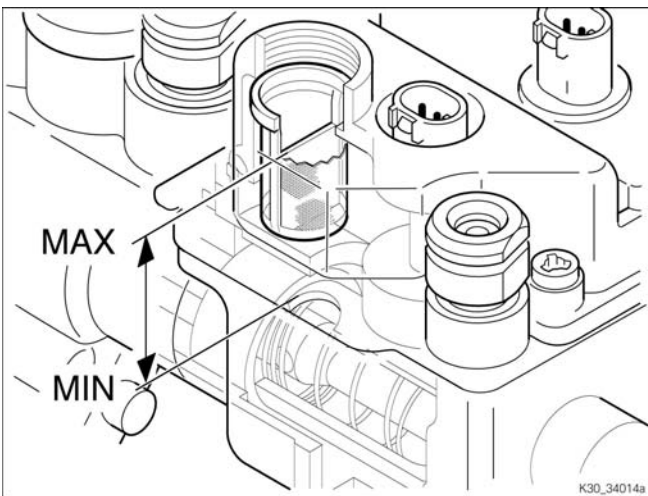
- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Connect the brake bleeding device to the bleed screw of the left brake calliper, but **do not switch on**.
- If necessary, use a cable tie to secure the hose of the brake bleeding device to the bleed screw.
- The procedure for changing the brake fluid in the left brake calliper is the same as that for the right calliper.
- When the fluid exits clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

- Release the brake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the **MAX** mark.

► Instructions for filling front wheel circuit reservoir

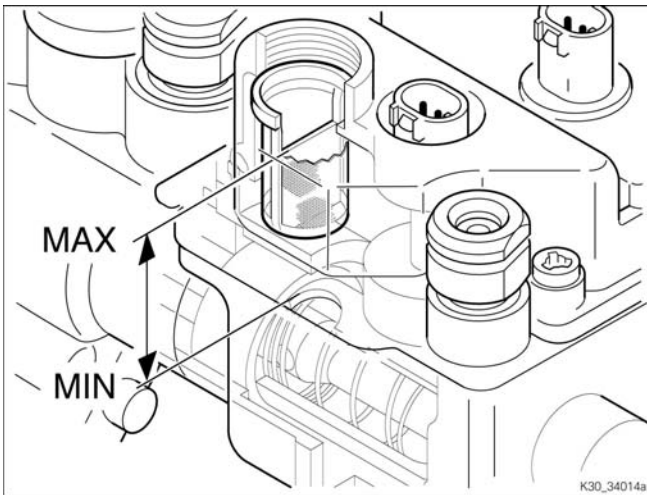


Attention


Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could

result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.



- Make sure that the front wheel-circuit reservoir is topped up to the "MAX" mark.
- Install adapter 22 (No. 34 1 533) in piston resetting device (No. 34 1 531) and locator (No. 34 1 532) in both front brake callipers and **fully compress** them until the adapter cannot move.
- Switch on the ignition.
- Pull handbrake lever until the pistons of the front brake callipers are in contact with piston resetting device (No. 34 1 531) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Hand-tighten the cap of the wheel-circuit reservoir.
- Using piston resetting device (No. 34 1 531) , force the brake pistons all the way back and remove, together with adapter 22 (No. 34 1 533) .
- Replace the front brake pads after removal, if necessary.

▷ **Installing front brake pads**

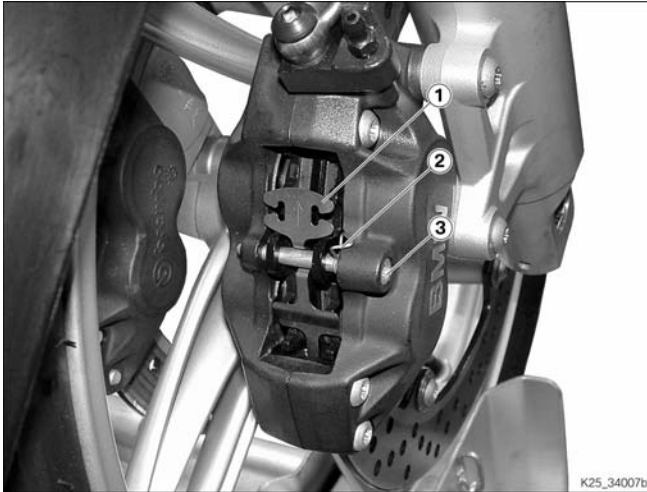


Warning

Nature: Greasing the backing plate can allow grease to make its way onto the friction pad and the brake disc.

Avoidance: Take care to grease only the rear and the trailing end face of the backing plate.

- Grease the rear and the trailing end face of the backing plate.



Consumables/lubricants

Never Seez compound	Protective grease	83 23 9 407 830
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- Install the brake pads.
- Install spring (1) with the arrow pointing in the forward direction of travel.
- Install screw (3).
- Install retainer (2).



Tightening torques

Grub screw, brake pads	7 Nm	
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Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.

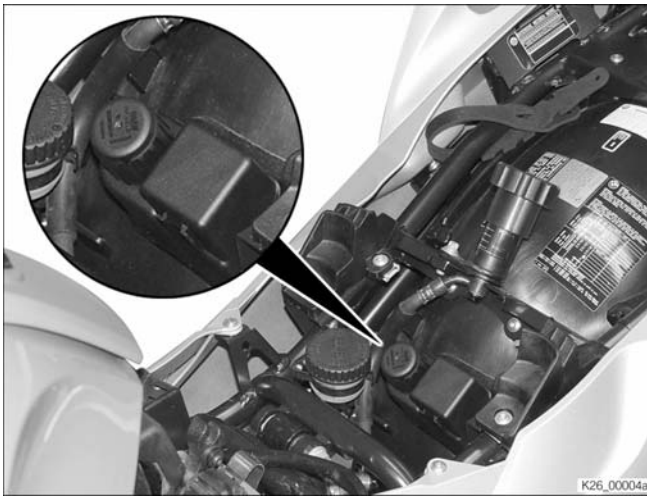
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Performing bleed test with the BMW Motorrad diagnostic system



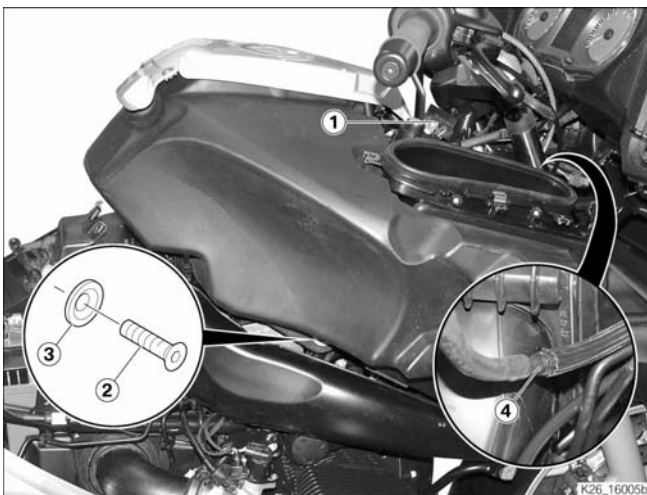
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.


Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

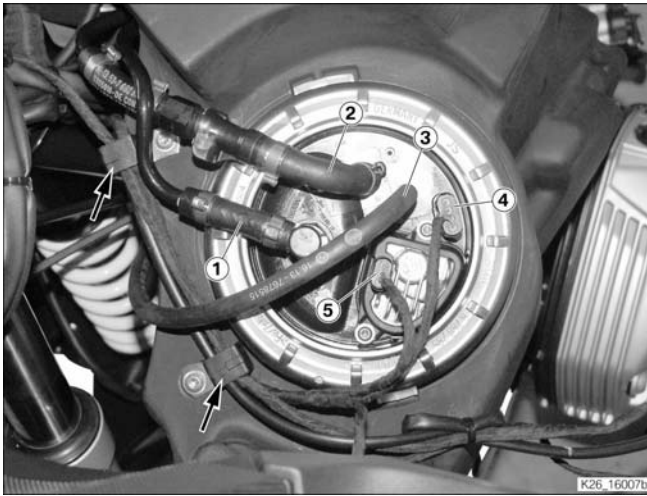
- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear,	16 Nm	



M8 x 40

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

**Attention**

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.

**Note**

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

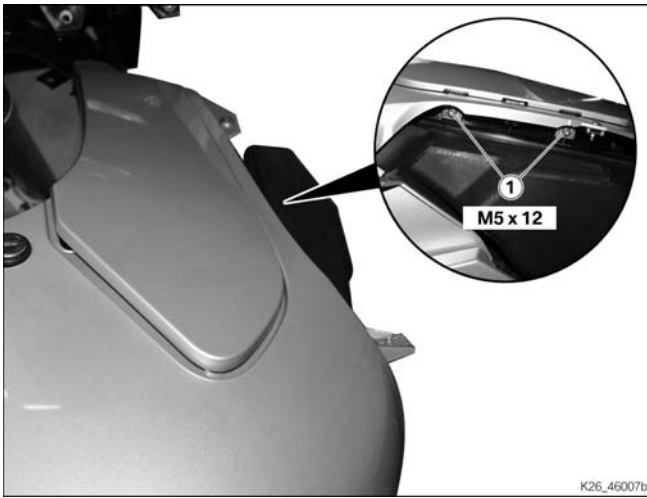
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



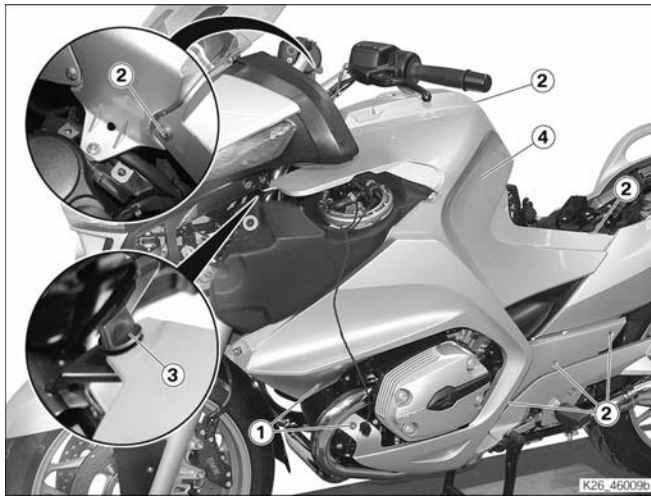
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **34 00 572 Integral ABS: Bleeding front control circuit**

(-) Filling front control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.




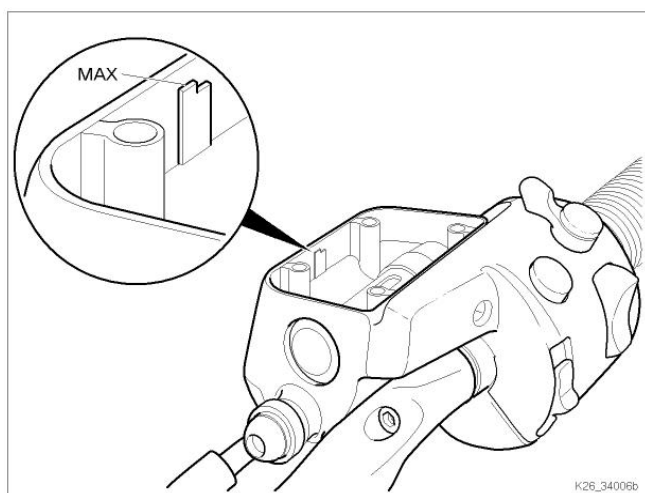
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Top up the brake fluid level to the **(MAX)** mark.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.

- Set the handbrake lever to the position for maximum span.

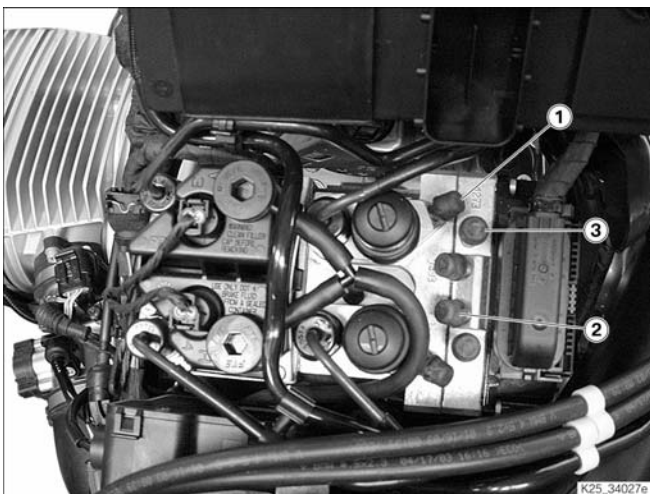


Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) of the front metering cylinder, but **do not switch on**.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

- In the following sequence, bleed:
 - front metering cylinder (1)
 - front integral circuit (2)
 - front control circuit (3) and
 - front metering cylinder (1) again in accordance with

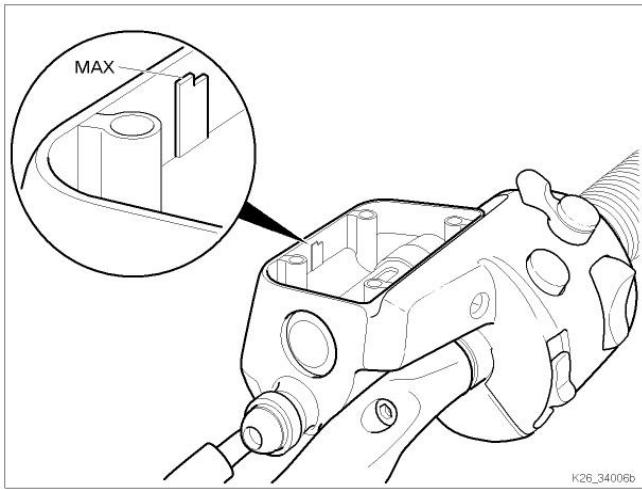
instructions for bleeding and using special ring spanner (No. 34 2 532)

► **Instructions for bleeding**

- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



- Fit the protective caps on the bleed screws.
- Top up the brake fluid to the **(MAX)** mark.
- Wipe the rim of the reservoir, the diaphragm and the cover to remove brake fluid, and carefully re-assemble the components.

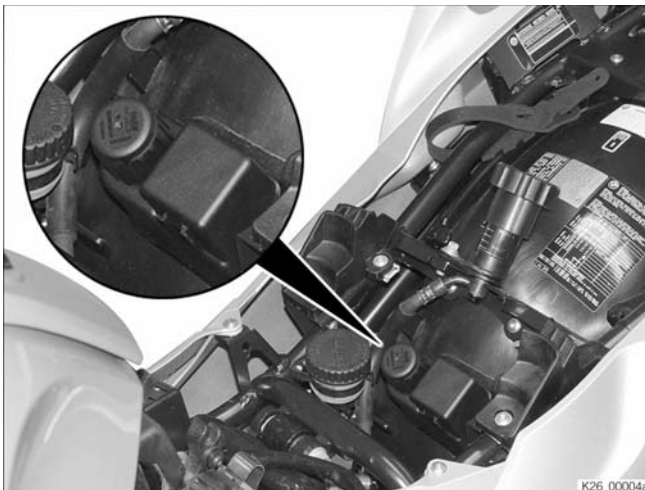


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW

Motorrad diagnostic system



Warning

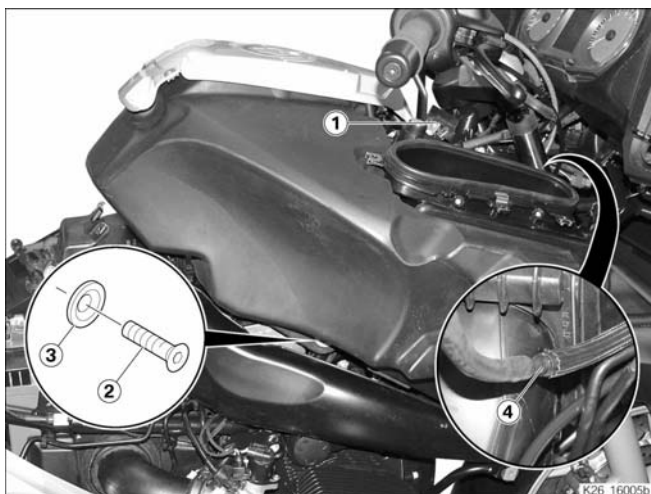
Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.


Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.



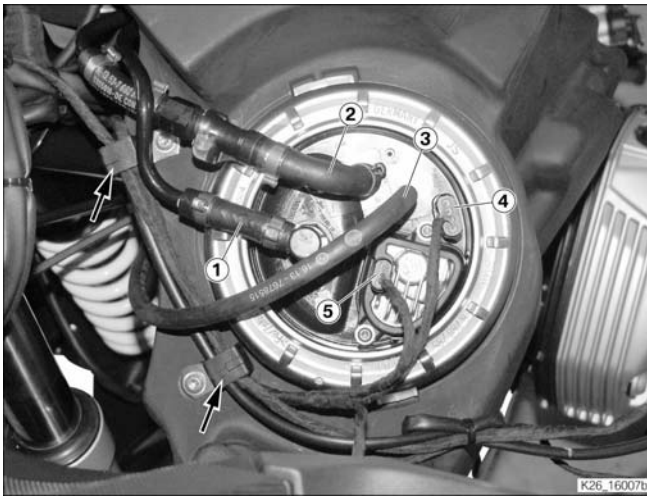
 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the



male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

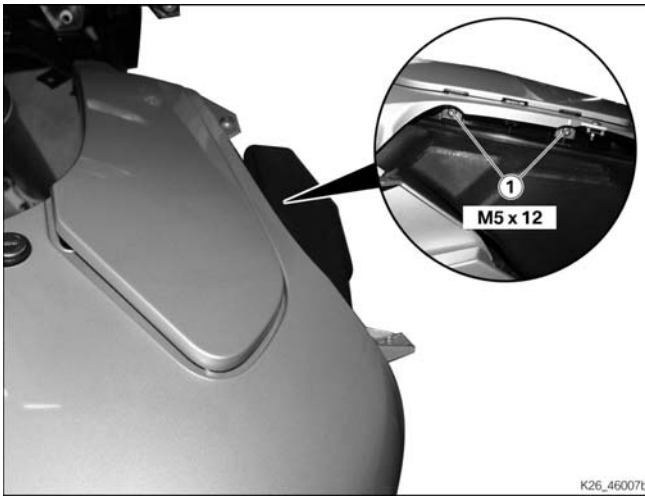
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.



- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **34 00 580 Integral ABS: Bleeding rear wheel circuit**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

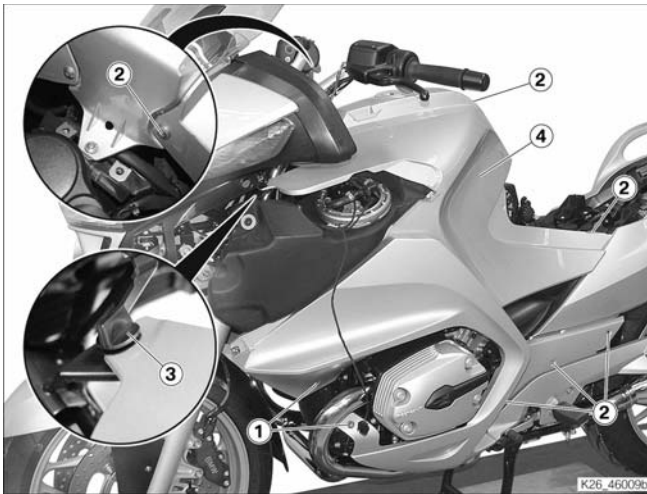


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

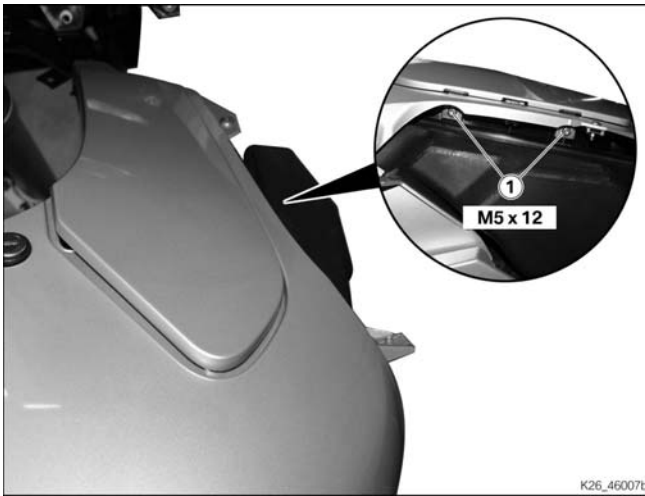
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



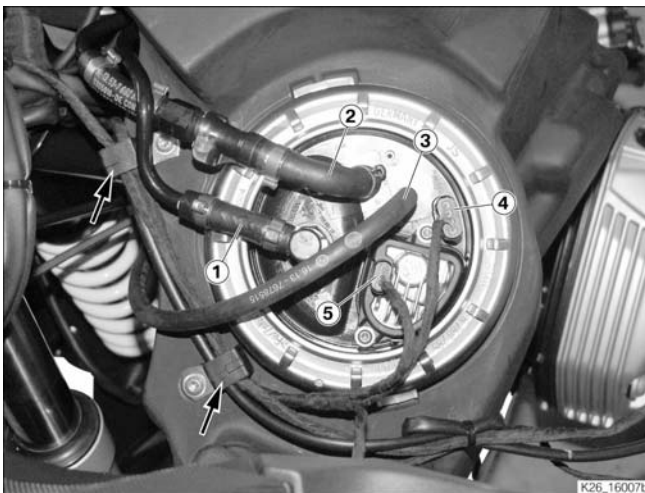
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

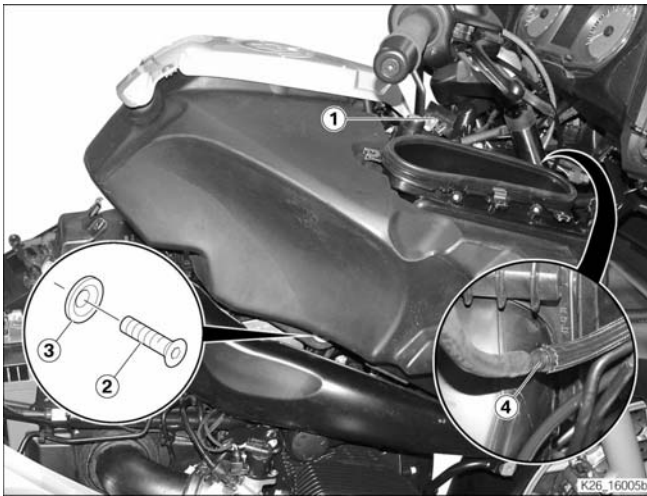


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

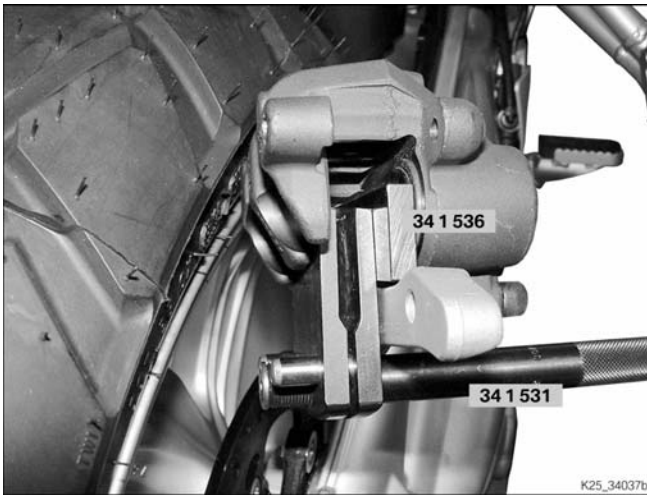
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.


Avoidance: Do not disconnect the plugs from the pressure modulator.



- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless

both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



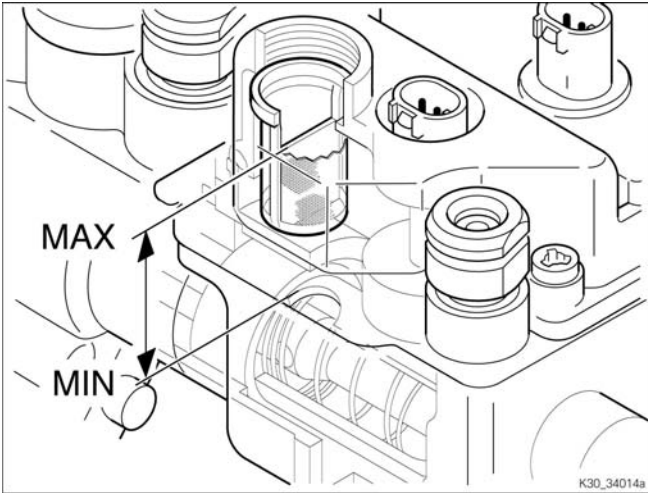
Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

- Release the footbrake lever and switch off the ignition.



- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

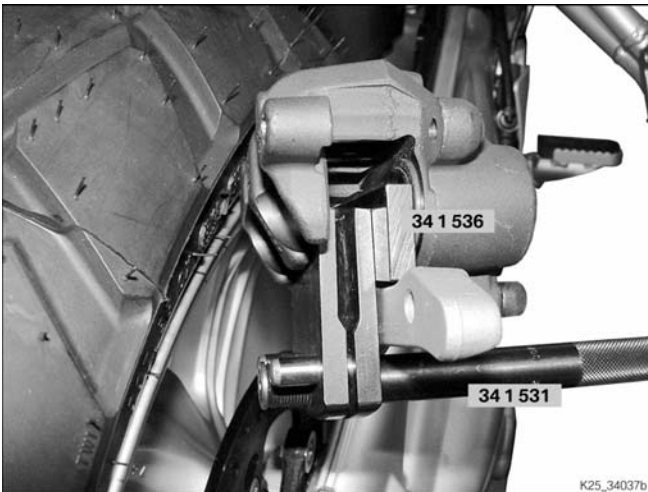
Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.

► **Instructions for filling rear wheel circuit reservoir**

- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536), in the rear brake caliper.



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.

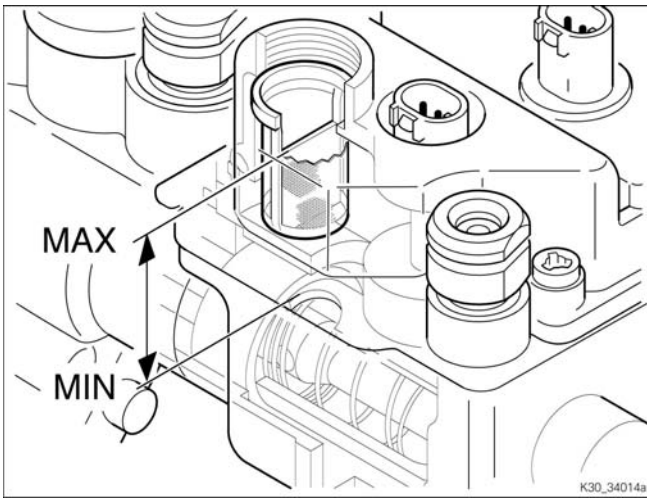
- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536).
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.



Consumables/lubricants

DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896,
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	83 13 0 139 897
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- Hand-tighten the cap of the rear wheel-circuit reservoir.

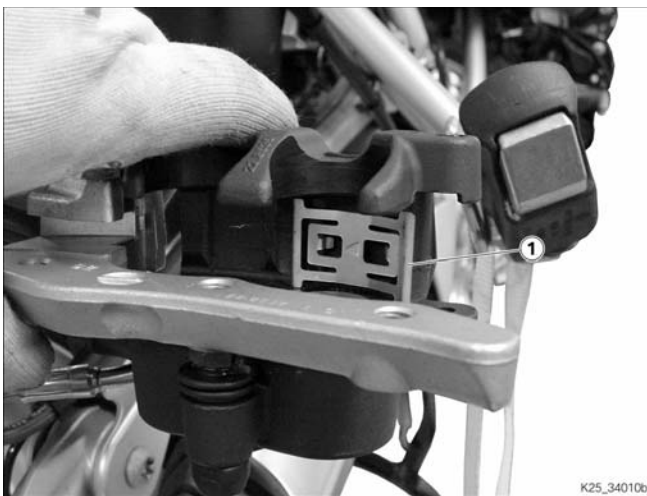
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536).

- Replace the rear brake pads after removal, if necessary

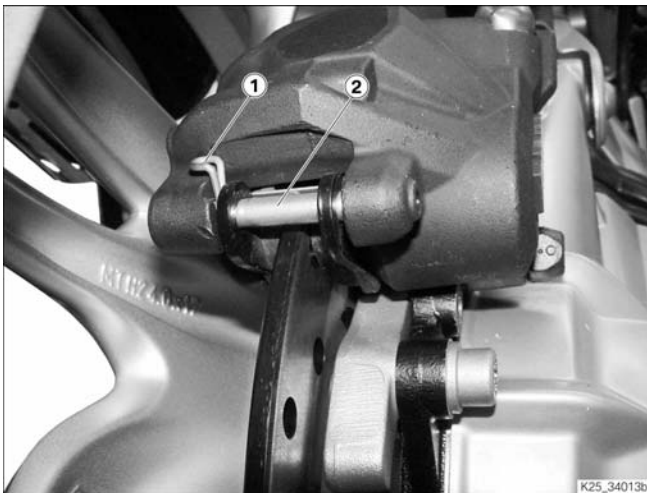
▷ **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.

» Arrow points in direction of travel.

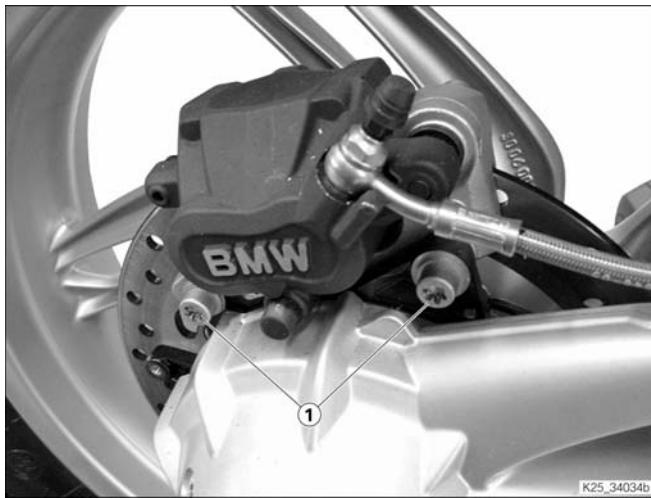


- Install the brake pads.
- Manually install retaining pin (2).



▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).



Tightening torques

Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	
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Warning

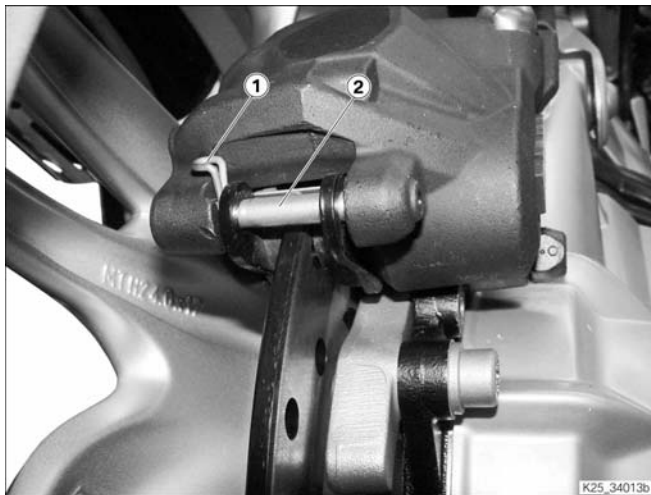
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure

to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.

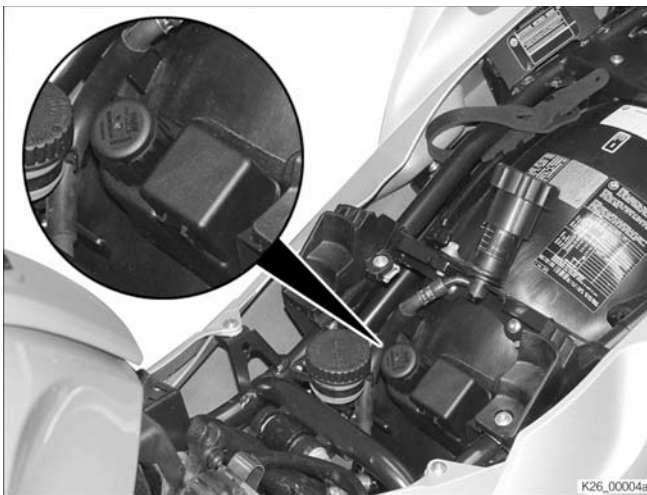


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



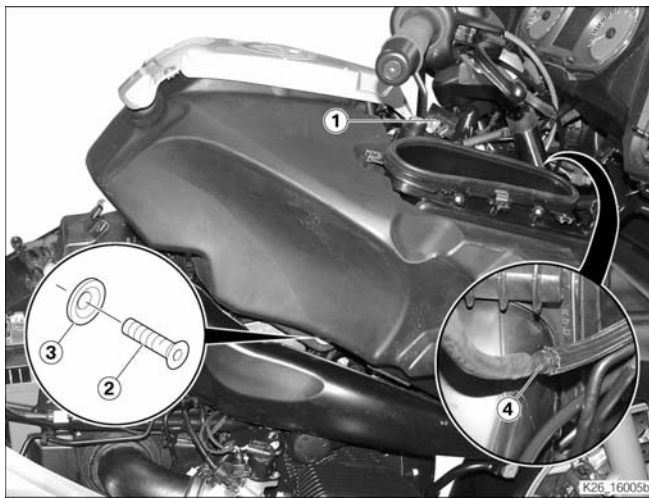
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.


Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

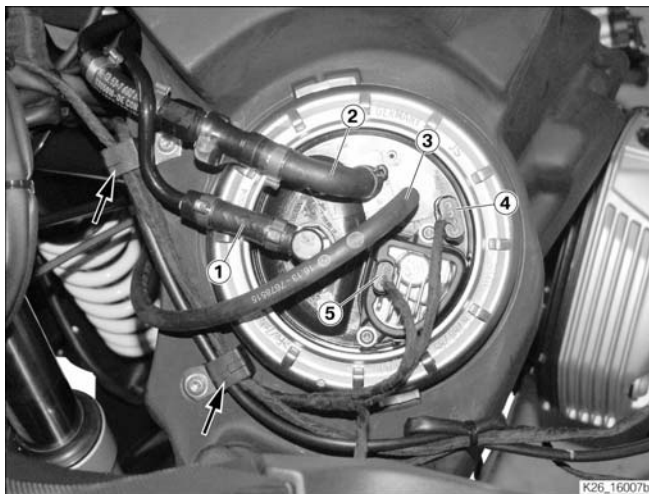
- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

 **Attention**

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.

 **Note**

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic

system from the motorcycle

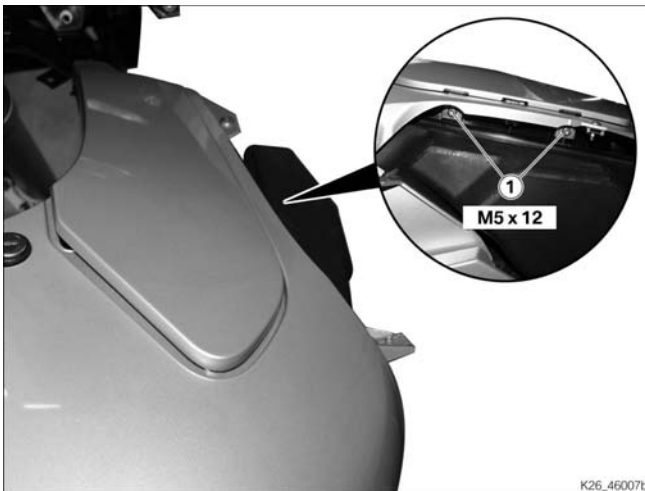
- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

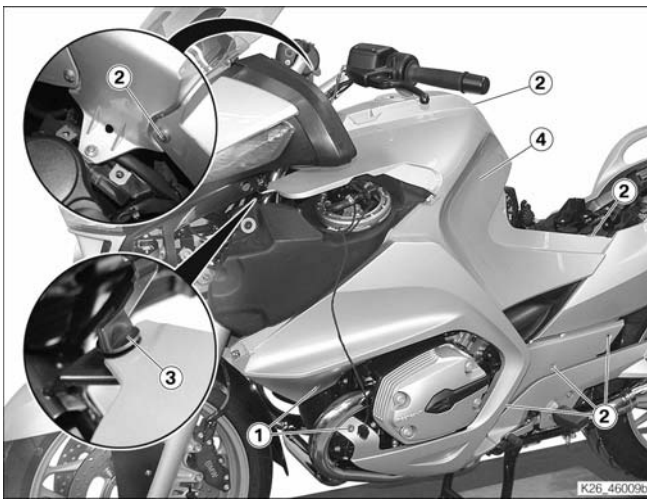
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

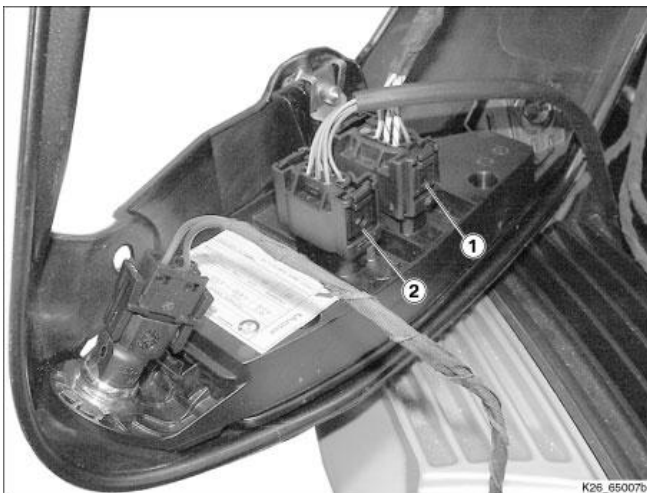
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **34 00 582 Integral ABS: Bleeding rear control circuit**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

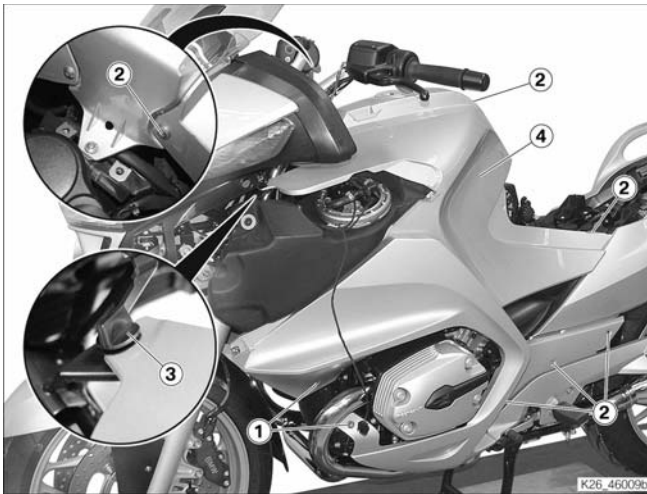


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

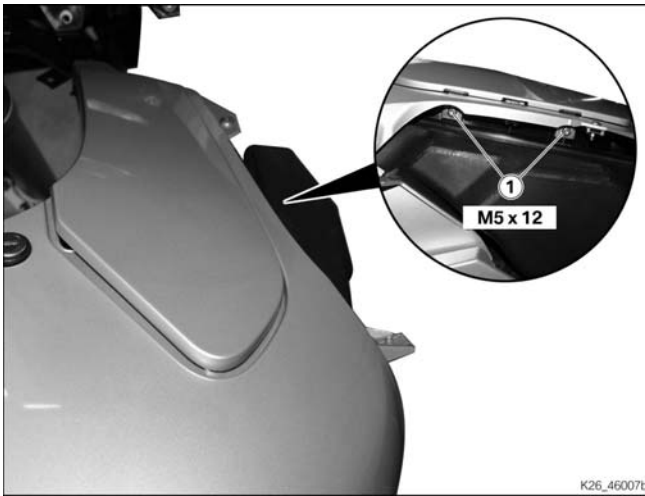
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



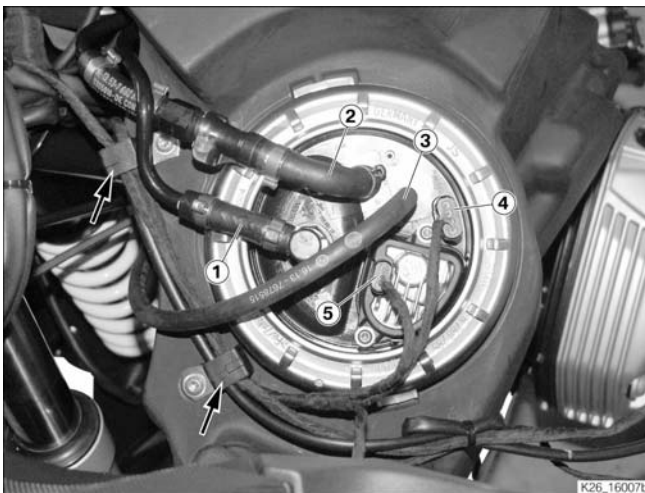
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

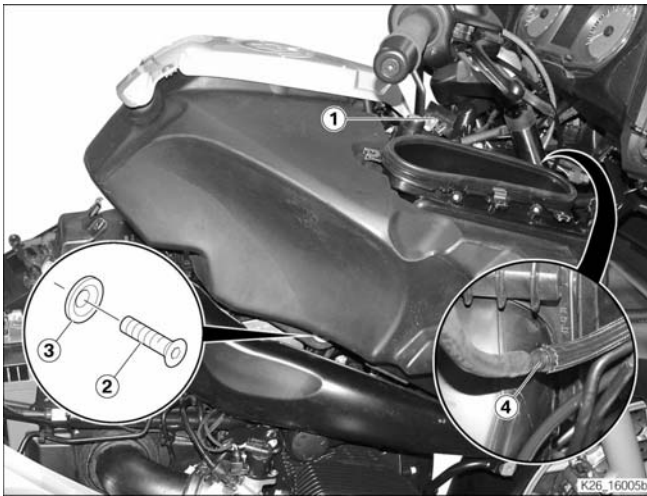


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Draining rear control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



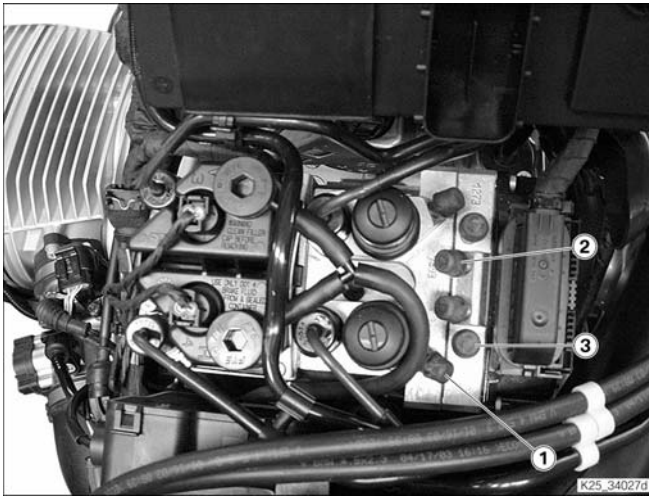
Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Remove the cap of the brake fluid reservoir and remove the rubber diaphragm.
- Draw off the brake fluid.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) on the rear metering cylinder.
- Draw off the brake fluid from the circuits in the correct sequence, using ring spanner (No. 34 2 532) :



Note

The pressure modulator has to be fully drained if it is to be removed/replaced. It is sufficient to drain the control circuit for all other tasks.

- rear metering cylinder (1)
- rear integral circuit (2)
- rear control circuit (3).

(-) Filling rear control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.

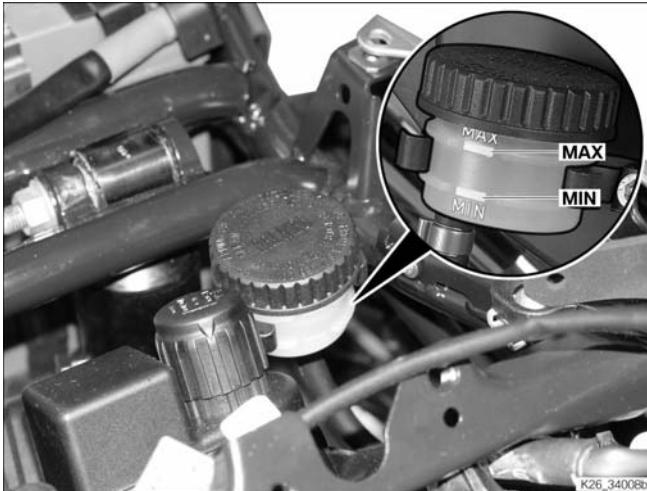


Warning


Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would

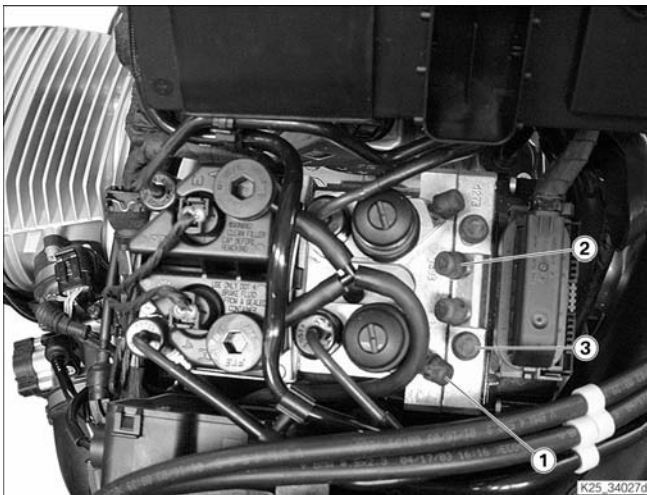
escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



- Top up the brake fluid level to the (MAX) mark.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) of the rear metering cylinder, but do not switch on.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

- In the following sequence, bleed:
- bleed screw (1) rear metering cylinder
- bleed screw (2) rear integral circuit
- bleed screw (3) rear control circuit, and
- for the second time, bleed screw (1) rear metering cylinder in accordance with instructions for bleeding and using special ring spanner (No. 34 2 532) .

► **Instructions for bleeding**

- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



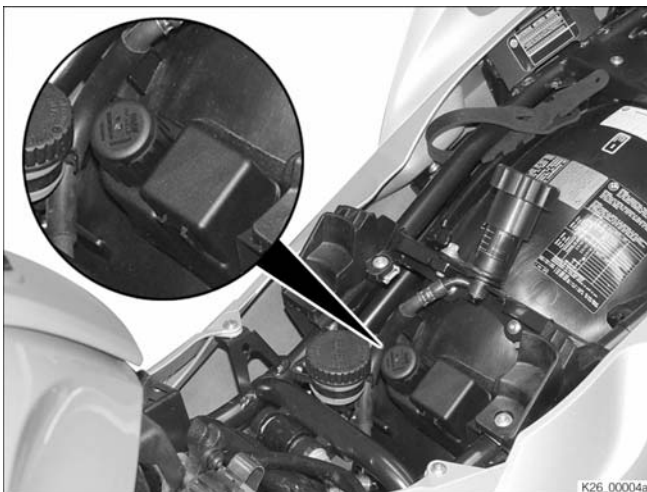
- Fit the protective caps on the bleed screws.
- Top up the brake fluid level to the (MAX) mark.
- Wipe the rim of the reservoir, the diaphragm and the cap to remove brake fluid, and carefully re-assemble the components.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



Warning

Nature:

If bubbles of air are trapped in the brake

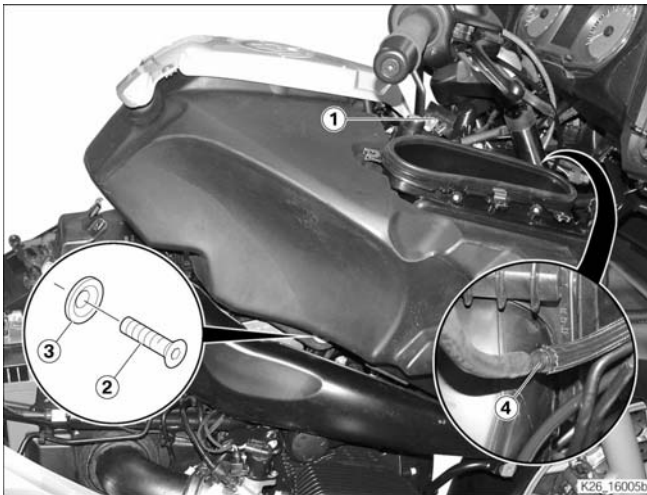
system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.


Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

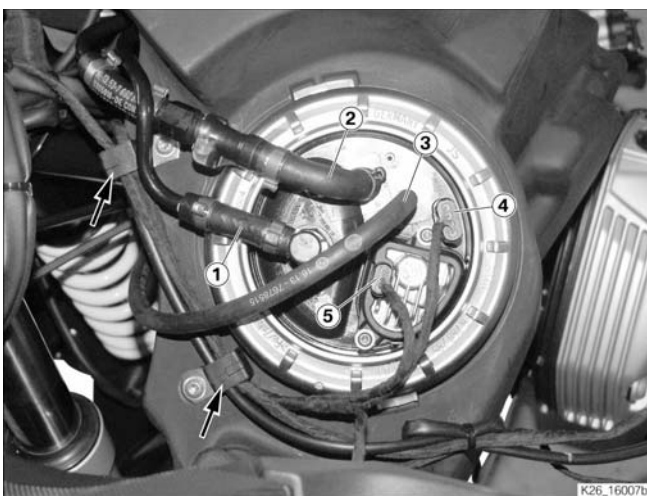
(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.



 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel

lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

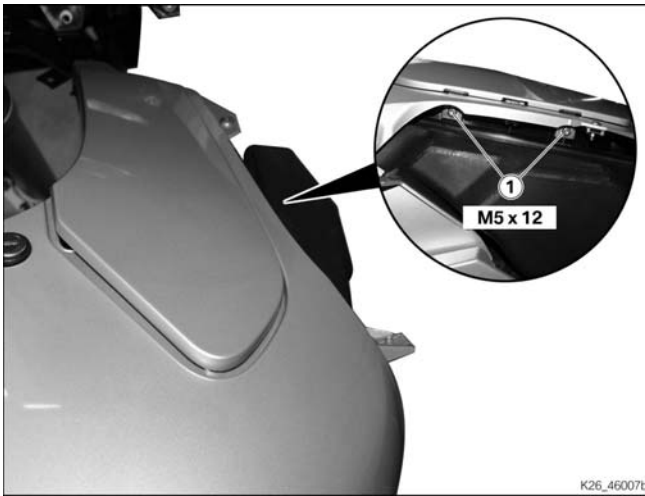
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

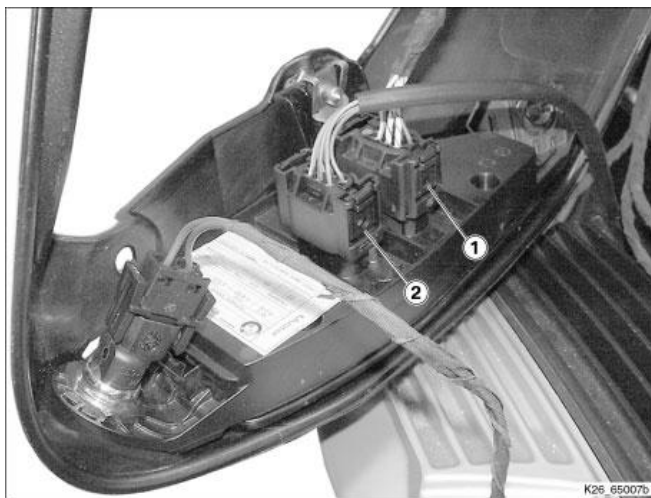
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



K26_65007b

- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



34 00 608 Changing brake fluid in entire Integral ABS control circuit (for maintenance)

(-) Changing brake fluid in control circuits within the framework of maintenance



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.
Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



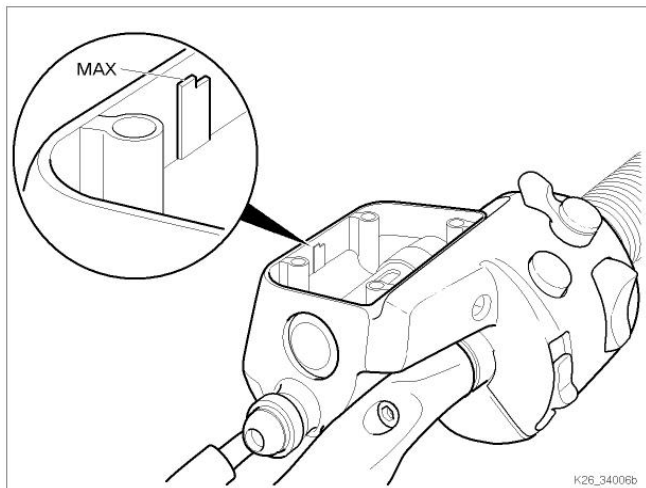
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

► Changing brake fluid in front control circuit within the framework of maintenance

- Turn the handlebars all the way to the left.
- Repeatedly and slowly pull front brake lever lightly to expel air from brake master cylinder.
- Turn the front wheel to a position in which the brake fluid reservoir is horizontal and secure the front wheel in this position.




⚠ Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Wrap cloths around the reservoir.
- Remove front reservoir cap with diaphragm, draw off the old brake fluid and clean the reservoir.
- Top up the brake fluid level to the **(MAX)** mark.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

⚠ Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

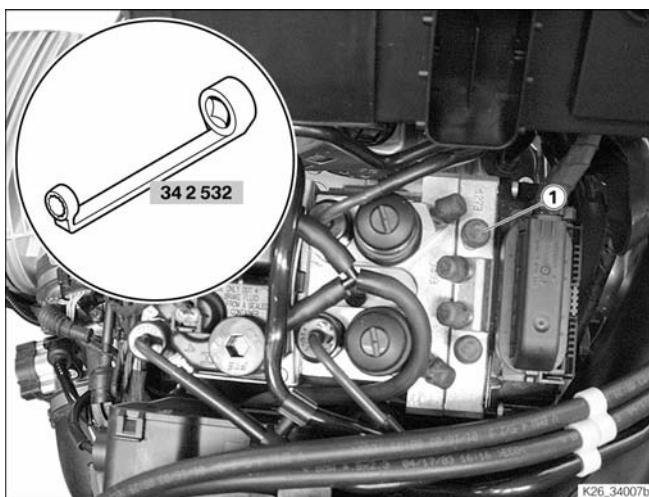
Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.

- Set the handbrake lever to the position for maximum span.

⚠ Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.



- Connect special ring spanner (No. 34 2 532) and bleeder unit to bleeder screw (1) of front control circuit, but **do not switch on**.

⚠ Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

- Change the brake fluid in the front control circuit in accordance with the bleeding instructions.



Note

Changing the brake fluid within the framework of regular maintenance merely entails changing the fluid through the bleed valve of the control circuit.

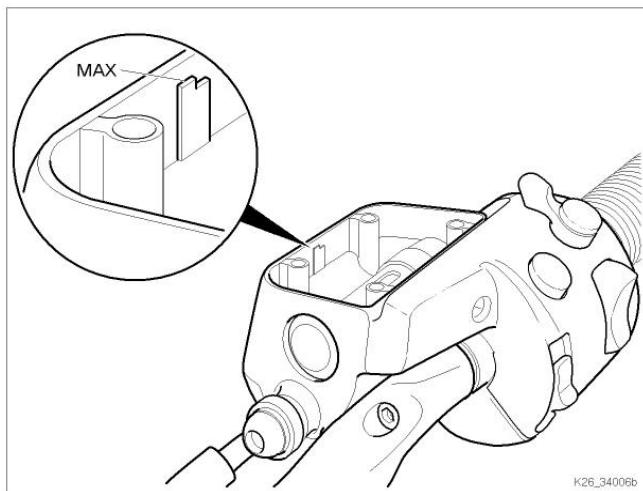
The integral circuit and the metering cylinder do not have to be bled unless the brake system was opened.

▷ Instructions for bleeding

- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



- Fit the protective caps on the bleed screws.
- Top up the brake fluid to the (MAX) mark.
- Wipe the rim of the reservoir, the diaphragm and the cover to remove brake fluid, and carefully re-assemble the components.

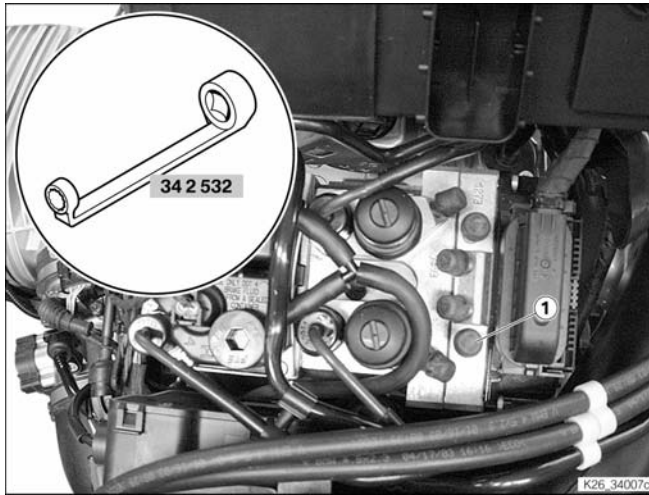
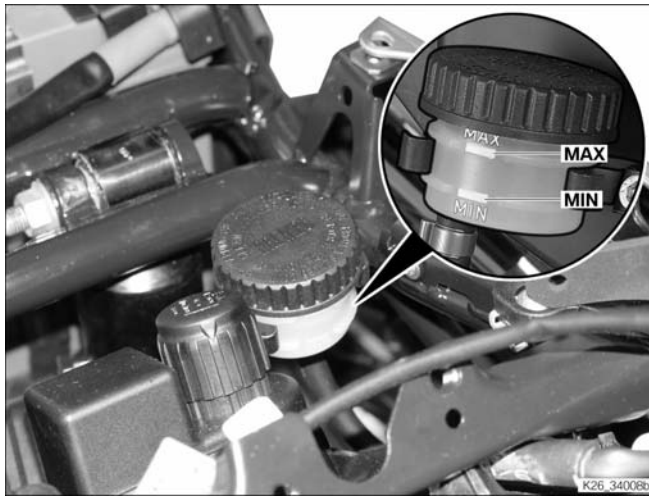


▶ Changing brake fluid in rear control circuit within the framework of maintenance

- Remove rear reservoir cap with diaphragm, draw off the old brake fluid and clean the reservoir.
- Top up the brake fluid level to the (MAX) mark.



Consumables/lubricants



DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect special ring spanner (No. 34 2 532) and bleeder unit to bleeder screw (1) of rear control circuit, but **do not switch on**.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

- Change the brake fluid in the rear control circuit in accordance with the bleeding instructions.



Note

Changing the brake fluid within the framework of regular maintenance merely entails changing the fluid through

the bleed valve of the control circuit.

The integral circuit and the metering cylinder do not have to be bled unless the brake system was opened.

▷ **Instructions for bleeding**

- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



- Fit the protective caps on the bleed screws.
- Top up the brake fluid level to the **(MAX)** mark.
- Wipe the rim of the reservoir, the diaphragm and the cap to remove brake fluid, and carefully re-assemble the components.



 **34 11 008 Replacing front brake pads**

(-) Changing front brake pads

- Change the brake pads on one side first, then the other side.


► **Removing front brake pads**

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Use piston resetting device (No. 34 1 531) and locator (No. 34 1 532) to force the pistons back just far enough to allow the new brake pads to be slipped into position.
- When installing the new brake pads, check that the colour codes on the brake caliper and brake pads match.



 Technical data			
Brake calipers / brake pads, front - colour of identification mark		Blue	

► **Installing front brake pads**



Warning

Nature: Greasing the backing plate can allow grease to make its way onto the friction pad and the brake disc.

Avoidance: Take care to grease only the rear and the trailing end face of the backing plate.


- Grease the rear and the trailing end face of the backing plate.

	Consumables/lubricants
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Never Seez compound	Protective grease	83 23 9 407 830
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- Install the brake pads.
- Install spring (1) with the arrow pointing in the forward direction of travel.
- Install screw (3).
- Install retainer (2).

 Tightening torques		
Grub screw, brake pads	7 Nm	



- ◀ Repeat this procedure with the second brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the brake pads have been changed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

📁 34 11 060 Replacing front brake caliper (without bleeding)

(-) Draining front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

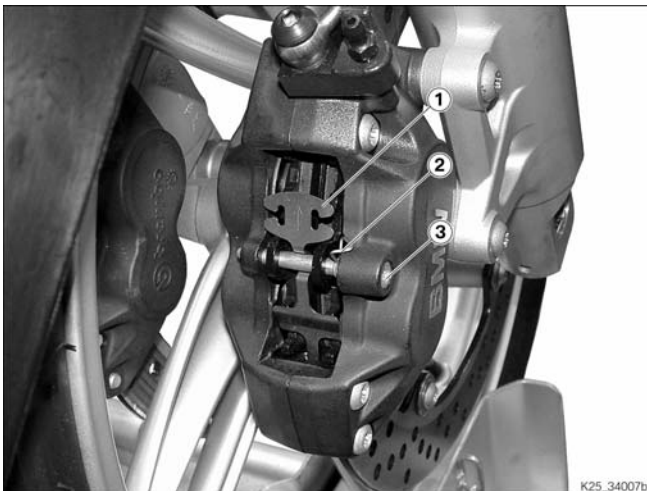
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.



► Removing front brake pads

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Using piston resetting device (No. 34 1 531) and locator (No. 34 1 532), force the pistons of the brake caliper fully back, and secure them in this position.

- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Repeat this procedure with the second brake caliper.

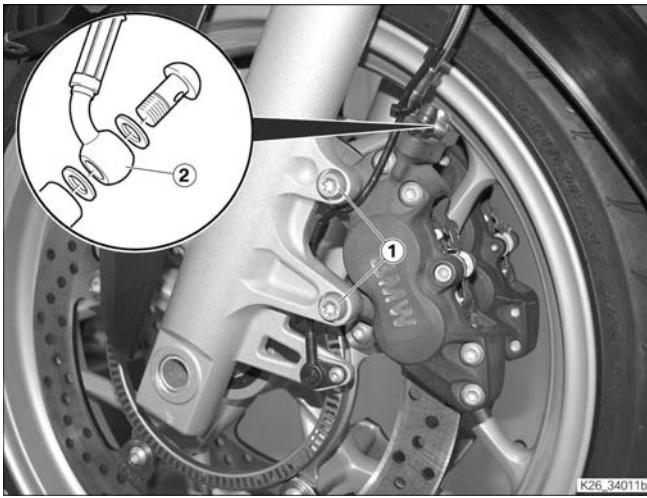


Note

Drain the brake system only to the extent necessary for the tasks in question to be performed.

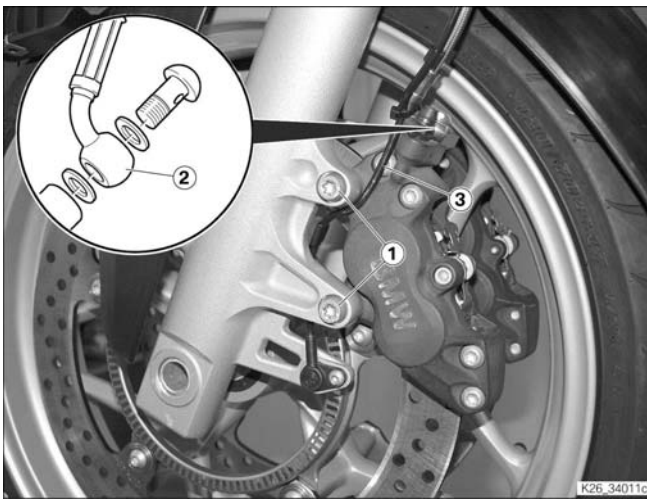
(-) Removing front left brake caliper


- Release banjo bolt (2) and remove together with seals.
- Remove screws (1).
- Remove the brake caliper.




(-) Installing front left brake caliper

- Install brake caliper, making sure the ABS sensor cable (3) is routed correctly.
- Secure the brake caliper with screws (1).



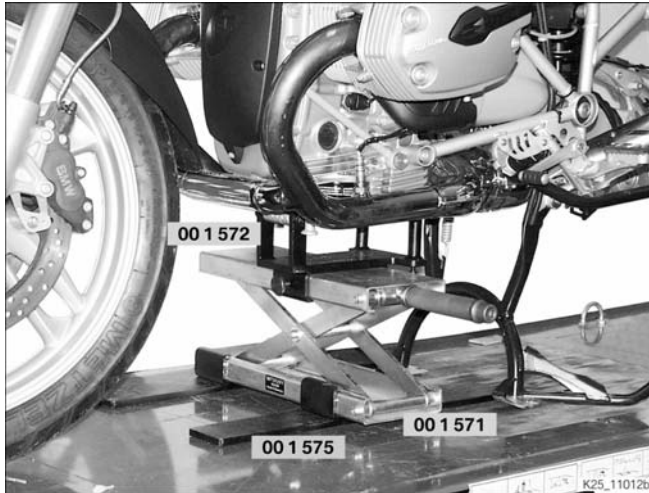
 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	

- Install the brake pipe with banjo bolt (2) and **new** sealing rings.

 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

=> Integral ABS: Bleeding front wheel circuit (Position: 34 00 570)

34 11 220 Replacing front brake discs



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

- Avoidance:** Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

- Avoidance:** Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

(-) Removing left brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

- Avoidance:** Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads



or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

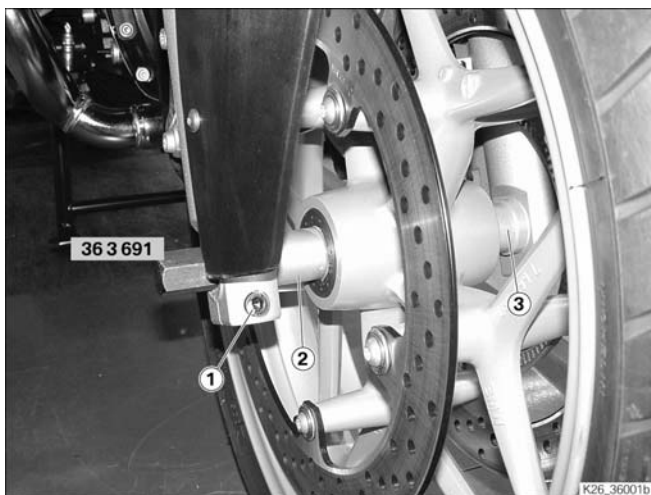
- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front section of front mudguard



- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.

(-) Removing front wheel



- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691).
- Roll the front wheel forward to remove.

📄 Note

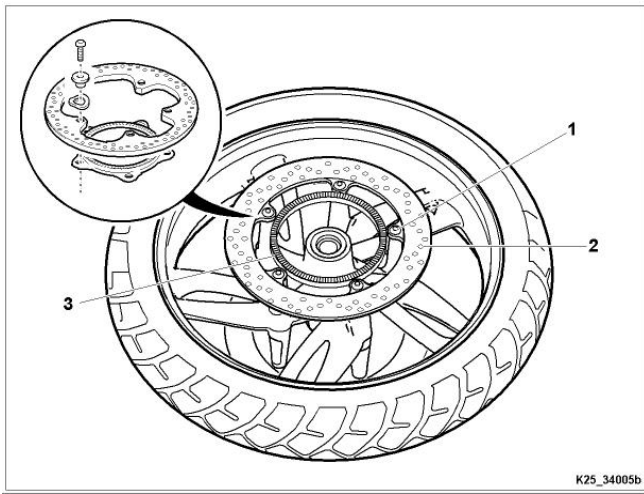
Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

(-) Removing front left brake disc

- Heat screws (1).

	Technical data			

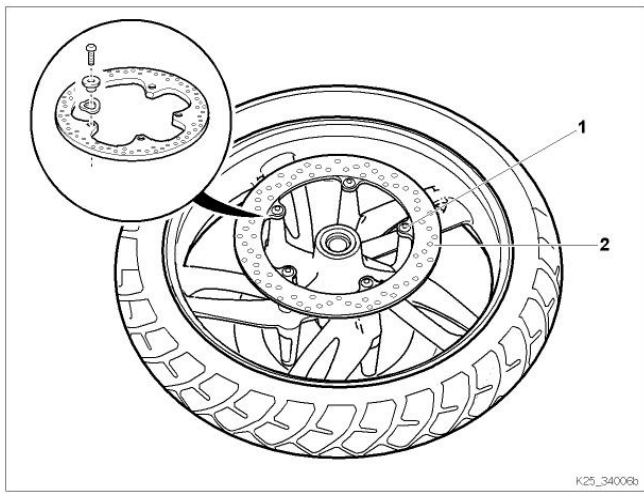



Threaded fastener of front brake disc - release temperature		80 °C	
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- Remove screws (1) complete with rollers and spring washers.
- Remove brake disc (2) and sensor ring (3).

(-) Removing front right brake disc

- Heat screws (1).

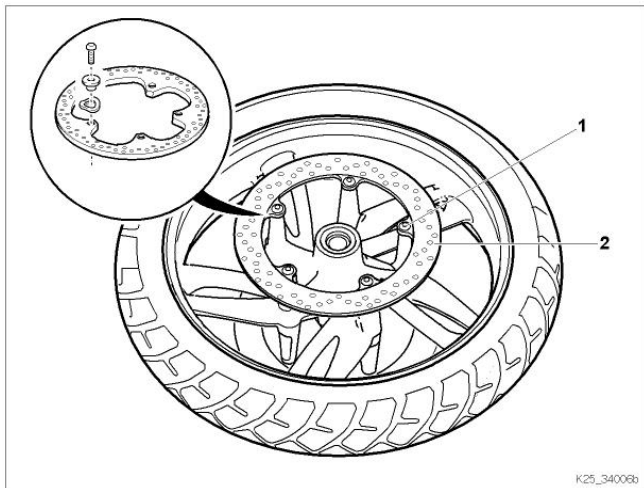



 Technical data			
Threaded fastener of front brake disc - release temperature		80 °C	

- Remove screws (1) complete with rollers and spring washers.
- Remove brake disc (2).

(-) Installing front right brake disc

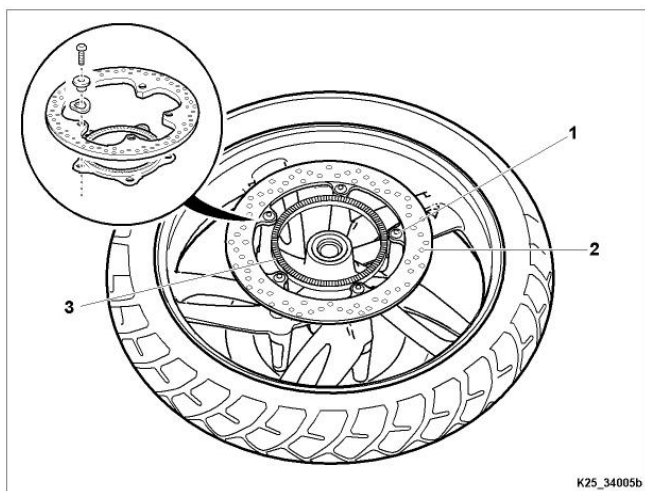
- Clean the tapped holes in the wheel rim.
- Lay brake disc (2) on the wheel rim with the lettering to the outside.
- Secure the brake disc with rollers, spring washers and new screws (1).




 Tightening torques		
Brake disc to front wheel, M8 x 25, Replace screws Micro-encapsulated	Initial torque,	12 Nm
	Final torque,	24 Nm

(-) Installing front left brake disc

- Clean the tapped holes in the wheel rim.
- Lay sensor ring (3) on the wheel rim.
- Lay brake disc (2) on the wheel rim with the lettering to the outside.
- Secure the brake disc with rollers, spring washers and



new screws (1).

 Tightening torques		
Brake disc to front wheel, M8 x 25, Replace screws Micro-encapsulated	Initial torque, 12 Nm	
	Final torque, 24 Nm	

(-) Installing the front wheel

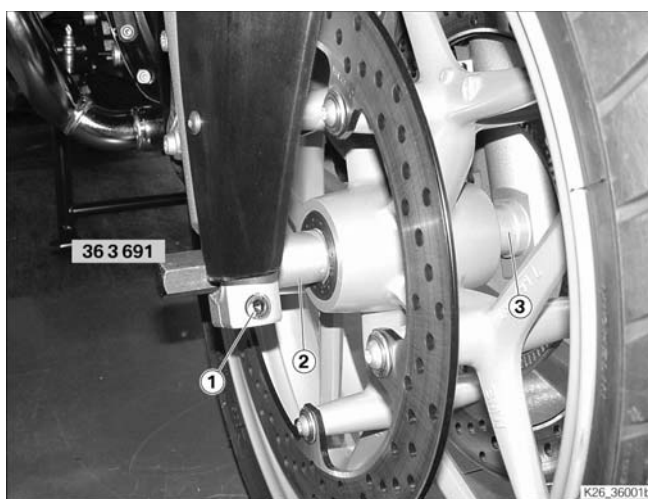
- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note


Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Clean quick-release axle (2) and grease it with lubricant.




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Install front section of front mudguard




- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

(-) Securing right brake caliper



- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning


Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider	30 Nm	



tube, M8 x 32 - 10.9		
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Warning

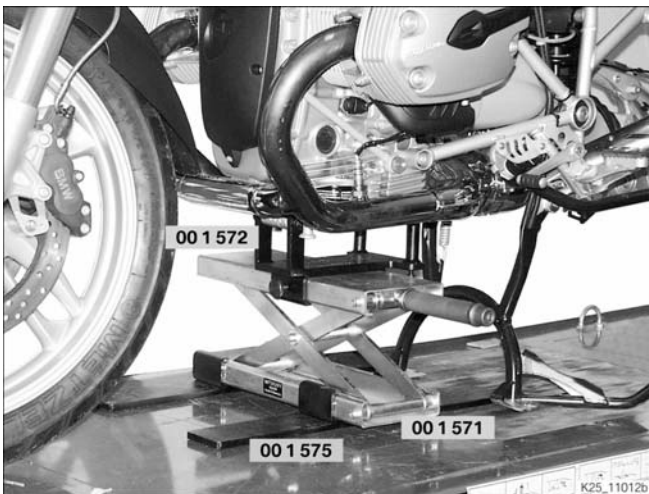
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 **34 11 832 Replacing front brake pads**



(-) Changing front brake pads


- Change the brake pads on one side first, then the other side.

► Removing front brake pads

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Use piston resetting device (No. 34 1 531) and locator (No. 34 1 532) to force the pistons back just far enough to allow the new brake pads to be slipped into position.
- When installing the new brake pads, check that the colour codes on the brake caliper and brake pads match.

 Technical data			
Brake calipers / brake pads, front - colour of identification mark		Blue	

► Installing front brake pads



Warning

Nature: Greasing the backing plate can allow grease to make its way onto the friction pad and the brake disc.

Avoidance: Take care to grease only the rear and the trailing end face of the backing plate.


- Grease the rear and the trailing end face of the backing plate.

	Consumables/lubricants
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Never Seez compound	Protective grease	83 23 9 407 830
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- Install the brake pads.
- Install spring (1) with the arrow pointing in the forward direction of travel.
- Install screw (3).
- Install retainer (2).

 Tightening torques		
Grub screw, brake pads	7 Nm	



- ◀ Repeat this procedure with the second brake caliper.



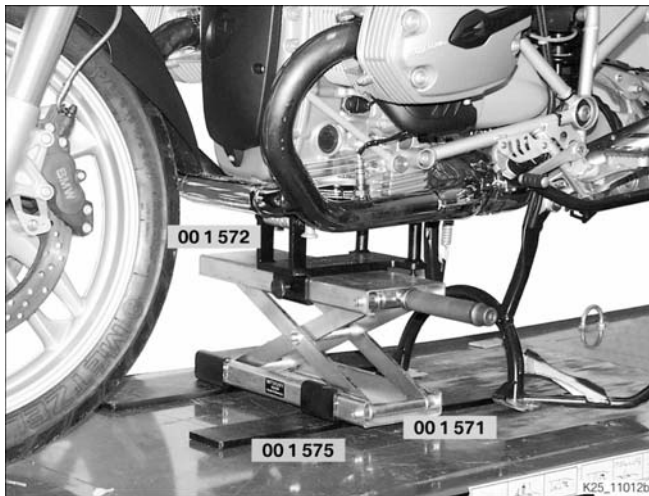
Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the brake pads have been changed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

34 11 840 Replacing front brake discs



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

- Avoidance:** Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

- Avoidance:** Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

(-) Removing left brake caliper

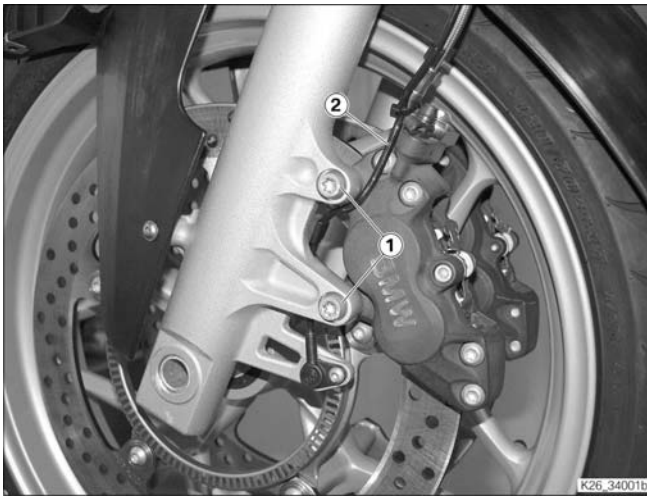


Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

- Avoidance:** Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads



or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

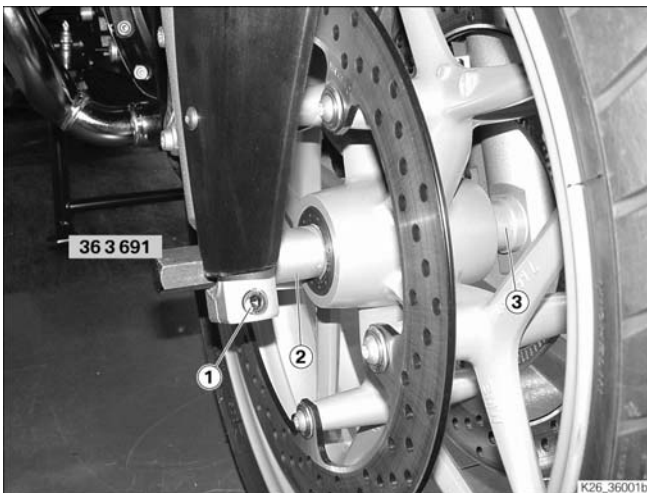
- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front section of front mudguard



- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.

(-) Removing front wheel



- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691).
- Roll the front wheel forward to remove.


📄 Note

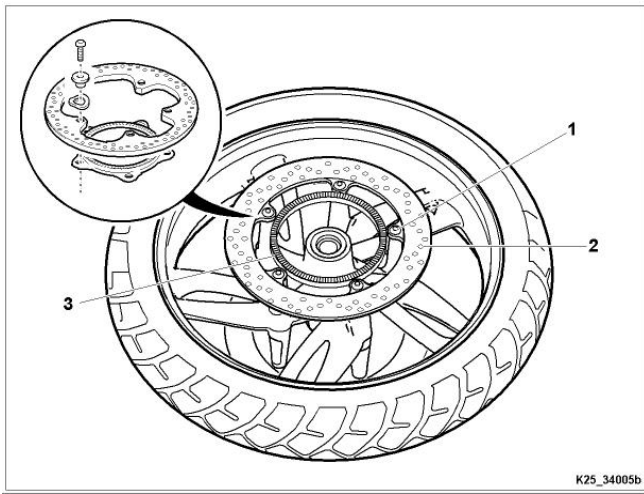
Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

(-) Removing front left brake disc

- Heat screws (1).

	Technical data		

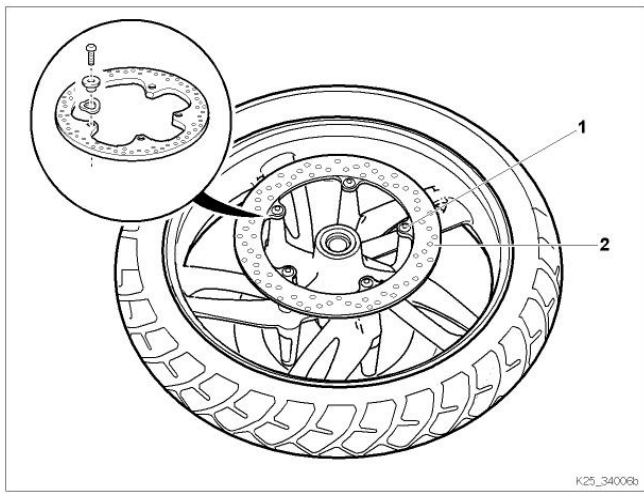



Threaded fastener of front brake disc - release temperature		80 °C	
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- Remove screws (1) complete with rollers and spring washers.
- Remove brake disc (2) and sensor ring (3).

(-) Removing front right brake disc

- Heat screws (1).

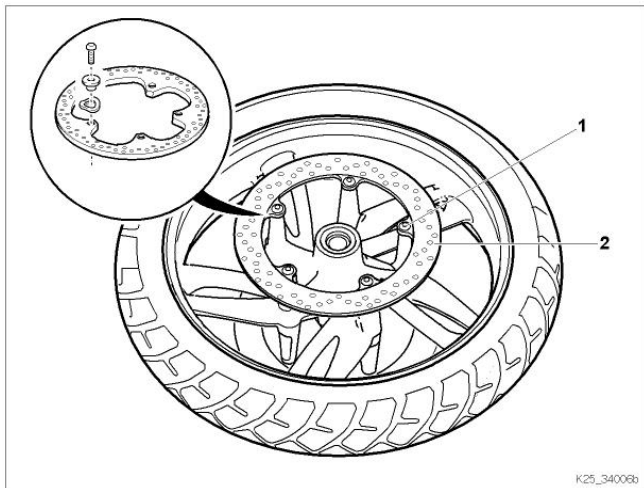



 Technical data			
Threaded fastener of front brake disc - release temperature		80 °C	

- Remove screws (1) complete with rollers and spring washers.
- Remove brake disc (2).

(-) Installing front right brake disc

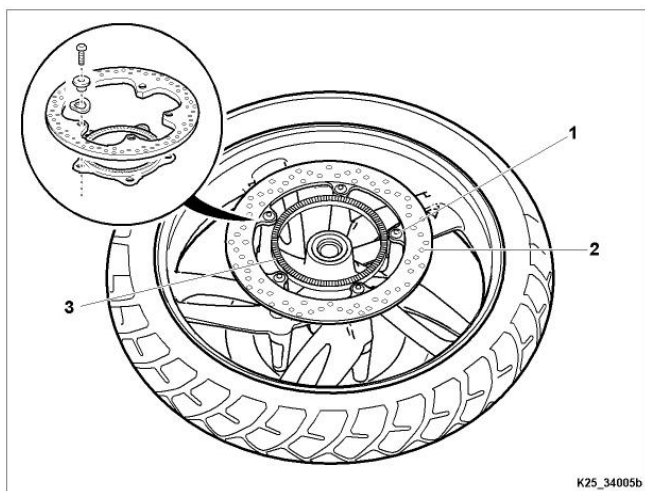
- Clean the tapped holes in the wheel rim.
- Lay brake disc (2) on the wheel rim with the lettering to the outside.
- Secure the brake disc with rollers, spring washers and new screws (1).




 Tightening torques		
Brake disc to front wheel, M8 x 25, Replace screws Micro-encapsulated	Initial torque,	12 Nm
	Final torque,	24 Nm

(-) Installing front left brake disc

- Clean the tapped holes in the wheel rim.
- Lay sensor ring (3) on the wheel rim.
- Lay brake disc (2) on the wheel rim with the lettering to the outside.
- Secure the brake disc with rollers, spring washers and



new screws (1).

 Tightening torques		
Brake disc to front wheel, M8 x 25, Replace screws Micro-encapsulated	Initial torque, 12 Nm	
	Final torque, 24 Nm	

(-) Installing the front wheel

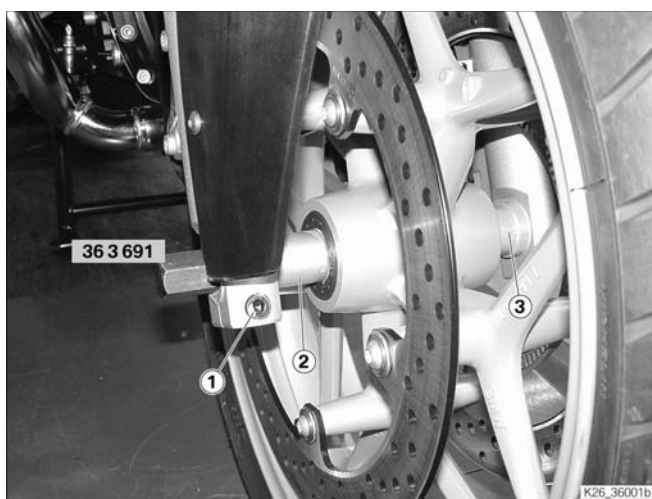
- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note


Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Clean quick-release axle (2) and grease it with lubricant.




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Install front section of front mudguard




- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

(-) Securing right brake caliper



- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning


Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider	30 Nm	



tube, M8 x 32 - 10.9		
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Warning

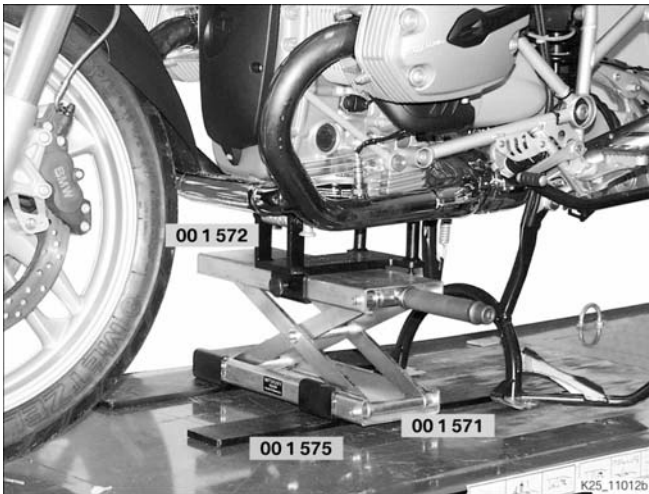
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



📁 34 21 060 Replacing rear brake caliper (without bleeding)

(-) Draining rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

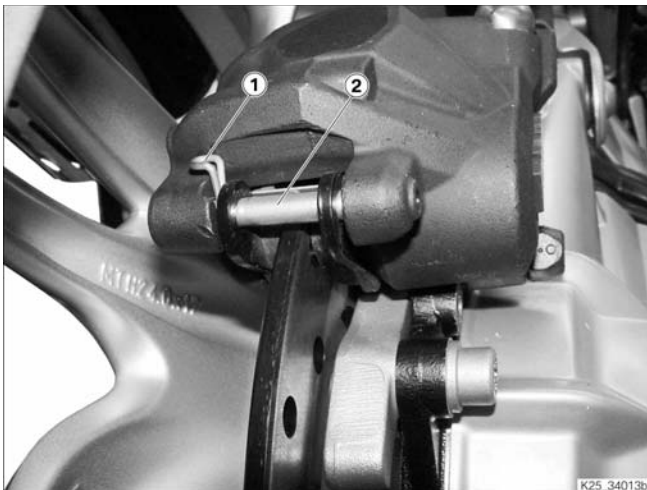
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

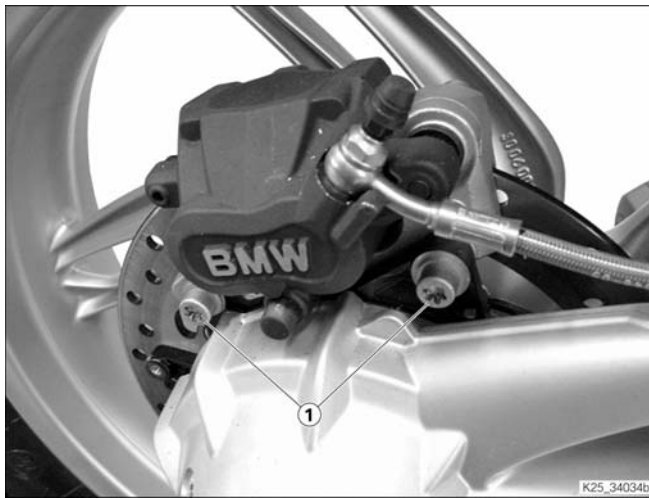
Avoidance: Do not disconnect the plugs from the pressure modulator.



► Removing rear brake pads

- Remove retainer (1).
- Drive retaining pin (2) out toward the wheel side.
- Remove the brake pads.

▷ Removing brake calliper



- Remove screws (1).

⚠ Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove the brake calliper.



- Using piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536), force the pistons of the brake caliper fully back, and secure them in this position.

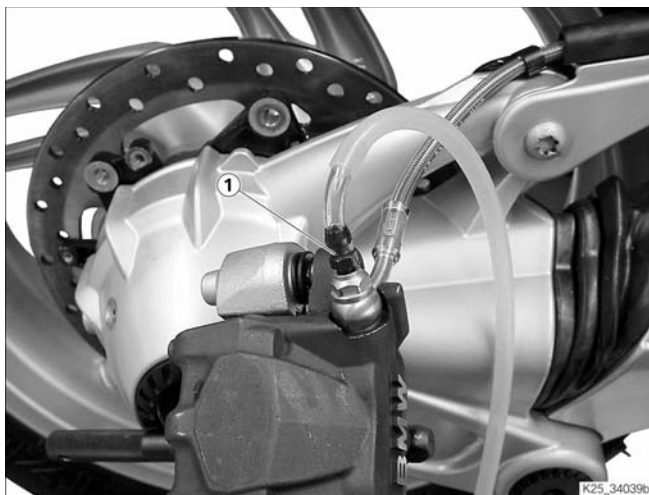


- Connect the brake bleeding device to bleed screw (1) on the brake caliper.

🚫 Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

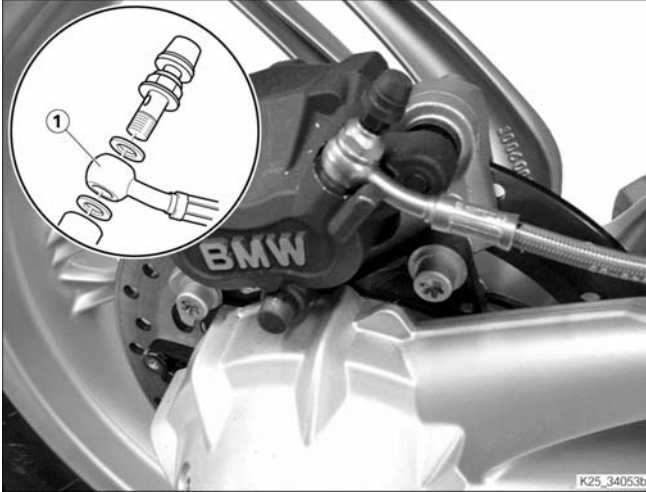
Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.



- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.

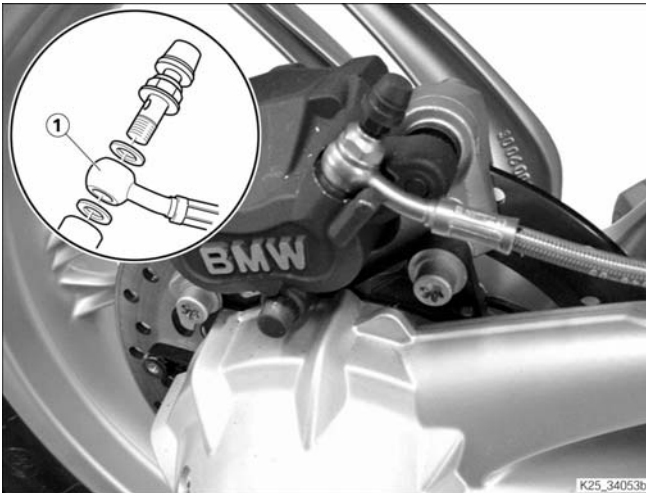
(-) Removing rear brake caliper


- Release banjo bolt (1).



(-) Installing rear brake caliper

- Hold the brake caliper in position on the rear-wheel drive and install the brake pipe with banjo bolt (1) and new sealing rings.



 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

=> Integral ABS: Bleeding rear wheel circuit (Position: 34 00 580)

📁 34 21 200 Replacing rear brake pads

(-) Changing rear brake pads

► Removing rear brake pads

- Remove retainer (1).
- Drive retaining pin (2) out toward the wheel side.
- Remove the brake pads.



▷ Removing brake calliper

- Remove screws (1).

⚠ Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

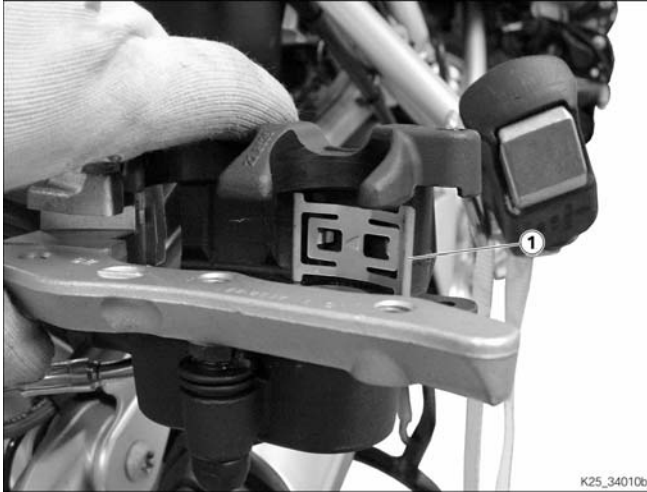
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove the brake calliper.



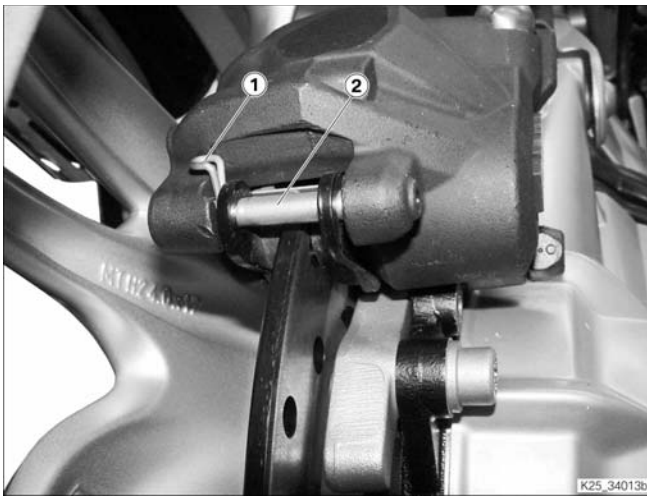
- Use piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) to force the pistons back just far enough to allow the new brake pads to be slipped into position.





► **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.
- » Arrow points in direction of travel.




- Install the brake pads.
- Manually install retaining pin (2).



▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).

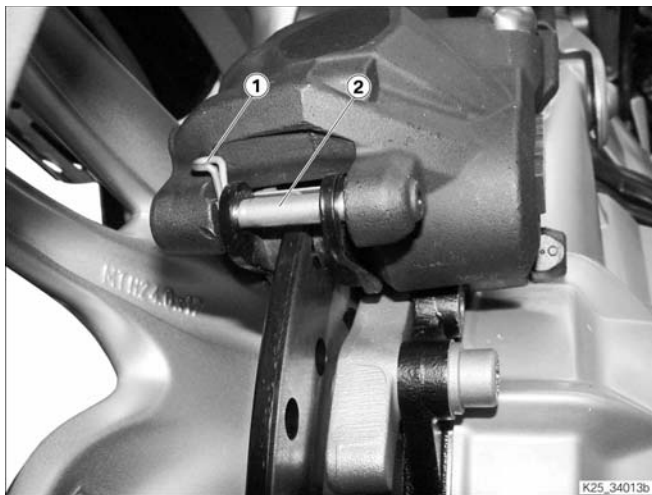
 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.



- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the brake pads have been changed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

34 21 301 Replacing rear brake disc



(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Remove rear wheel.

(-) Removing brake calliper

- Remove screws (1).



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

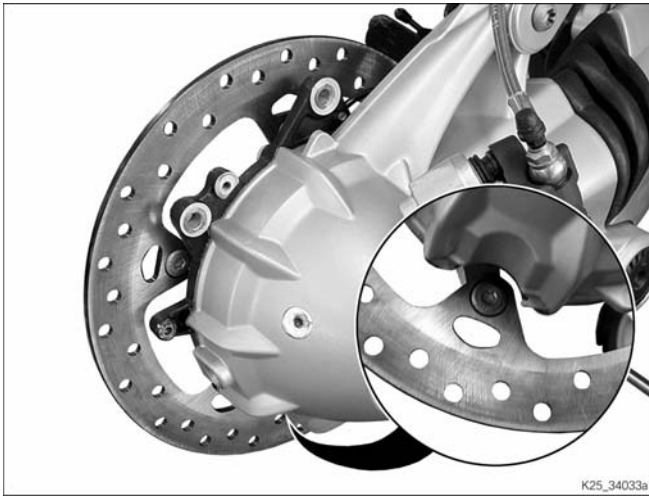
Avoidance: Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove the brake calliper.

(-) Removing rear brake disc

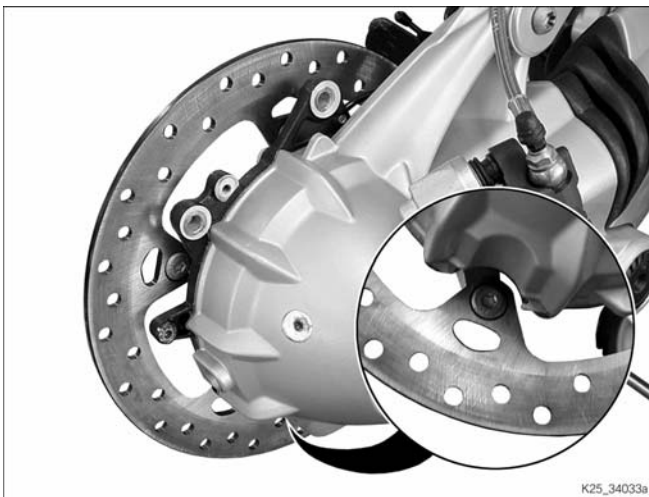
- Turn the brake disc until a screw is accessible and remove the screw.
- Repeat this procedure until all the screws are removed and then remove the brake disc.






(-) Installing rear brake disc

- Clean the tapped holes.
- Turn the brake disc carrier until a tapped hole is visible.
- Hold the brake disc in position and install and tighten new screws until hand-tight.
- Tighten the screws.




 Tightening torques		
Brake disc to wheel carrier, M8 x 15.5, Replace screws Micro-encapsulated	Initial torque, 12 Nm	
	Final torque, 30 Nm	

(-) Installing rear brake caliper

- Hold the brake caliper in position and secure with screws (1).



 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Installing rear wheel

- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.



Attention


Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.



K26_36005b

- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.

 Tightening torques		
Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite sequence	60 Nm	
Wheel flange with cut thread, M10 x 40 x 1.25, in diagonally opposite sequence	60 Nm	

 **34 21 769 Replacing rear brake pads**

(-) Changing rear brake pads

► Removing rear brake pads

- Remove retainer (1).
- Drive retaining pin (2) out toward the wheel side.
- Remove the brake pads.



▷ Removing brake calliper

- Remove screws (1).

⚠ Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

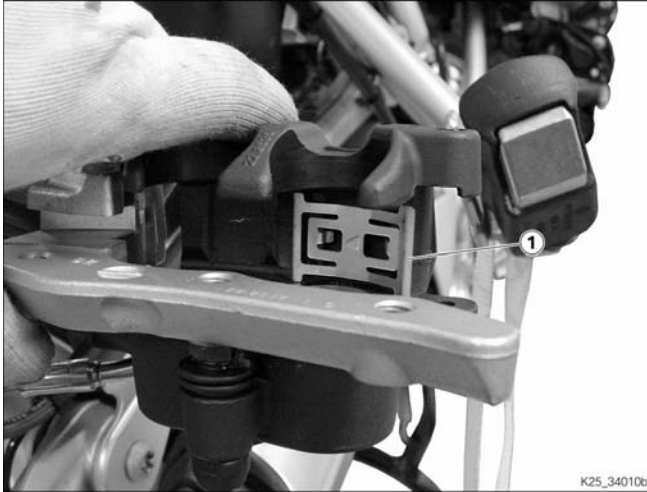
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove the brake calliper.



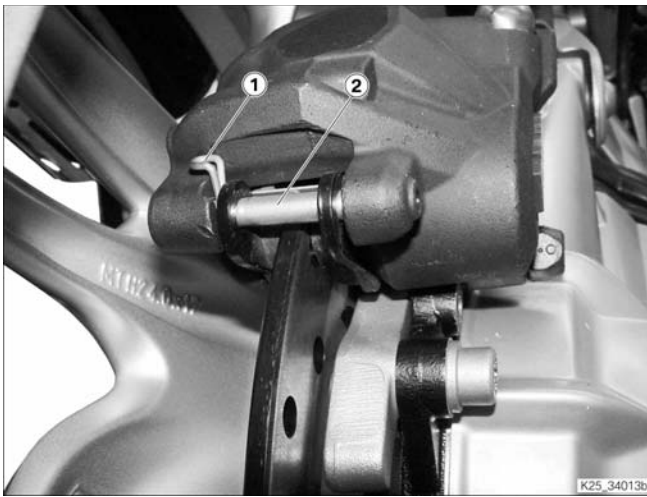
- Use piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) to force the pistons back just far enough to allow the new brake pads to be slipped into position.



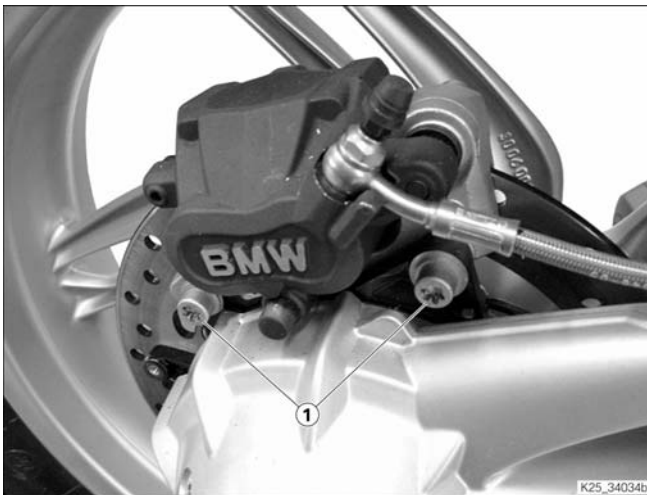


► **Installing rear brake pads**

- Check that spring (1) is correctly seated and installed right way round.
- » Arrow points in direction of travel.




- Install the brake pads.
- Manually install retaining pin (2).



▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).

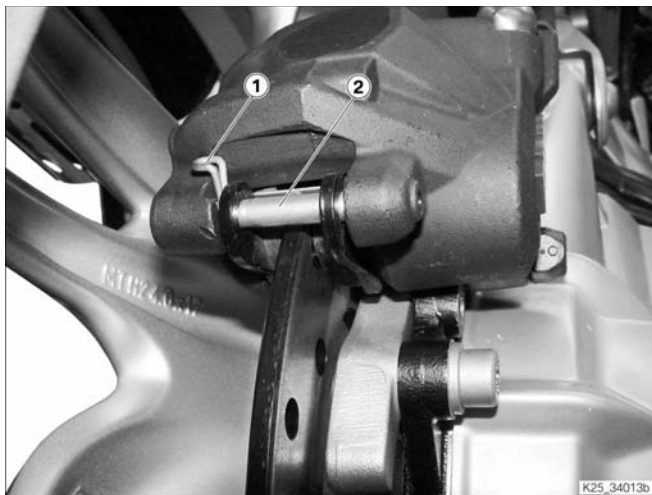
 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.



- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the brake pads have been changed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

34 21 772 Replacing rear brake disc



(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Remove rear wheel.

(-) Removing brake calliper

- Remove screws (1).

⚠ Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

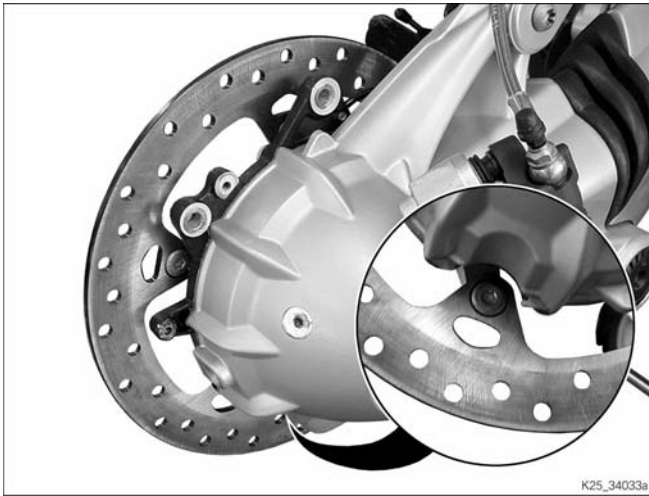
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove the brake calliper.

(-) Removing rear brake disc

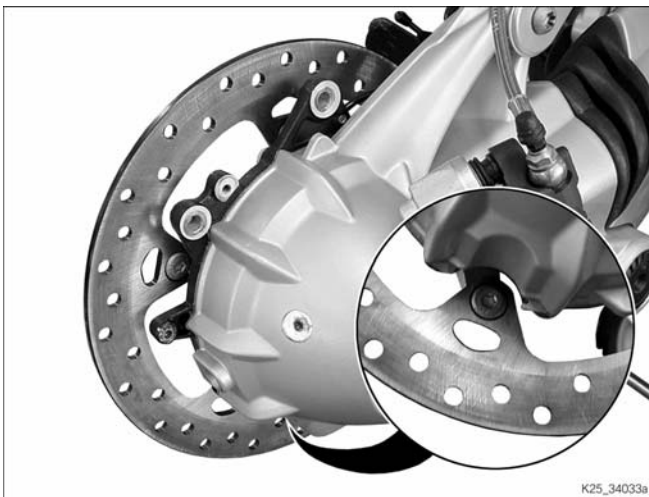
- Turn the brake disc until a screw is accessible and remove the screw.
- Repeat this procedure until all the screws are removed and then remove the brake disc.






(-) Installing rear brake disc

- Clean the tapped holes.
- Turn the brake disc carrier until a tapped hole is visible.
- Hold the brake disc in position and install and tighten new screws until hand-tight.
- Tighten the screws.




 Tightening torques		
Brake disc to wheel carrier, M8 x 15.5, Replace screws Micro-encapsulated	Initial torque, 12 Nm	
	Final torque, 30 Nm	

(-) Installing rear brake caliper

- Hold the brake caliper in position and secure with screws (1).



 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Installing rear wheel

- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.



Attention


Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.



K26_36005b

- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.

 Tightening torques		
Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite sequence	60 Nm	
Wheel flange with cut thread, M10 x 40 x 1.25, in diagonally opposite sequence	60 Nm	

 **34 31 001 Replacing rear brake master cylinder**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

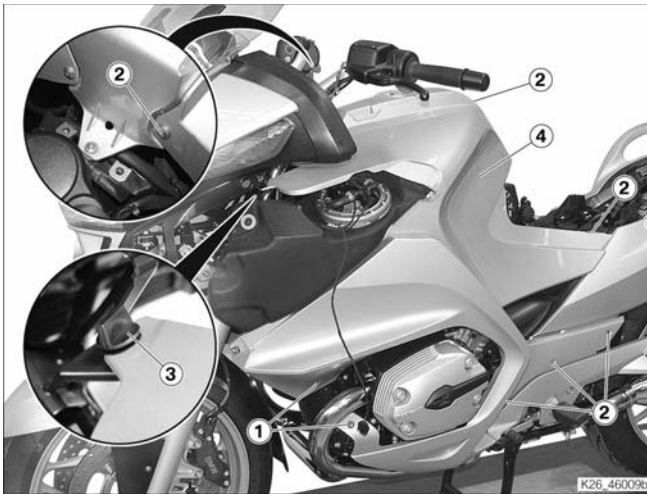


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

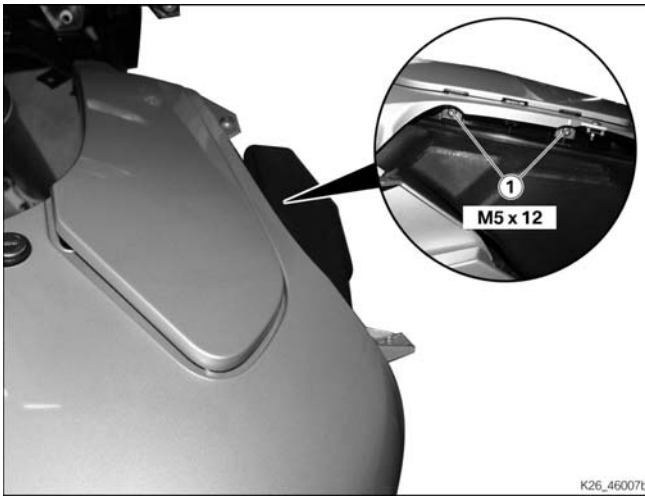
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



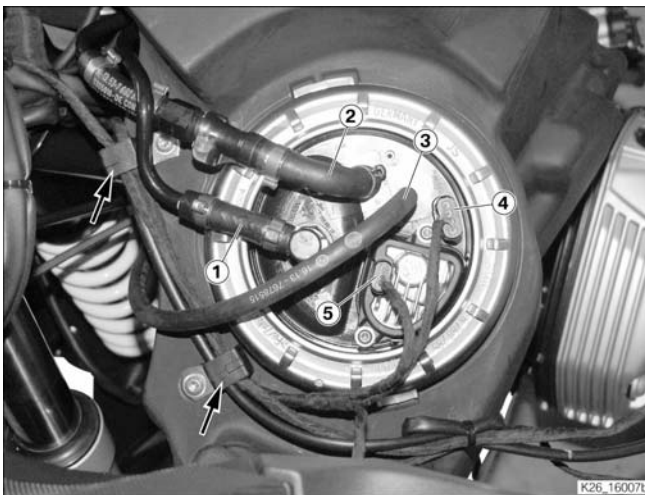
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

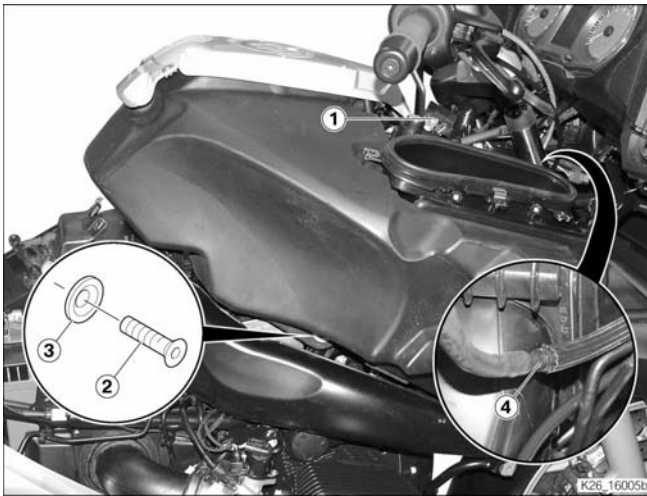


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Draining rear control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



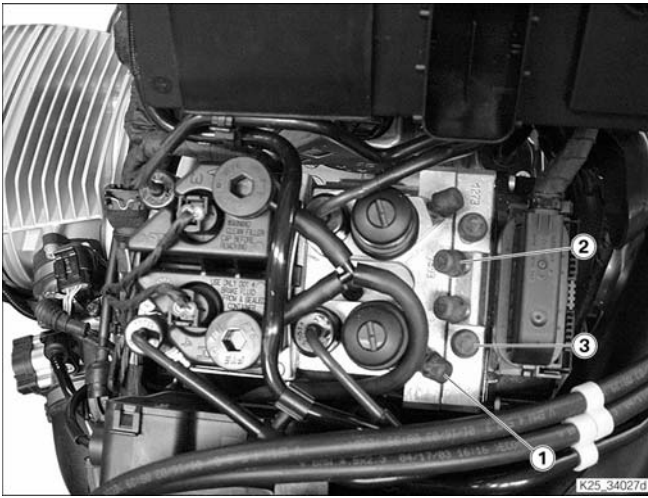
Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Remove the cap of the brake fluid reservoir and remove the rubber diaphragm.
- Draw off the brake fluid.



⚠ Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) on the rear metering cylinder.
- Draw off the brake fluid from the circuits in the correct sequence, using ring spanner (No. 34 2 532) :

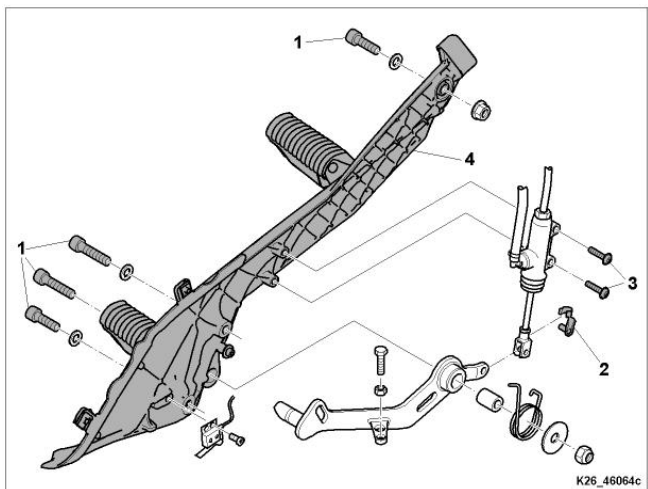
📄 Note

The pressure modulator has to be fully drained if it is to be removed/replaced. It is sufficient to drain the control circuit for all other tasks.


- rear metering cylinder (1)
- rear integral circuit (2)
- rear control circuit (3).

(-) Releasing right footrest plate

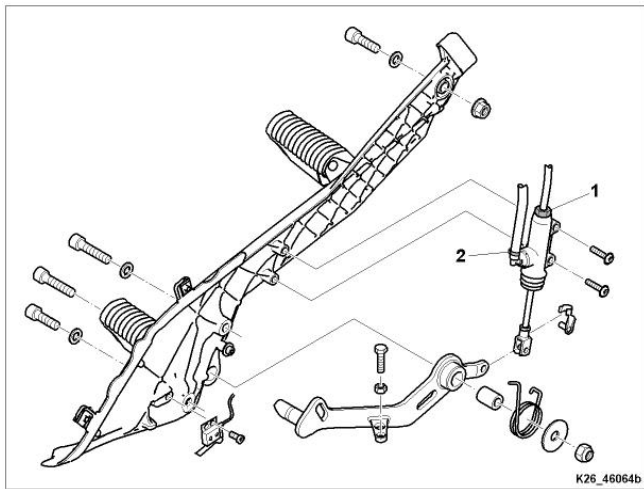
- Remove screws (1).



- Disengage pin (2).
- Remove screws (1).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.

 Technical data			
Release temperature, screws for rear brake master cylinder		100 °C	

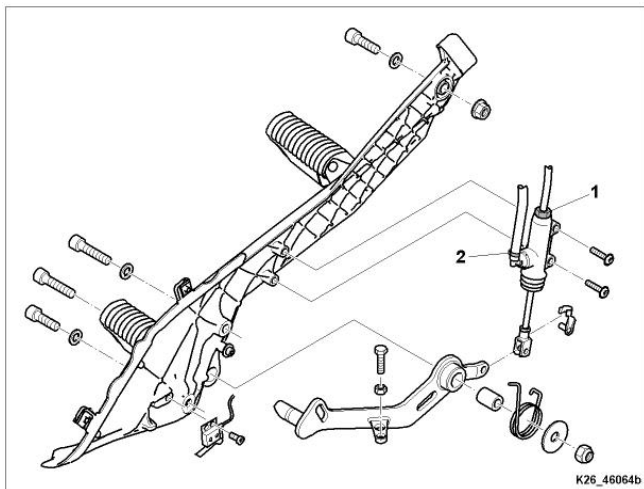
- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the



- speed nuts on the footrest plate.
- Use cable ties to secure the footrest plate to the frame.

(-) Removing rear brake master cylinder

- Release pipe fastener (1).
- Open hose clip (2).
- Disconnect the brake master cylinder from the brake fluid hose.

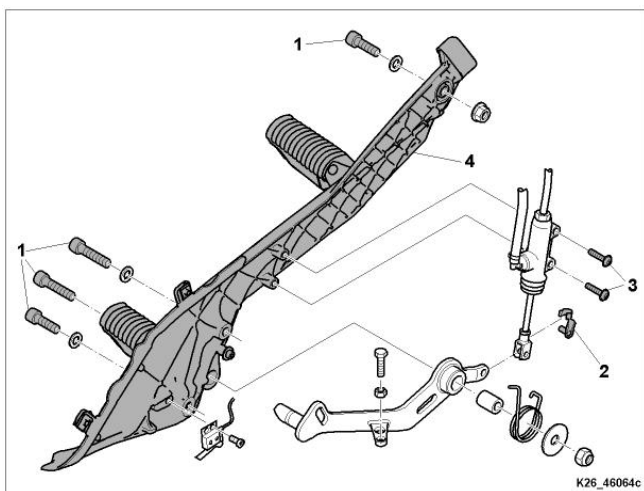


(-) Installing rear brake master cylinder

- Connect the brake hose from the brake fluid reservoir to the brake master cylinder.
- Hold pipe fastener (1) in position, align the brake master cylinder in its installed position and tighten.

Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

- Close hose clip (2) with pliers (No. 13 1 500) .



(-) Securing right footrest plate

- Clean the threads.
- Hold footrest plate (4) in position.
- Install master brake cylinder with new screws (3).

Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

- Install screws (1).

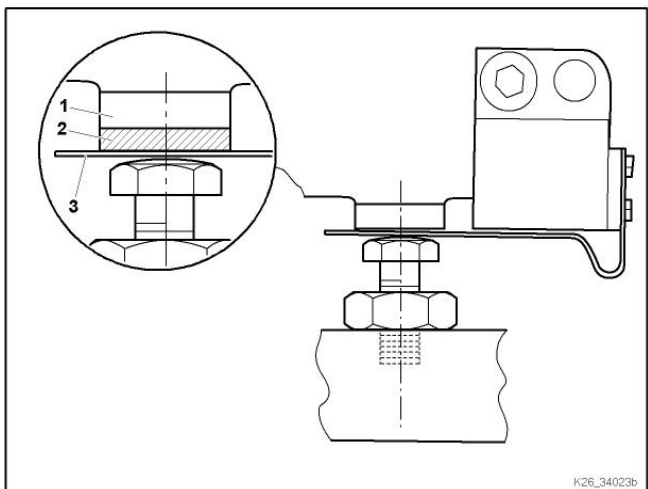
Tightening torques		
Footrest plate to rear frame, bottom front/rear,	19 Nm	

M8 x 25		
Footrest plate to rear frame, top front, M8 x 35	19 Nm	




- Engage pin (2).
- Install screws (1).

(-) Checking blow-by clearance at piston rod



Test

- Check the play of the piston rod between brake-light switch tab (3) and stop of adjusting screw (1) with feeler gauge (2).

 Technical data		
Play of piston pushrod, rear brake master cylinder	Measured between brake-light switch tongue and stop of adjusting screw	2 ⁺¹ mm

Result: Measured value is not to specification.

Measure:

► **Adjusting blow-by clearance at piston rod**

Precondition


- The blade of the feeler gauge must be placed transversely with respect to forward direction between the plate of the brake light switch and stop of the adjusting screw.



- Slacken nut (1) on pushrod (2).
- Turn push rod (2) to relieve the pressure until it has play.
- Turn pushrod (2) until all play **at the pushrod** is taken up.



- Lock nut (1).

 Tightening torques		
Lock nut, pushrod, rear brake master cylinder, M6 Sealing lacquer	8 Nm	

- When work is completed, apply coloured sealing lacquer across nut (1) and the adjacent component.



(-) Filling rear control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

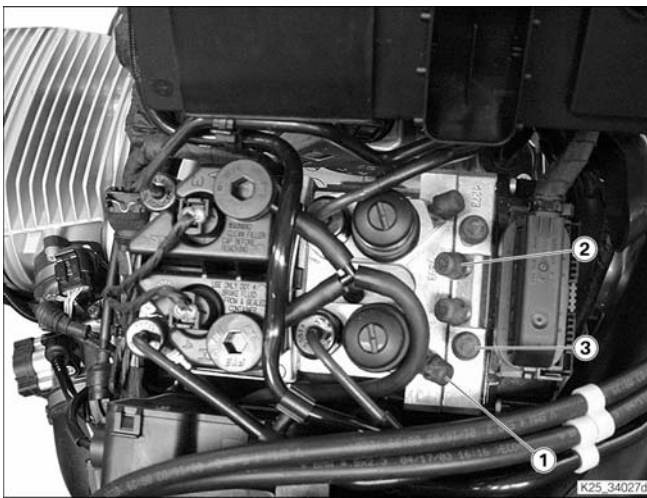
Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



- Top up the brake fluid level to the (MAX) mark.



Consumables/lubricants

DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) of the rear metering cylinder, but do not switch on.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

- In the following sequence, bleed:
 - bleed screw (1) rear metering cylinder
 - bleed screw (2) rear integral circuit
 - bleed screw (3) rear control circuit, and
- for the second time, bleed screw (1) rear metering cylinder in accordance with instructions for bleeding

and using special ring spanner (No. 34 2 532) .

► Instructions for bleeding

- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



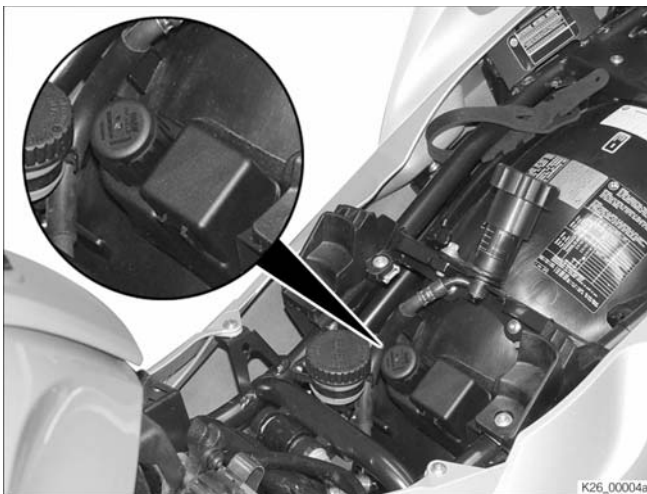
- Fit the protective caps on the bleed screws.
- Top up the brake fluid level to the (MAX) mark.
- Wipe the rim of the reservoir, the diaphragm and the cap to remove brake fluid, and carefully re-assemble the components.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Function test, rear brake-light switch

Test

- Test the brake-switch setting with the BMW Motorrad diagnostic system.


Result: If test result is not OK

Measure:


► Adjusting blow-by clearance at piston rod

- Slacken nut (1) on pushrod (2) at the brake master cylinder.



 Technical data			
Play of piston pushrod, rear brake master cylinder	Measured between brake-light switch tongue and stop of adjusting screw	2 ⁺¹ mm	

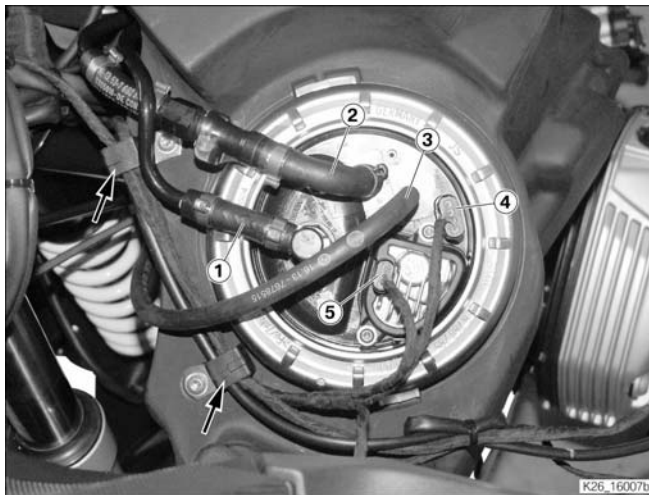
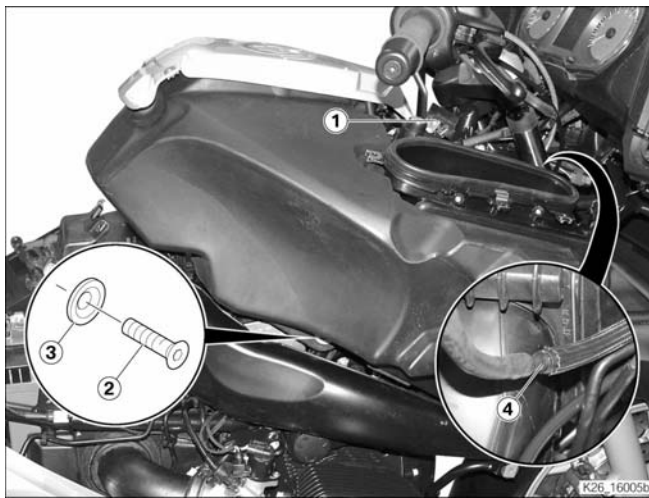
- Increase play in small steps to the maximum value.
- Lock nut (1).

 Tightening torques		
Lock nut, pushrod, rear brake master cylinder, M6 Sealing lacquer	8 Nm	

- When work is completed, apply coloured sealing lacquer across nut (1) and the adjacent component.

◀ (-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.



Tightening torques

Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.

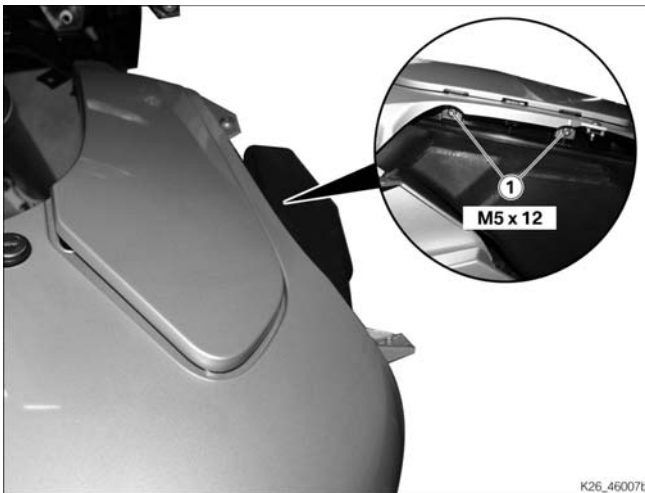
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



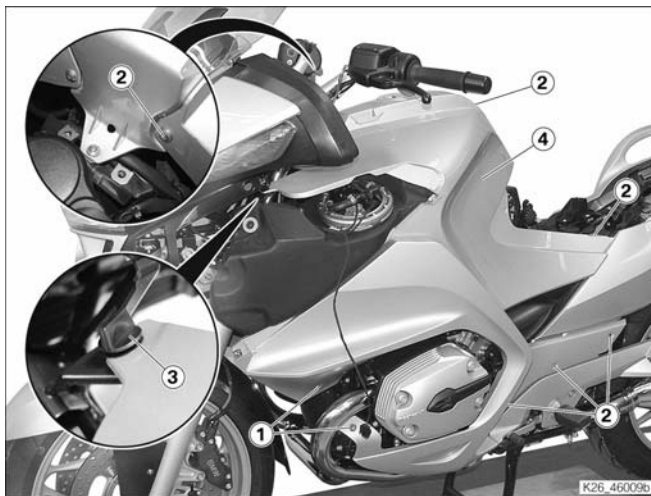
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

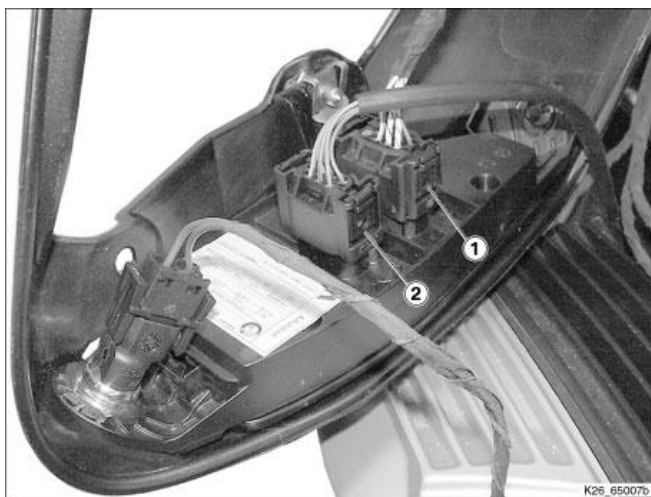
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

📁 34 32 030 Replacing front brake hose to left brake caliper (without bleeding)

(-) Draining front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

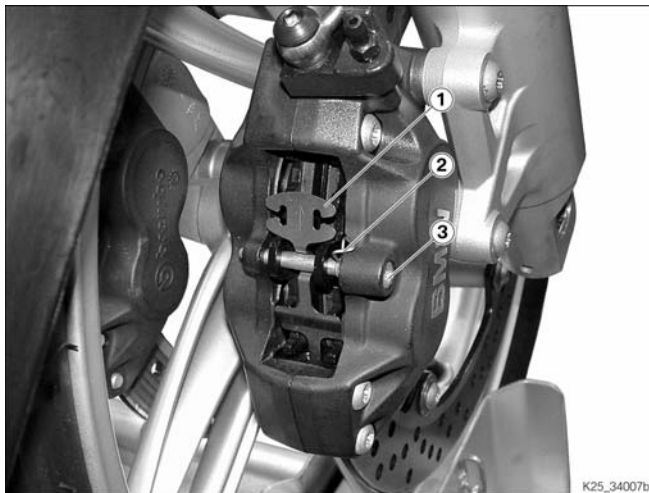
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.



► Removing front brake pads

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Using piston resetting device (No. 34 1 531) and locator (No. 34 1 532), force the pistons of the brake caliper fully back, and secure them in this position.

- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Repeat this procedure with the second brake caliper.



Note

Drain the brake system only to the extent necessary for the tasks in question to be performed.

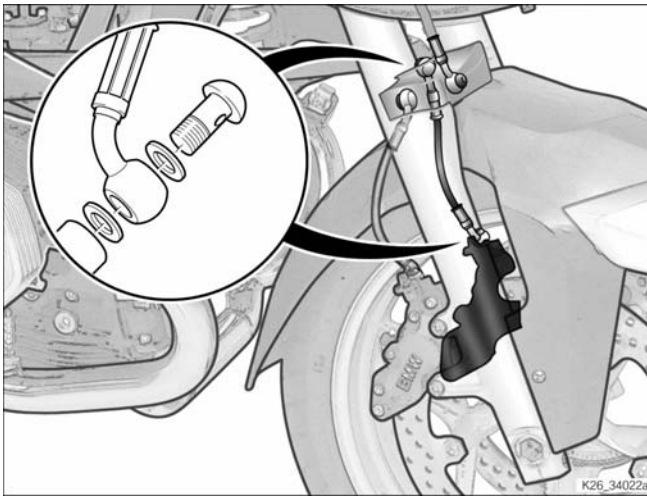
(-) Removing brake hose to brake caliper, left



Attention

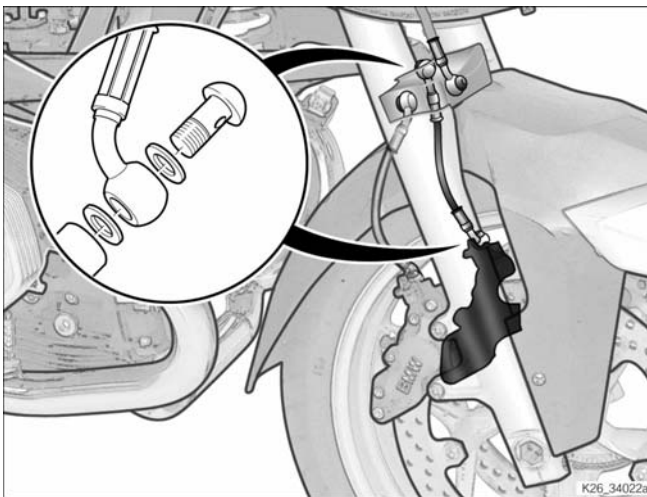
Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Remove the banjo bolt from the brake caliper complete with sealing rings.
- Remove the banjo bolt from the fork bridge complete with sealing rings and remove the brake hose.

(-) Connecting brake hose to brake caliper, left




⚠ Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Hold the brake hose in position and install the banjo bolt with **new** sealing rings in the fork bridge.
- Secure the banjo bolt to the brake caliper with **new** sealing rings.
- Tighten both banjo bolts.

 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

=> Integral ABS: Bleeding front wheel circuit (Position: 34 00 570)

📁 34 32 031 Replacing front brake hose to right brake caliper (without bleeding)

(-) Draining front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

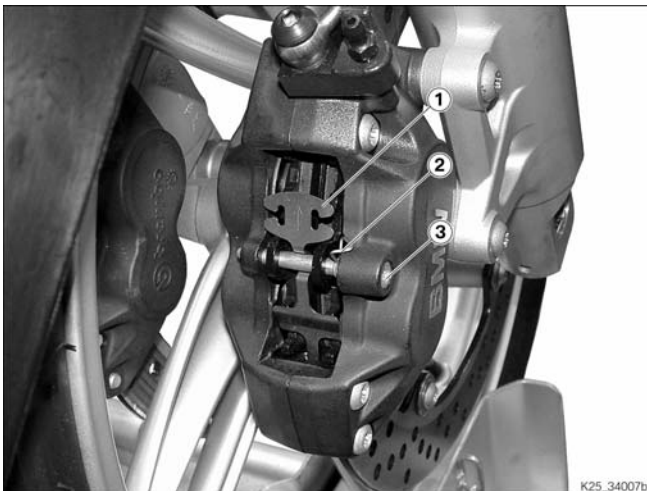
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.



► Removing front brake pads

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Using piston resetting device (No. 34 1 531) and locator (No. 34 1 532), force the pistons of the brake caliper fully back, and secure them in this position.

- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Repeat this procedure with the second brake caliper.



Note

Drain the brake system only to the extent necessary for the tasks in question to be performed.

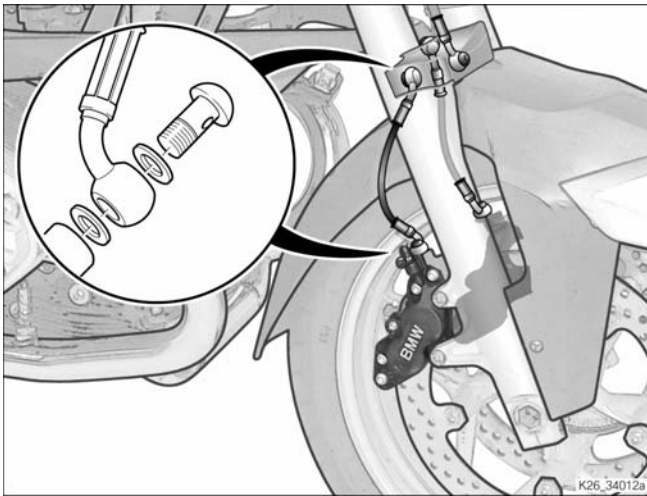
(-) Removing brake hose to brake caliper, right



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Remove the banjo bolt from the brake caliper complete with sealing rings.
- Remove the banjo bolt from the fork bridge complete with sealing rings and remove the brake hose.

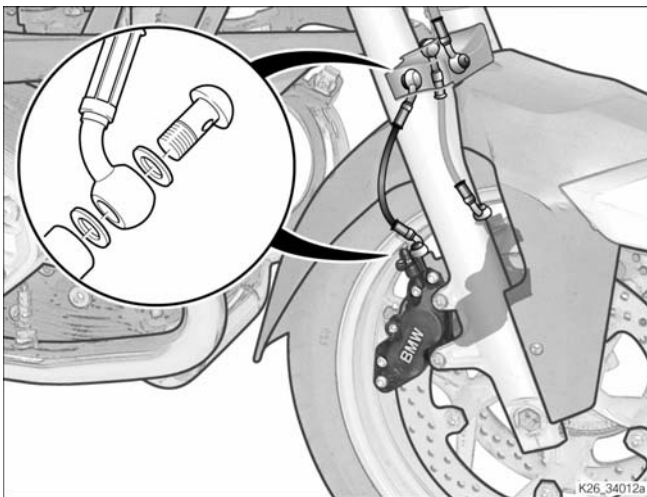
(-) Connecting brake hose to brake caliper, right




Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Hold the brake hose in position and install the banjo bolt with **new** sealing rings in the fork bridge.
- Secure the banjo bolt to the brake caliper with **new** sealing rings.
- Tighten both banjo bolts.

 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

=> Integral ABS: Bleeding front wheel circuit (Position: 34 00 570)

34 32 032 Replacing front brake hose (without bleeding)

(-) Draining front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

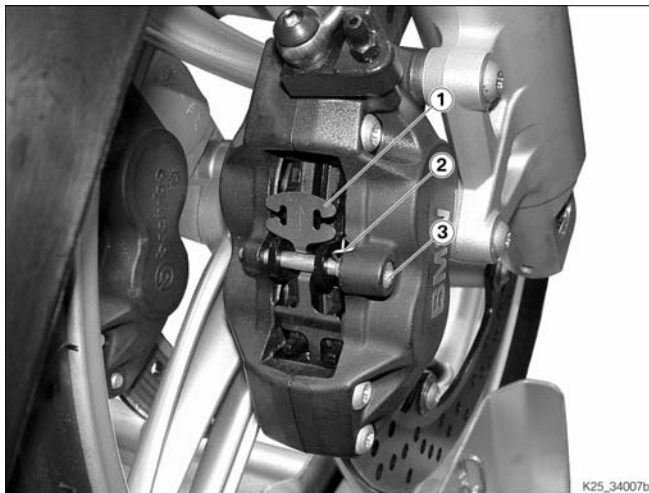
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.



► Removing front brake pads

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Using piston resetting device (No. 34 1 531) and locator (No. 34 1 532), force the pistons of the brake caliper fully back, and secure them in this position.

- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Repeat this procedure with the second brake caliper.



Note

Drain the brake system only to the extent necessary for the tasks in question to be performed.

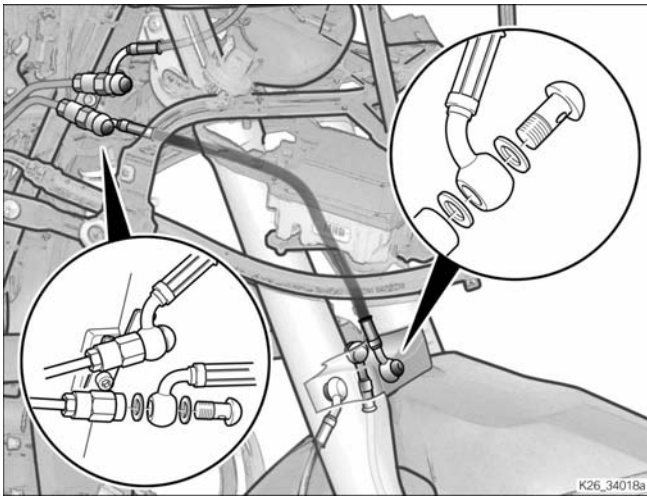
(-) Removing front brake hose



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Remove the banjo bolt from the distributor complete with sealing rings.
- Remove the banjo bolt from the fork bridge complete with sealing rings and remove the brake hose.

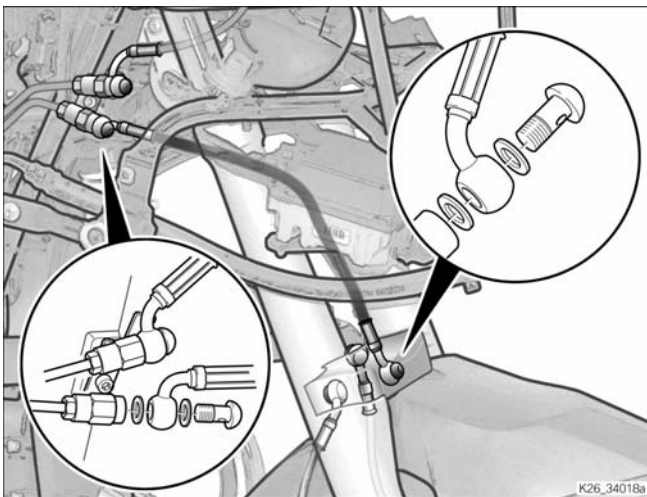
(-) Installing front brake hose




Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Hold the brake hose in position and install the banjo bolt with **new** sealing rings in the fork bridge.
- Install the banjo bolt with **new** sealing rings in the distributor.
- Tighten both banjo bolts.

 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

=> **Integral ABS: Bleeding front wheel circuit (Position: 34 00 570)**

 **34 32 036 Replacing front brake hose to handbrake fitting (without bleeding)**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

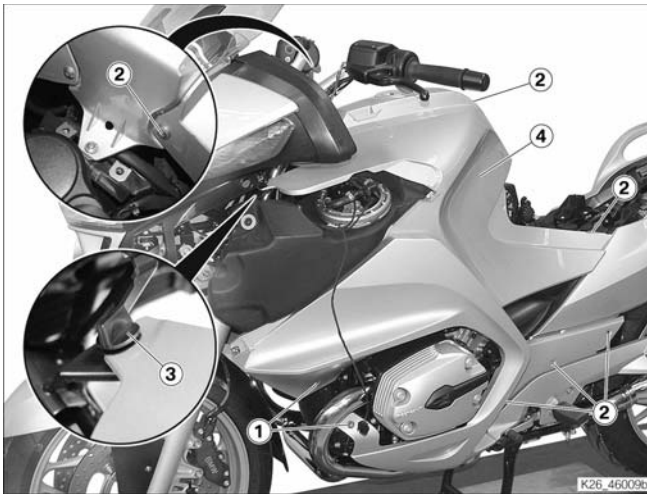


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

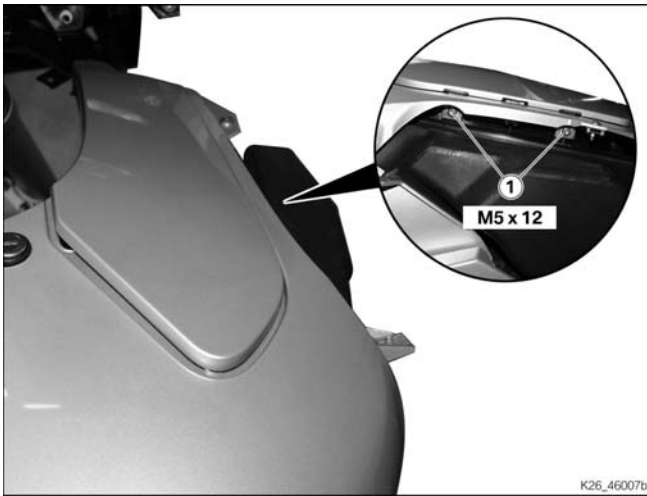
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



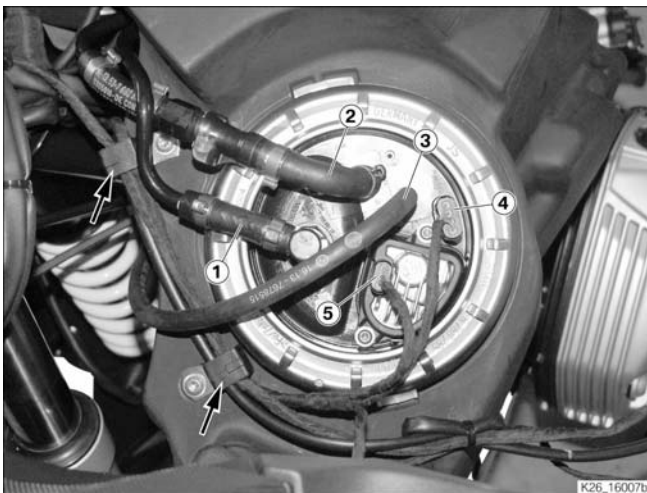
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

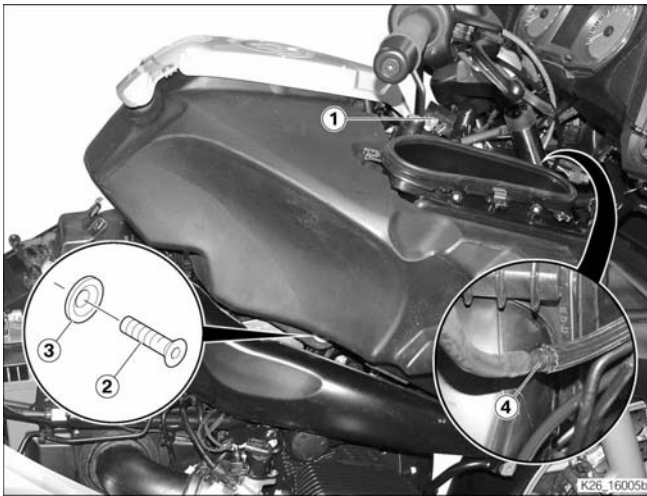


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Draining front control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Turn the handlebars to a position in which the brake fluid reservoir is horizontal.

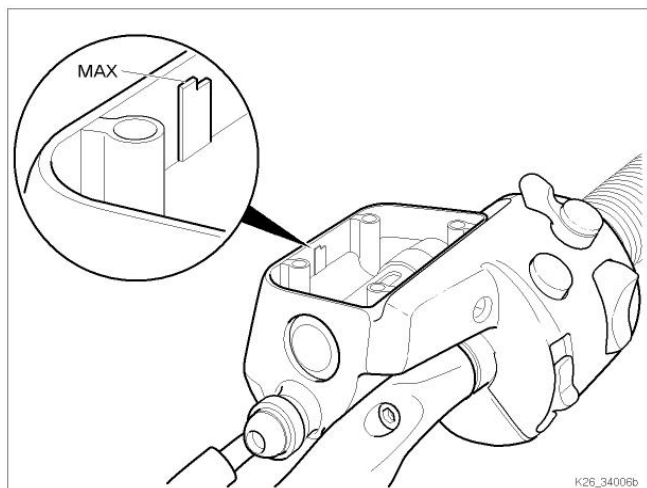


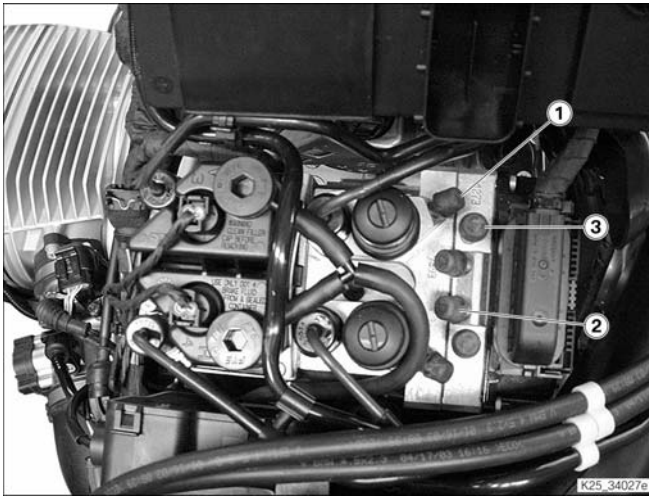
Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Open the reservoir.
- Remove front reservoir cap with diaphragm, and draw off the old brake fluid.
- Set the cap on the brake fluid reservoir, but do not tighten it.





⚠ Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) on the front metering cylinder.
- Draw off the brake fluid from the circuits in the correct sequence, using ring spanner (No. 34 2 532) :

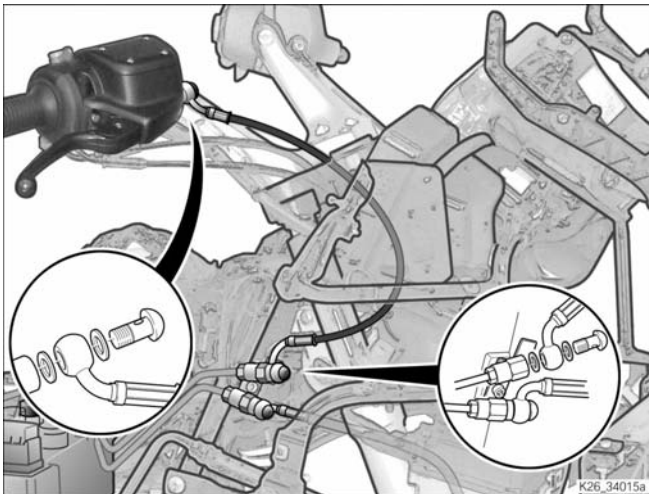


Note

The pressure modulator has to be fully drained if it is to be removed/replaced. It is sufficient to drain the control circuit for all other tasks.

- front metering cylinder (1)
- front integral circuit (2)
- front control circuit (3).

(-) Removing brake hose from front brake master cylinder



⚠ Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Remove the banjo bolt from the distributor complete with sealing rings.
- Remove the banjo bolt from the front brake master cylinder complete with sealing rings and remove the brake hose.

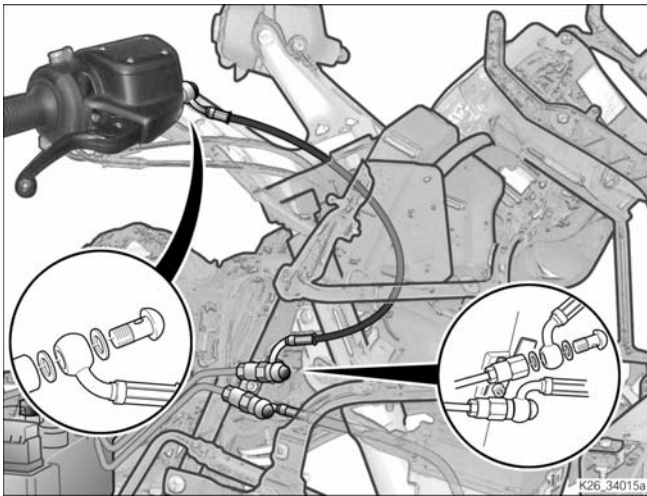
(-) Connecting brake hose to front brake master cylinder

⚠ Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Hold the brake hose in position and install the banjo bolt with **new** sealing rings in the front brake master cylinder.




⚠ Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Install the banjo bolt with **new** sealing rings in the distributor.
- Tighten both banjo bolts.

 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

=> Integral ABS: Bleeding front control circuit (Position: 34 00 572)

34 32 038 Replacing rear brake hose to brake caliper (without bleeding)

(-) Draining rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

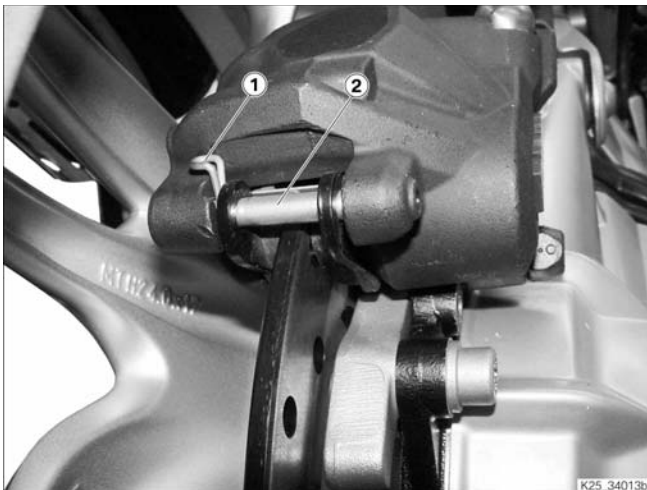
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

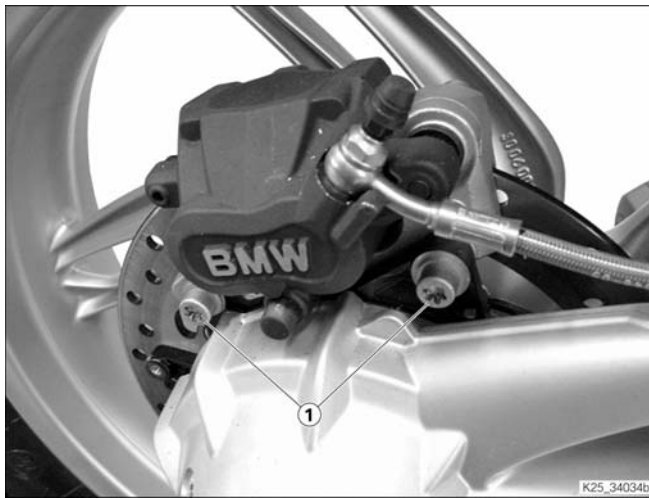
Avoidance: Do not disconnect the plugs from the pressure modulator.



► Removing rear brake pads

- Remove retainer (1).
- Drive retaining pin (2) out toward the wheel side.
- Remove the brake pads.

▷ Removing brake calliper



- Remove screws (1).

⚠ Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove the brake calliper.



- Using piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536), force the pistons of the brake caliper fully back, and secure them in this position.

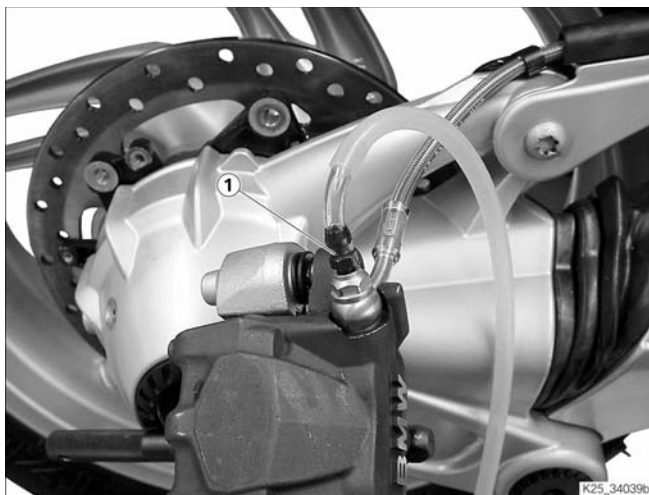


- Connect the brake bleeding device to bleed screw (1) on the brake caliper.

🚫 Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.



- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.

(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Remove rear wheel.



(-) Removing brake-hose cover

- Remove the screws and lift off the cover.



(-) Removing brake hose to brake caliper, rear

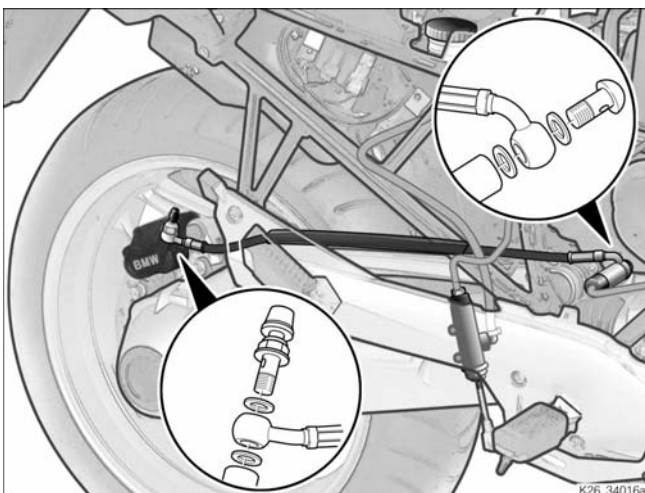


Attention

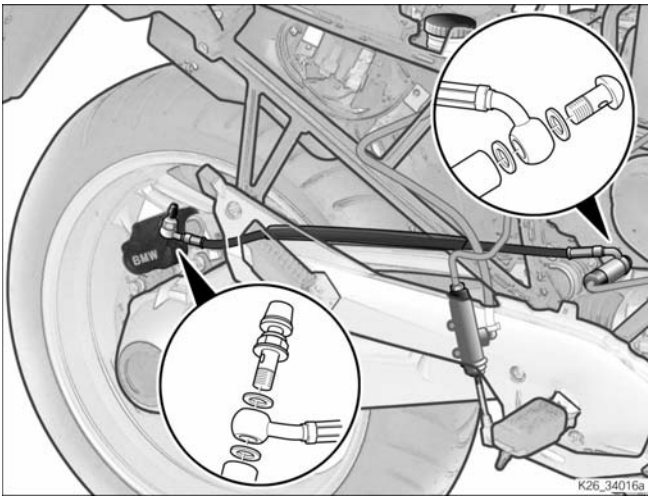
Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Remove the banjo bolt from the brake caliper complete with sealing rings.
- Remove the banjo bolt from the connector complete with sealing rings and remove the brake hose.



(-) Connecting brake hose to brake caliper, rear



⚠ Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Hold the brake hose in position.
- Install the banjo bolt with **new** sealing rings in the brake caliper.
- Install the banjo bolt with **new** sealing rings in the distributor.
- Tighten both banjo bolts.

🔧 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

(-) Installing brake hose cover

- Hold the cover in position and secure it with screws.



🔧 Tightening torques		
Brake hose cover to strut, M6 x 16	8 Nm	

(-) Installing rear wheel

- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.



Tightening torques

Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite sequence	60 Nm	
Wheel flange with cut thread, M10 x 40 x 1.25, in diagonally opposite sequence	60 Nm	

=> Integral ABS: Bleeding rear wheel circuit (Position: 34 00 580)

 **34 32 040 Replacing front ABS brake pipe to pressure modulator**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_46016a

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



K26_52002b

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



K26_52001b

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

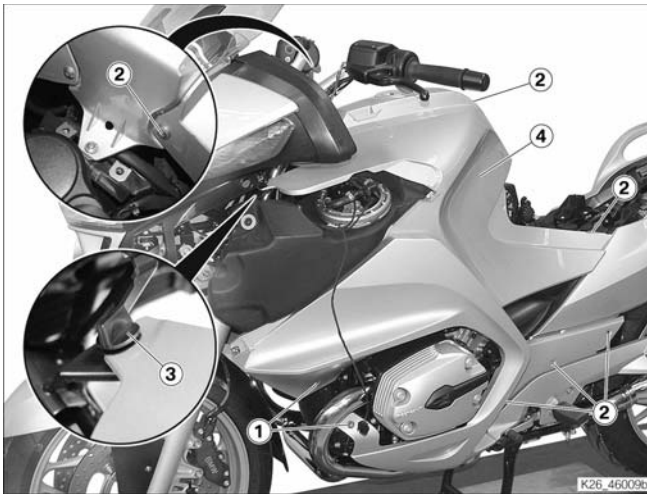


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

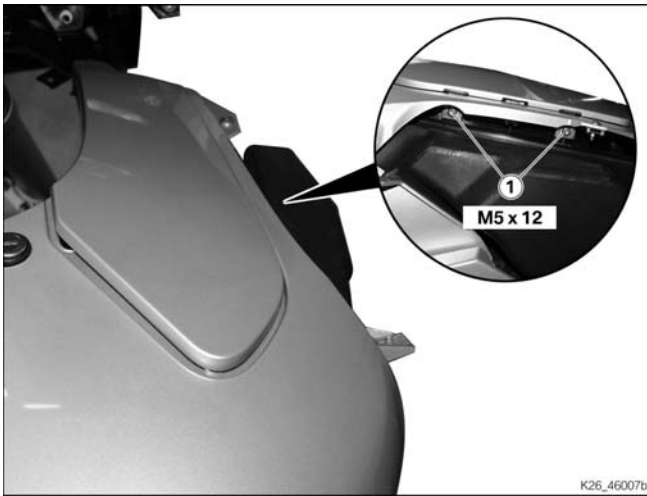
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



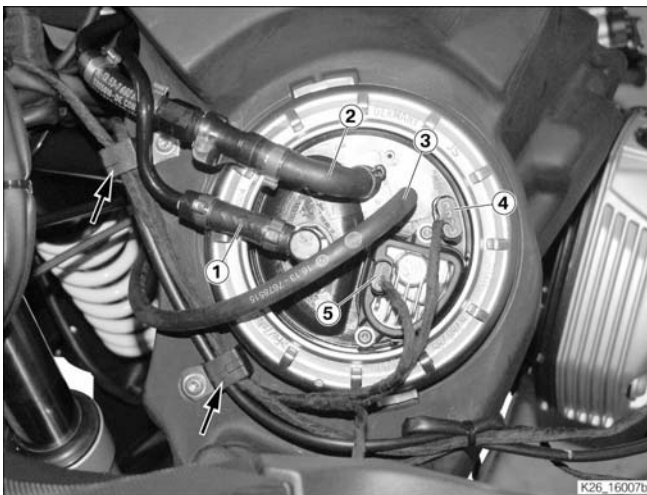
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

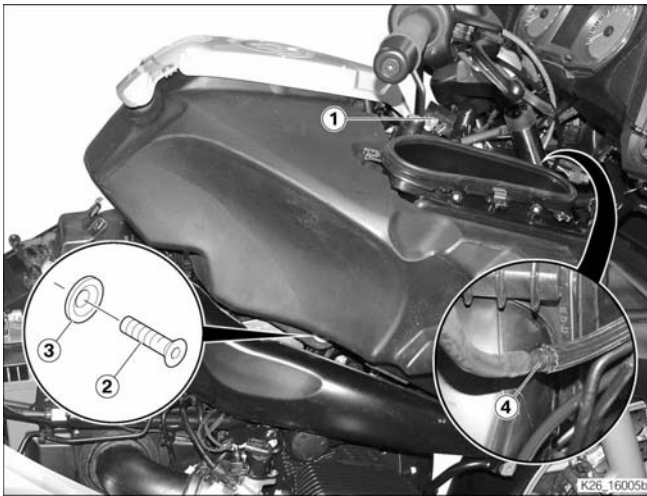


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Draining front control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

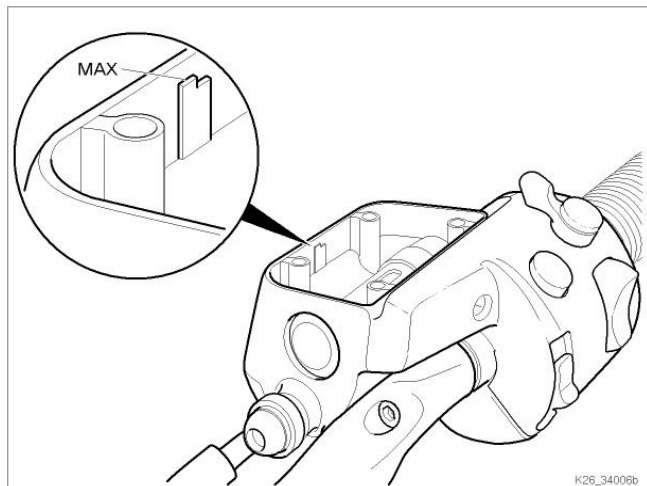
Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Turn the handlebars to a position in which the brake fluid reservoir is horizontal.

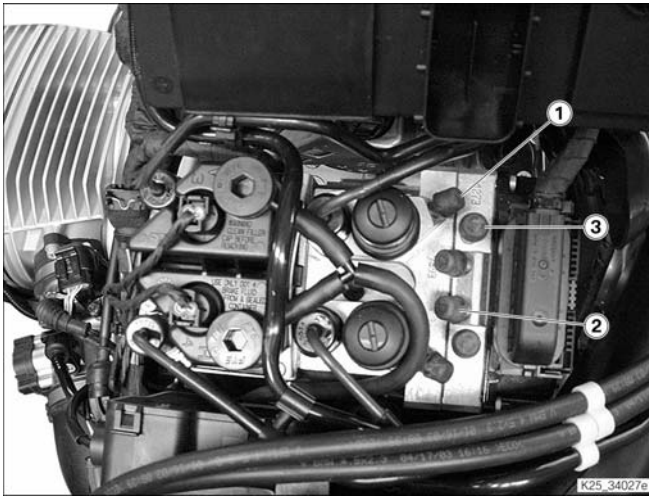


Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Open the reservoir.
- Remove front reservoir cap with diaphragm, and draw off the old brake fluid.
- Set the cap on the brake fluid reservoir, but do not tighten it.



⚠ Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) on the front metering cylinder.
- Draw off the brake fluid from the circuits in the correct sequence, using ring spanner (No. 34 2 532) :

📄 Note

The pressure modulator has to be fully drained if it is to be removed/replaced. It is sufficient to drain the control circuit for all other tasks.

- front metering cylinder (1)
- front integral circuit (2)
- front control circuit (3).

(-) Replacing brake pipe, front control circuit

▶ Removing brake pipe, front control circuit

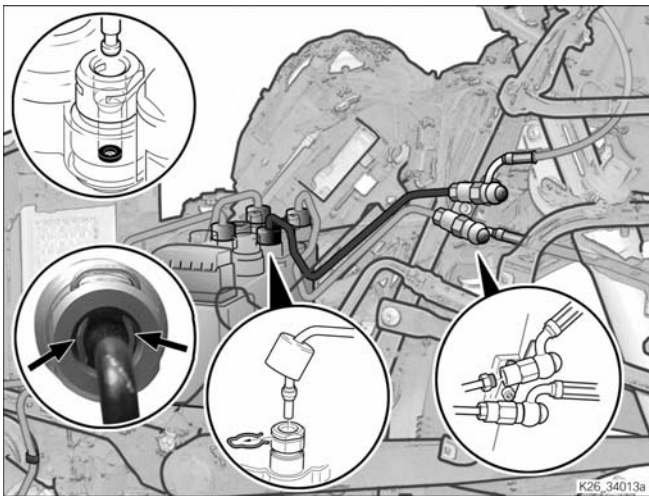
- Release the pipe fastener at the distributor.
- Push the protective cap up.
- Remove the spring clip.

⚠ Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

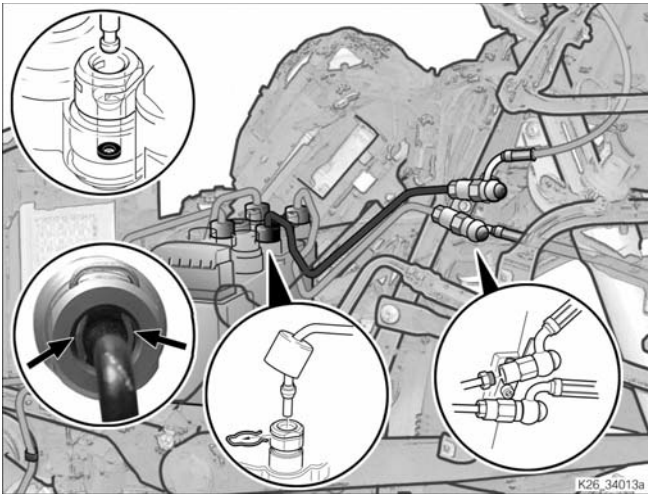


- Remove the brake pipe.

🚫 Warning

Nature: Connecting a new brake pipe to the pressure modulator using an old square-section ring can result in leaks.

Avoidance: When a brake pipe is replaced, always fit a new square-section ring in the pressure modulator.



- Using disassembly tool (No. 34 2 561) , remove the square-section ring from the brake-pipe bore in the pressure modulator.
 - Install a **new** square-section ring with the brake pipe.
- **Installing brake pipe, front control circuit**

⚠ Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Thread the brake pipe into position.
- Tighten the pipe fastener at the distributor until hand-tight.
- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.

🚫 Warning

Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.

- Install **new** spring clips.
- Seat the brake pipe in the clips.
- Check that the spring clips (**arrows**) are correctly seated.
- Seat the protective cap on the connector.
- Tighten the pipe fastener at the distributor.

🔧 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

◀ **(-) Filling front control circuit**

🚫 Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

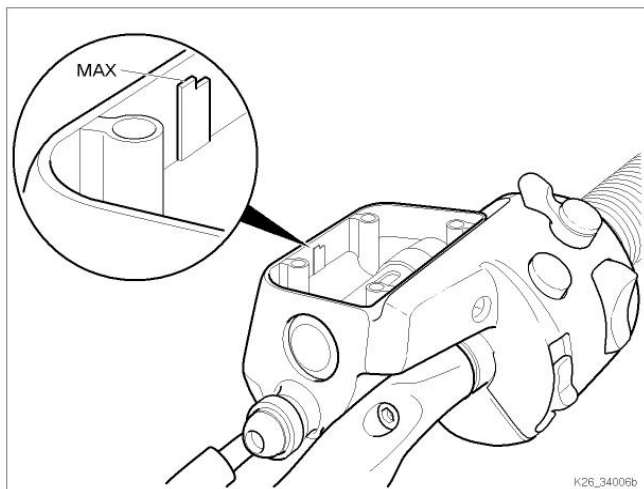
Avoidance: Use only new brake fluid from freshly opened containers.




Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



- Top up the brake fluid level to the (MAX) mark.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

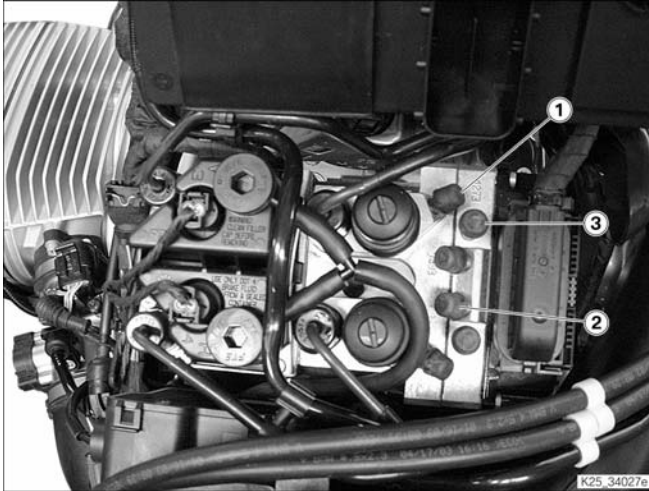


Warning

Nature: Air can be drawn into the system through

the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.



- Set the handbrake lever to the position for maximum span.

Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) of the front metering cylinder, but **do not switch on**.

Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

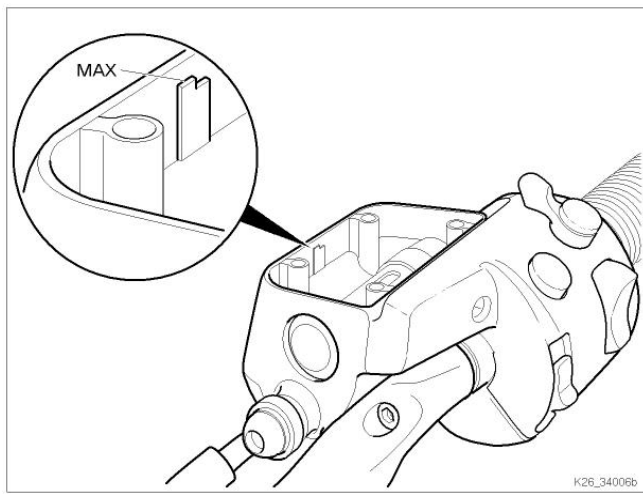
- In the following sequence, bleed:
 - front metering cylinder (1)
 - front integral circuit (2)
 - front control circuit (3) and
 - front metering cylinder (1) again in accordance with instructions for bleeding and using special ring spanner (No. 34 2 532)

► Instructions for bleeding

- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



- Fit the protective caps on the bleed screws.
- Top up the brake fluid to the (MAX) mark.
- Wipe the rim of the reservoir, the diaphragm and the cover to remove brake fluid, and carefully re-assemble the components.

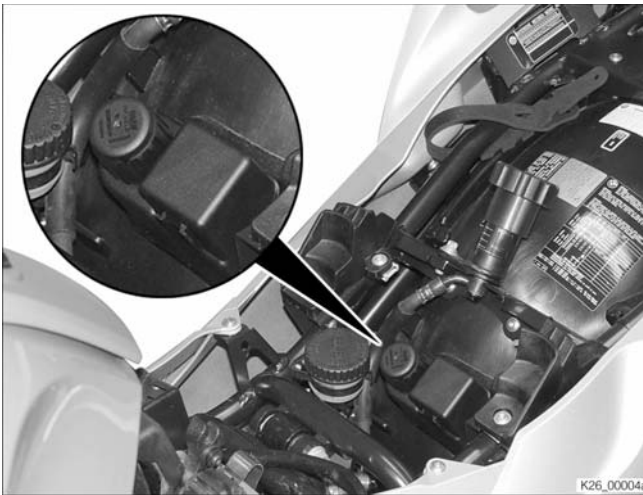


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



Warning

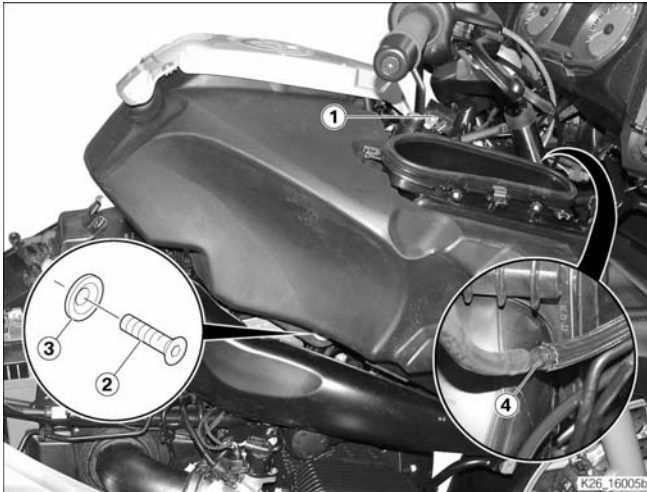
Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always

operate the brakes slowly. Do not pump quickly or vigorously.

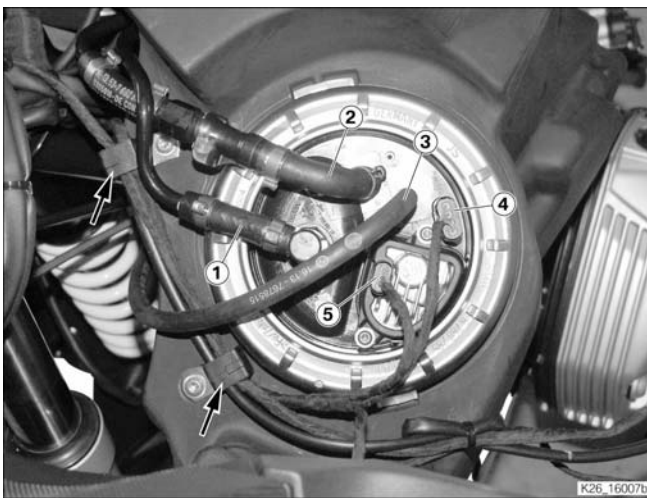
- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

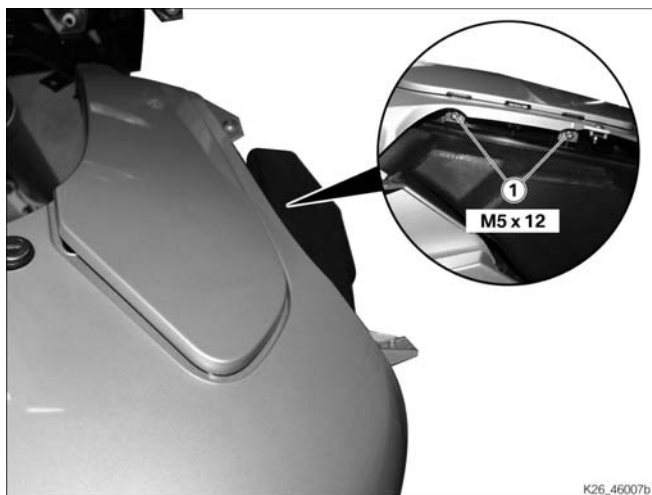
- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

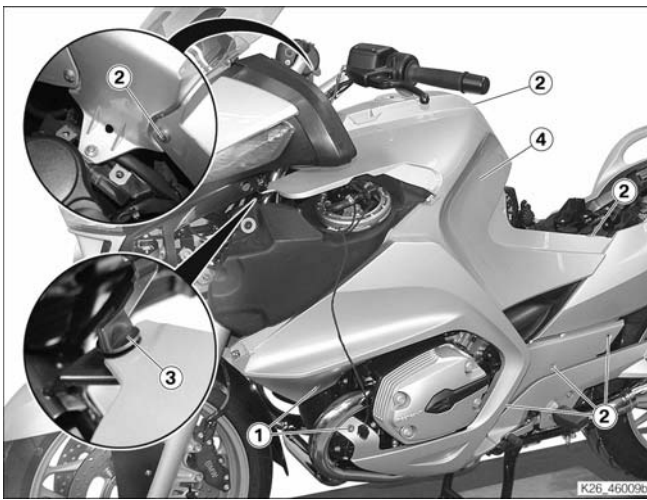
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

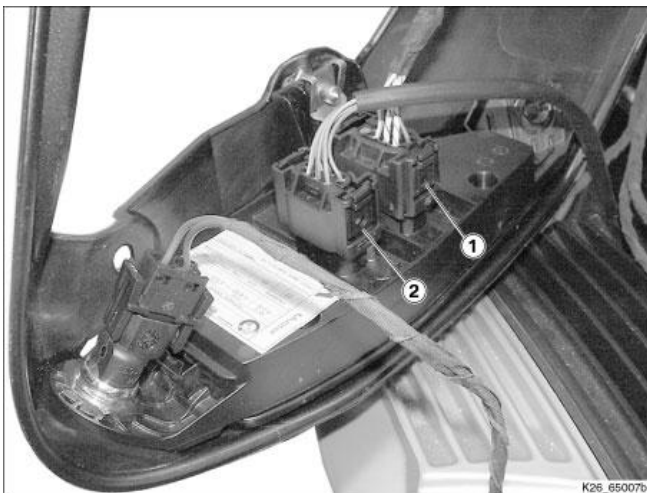
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



K26_46012b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **34 32 044 Replacing front ABS brake pipe from pressure modulator**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

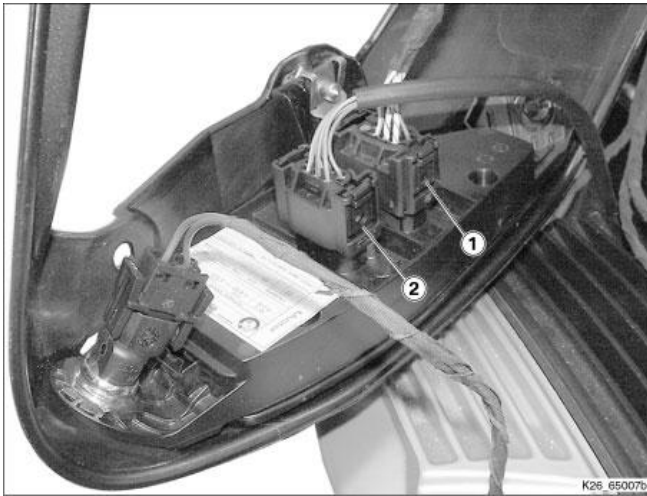


- Disconnect plug (1) from socket.

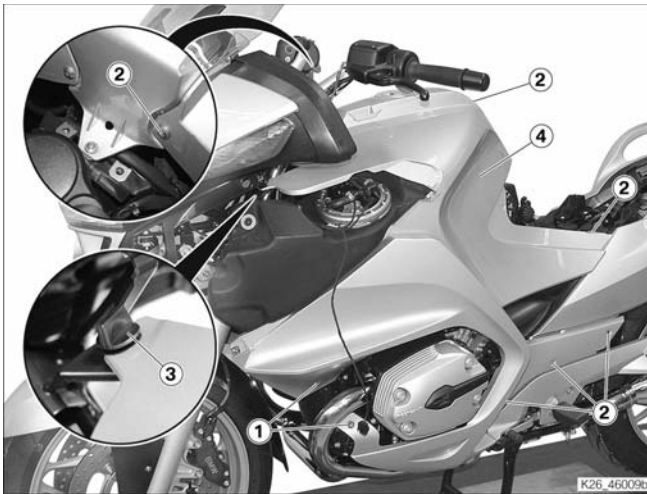


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

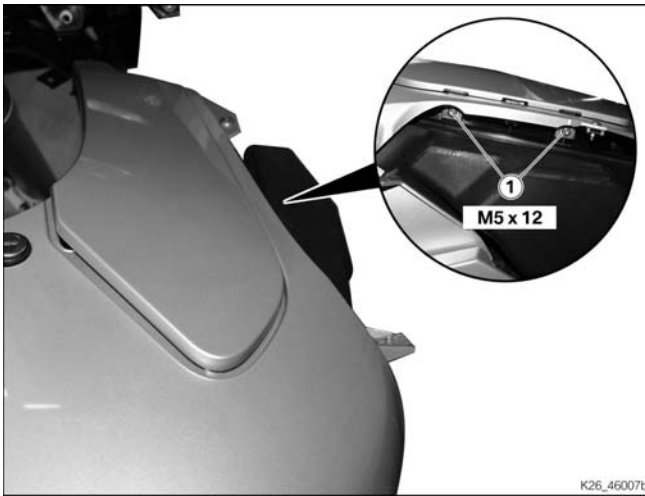
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



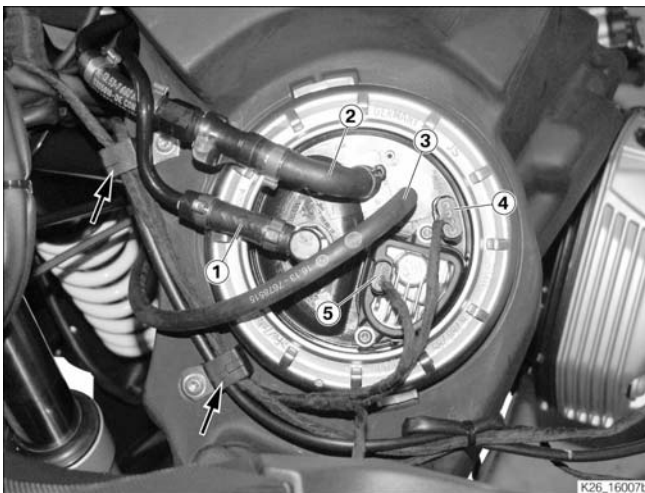
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

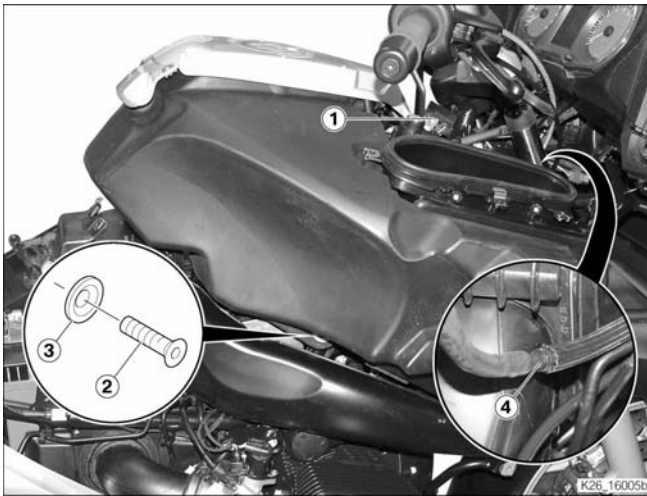


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Draining front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

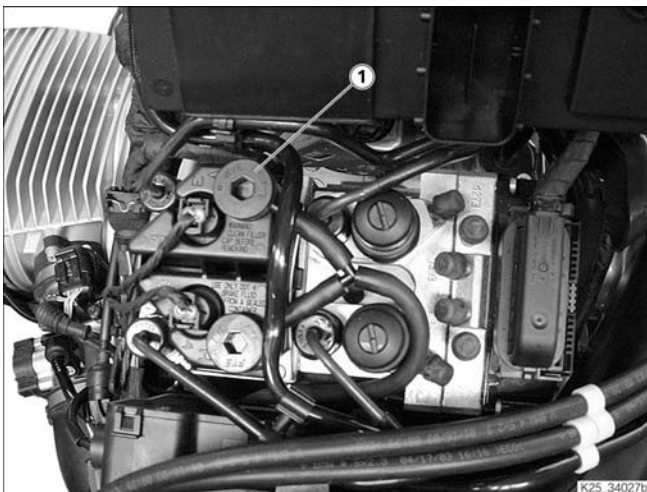
Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside



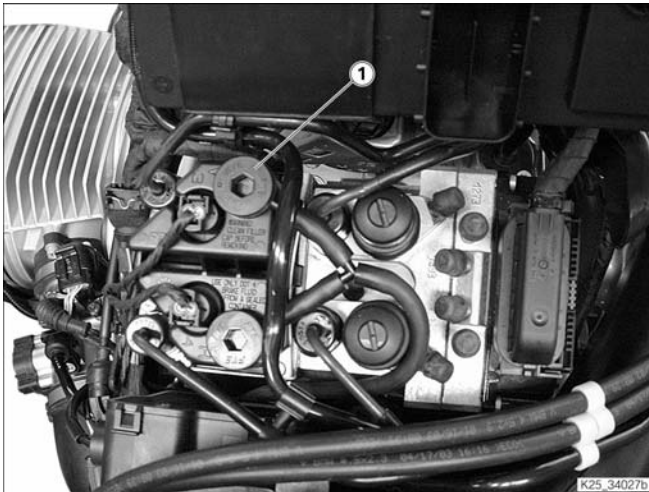
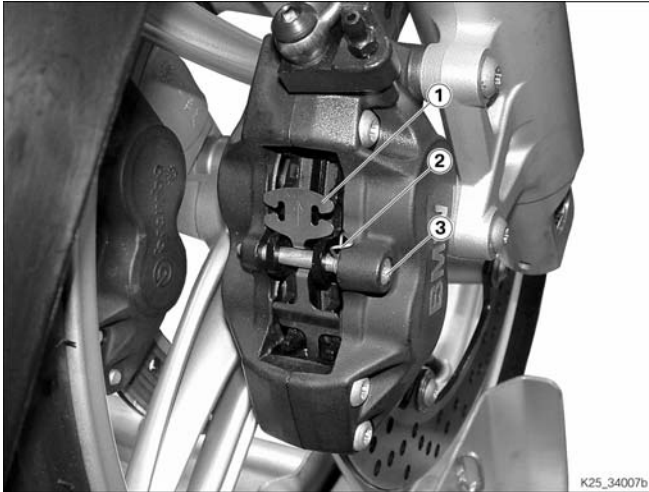
the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

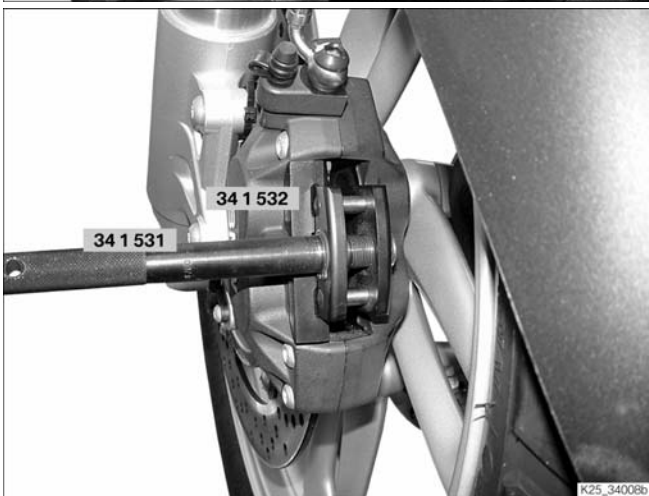
- Open wheel-circuit reservoir (1).

► **Removing front brake pads**

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Using piston resetting device (No. 34 1 531) and locator (No. 34 1 532), force the pistons of the brake caliper fully back, and secure them in this position.



- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Repeat this procedure with the second brake caliper.



Note

Drain the brake system only to the extent necessary for the tasks in question to be performed.

(-) Replacing brake pipe, front wheel circuit

► Removing brake pipe, front wheel circuit

- Release the pipe fastener at the distributor.
- Push the protective cap up.
- Remove the spring clip.

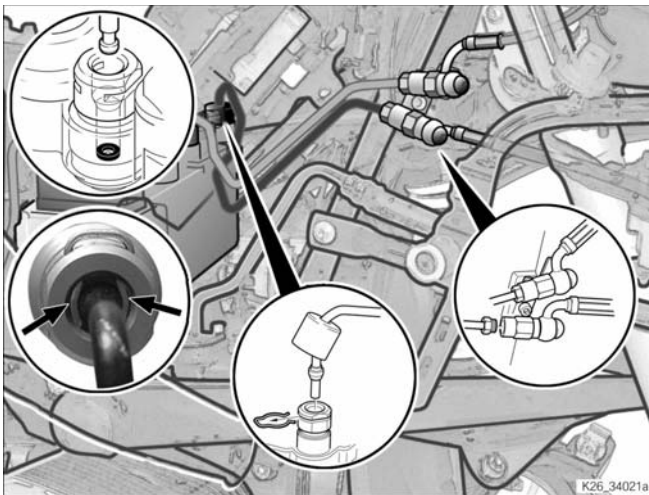


Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.



- Remove the brake pipe.



Warning

Nature: Connecting a new brake pipe to the pressure modulator using an old square-

section ring can result in leaks.

Avoidance: When a brake pipe is replaced, always fit a new square-section ring in the pressure modulator.

- Using disassembly tool (No. 34 2 561) , remove the square-section ring from the brake-pipe bore in the pressure modulator.
- Install a **new** square-section ring with the brake pipe.

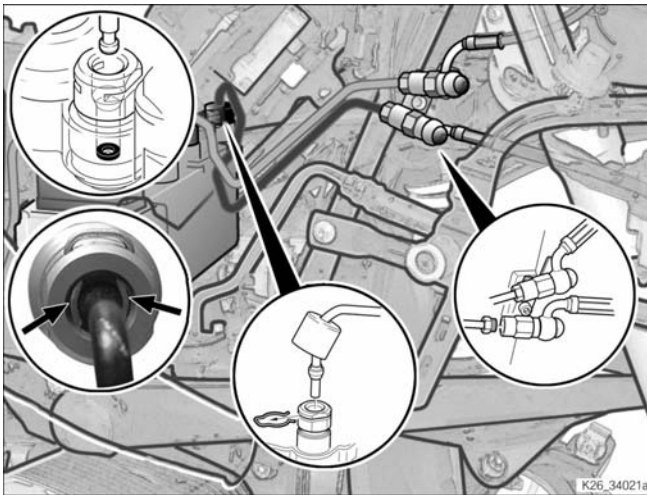
► **Installing brake pipe, front wheel circuit**

 **Attention**

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.




- Thread the brake pipe into position.
- Tighten the pipe fastener at the distributor until hand-tight.
- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.

 **Warning**

Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.

- Install **new** spring clips.
- Seat the brake pipe in the clips.
- Check that the spring clips (**arrows**) are correctly seated.
- Seat the protective cap on the connector.
- Tighten the pipe fastener at the distributor.

 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	



(-) Filling front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

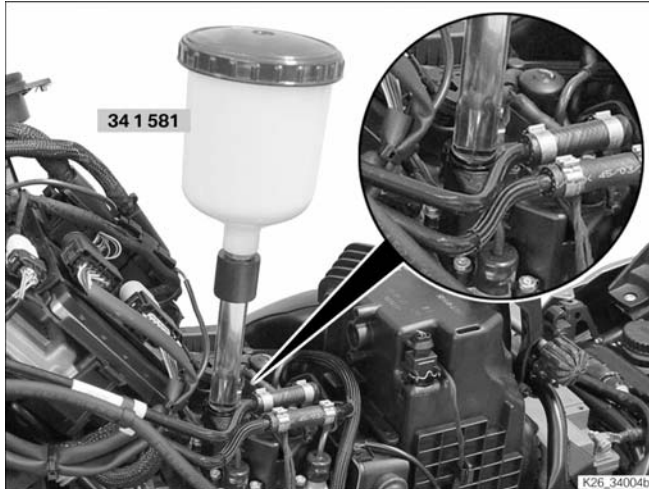
Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside

the housing and causing damage.


Avoidance: Do not disconnect the plugs from the pressure modulator.



- Wrap cloths around the left and right brake callipers.
- Use piston resetting device (No. 34 1 531) and locator (No. 34 1 532) to force the pistons in the left and right brake callipers all the way back and hold them in this position.



- Screw container (No. 34 1 581) onto front wheel circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/2 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw of the right brake calliper, but **do not switch on**.
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.




Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake

calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note


The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- Continue pumping off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.

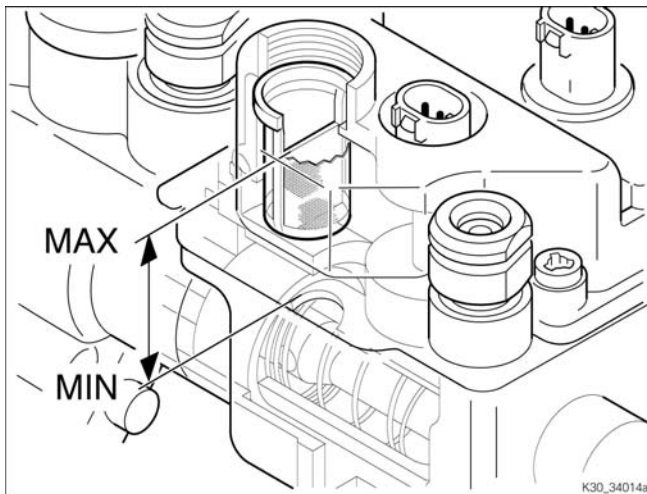
 Tightening torques		
Front brake calliper bleed screw	5 Nm	

- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Connect the brake bleeding device to the bleed screw of the left brake calliper, but **do not switch on**.

- If necessary, use a cable tie to secure the hose of the brake bleeding device to the bleed screw.
- The procedure for changing the brake fluid in the left brake calliper is the same as that for the right calliper.
- When the fluid exits clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

- Release the brake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the **MAX** mark.

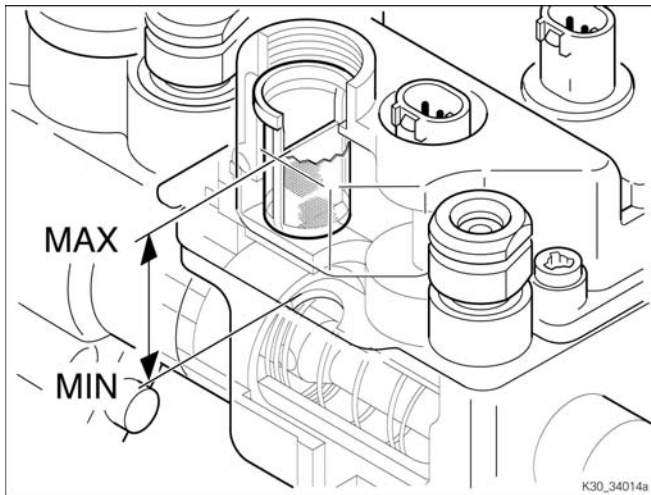
► **Instructions for filling front wheel circuit reservoir**

Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.


Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Make sure that the front wheel-circuit reservoir is topped up to the "MAX" mark.
- Install adapter 22 (No. 34 1 533) in piston resetting device (No. 34 1 531) and locator (No. 34 1 532) in both front brake callipers and **fully compress** them until the adapter cannot move.
- Switch on the ignition.
- Pull handbrake lever until the pistons of the front brake callipers are in contact with piston resetting device



(No. 34 1 531) .

- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Hand-tighten the cap of the wheel-circuit reservoir.
- Using piston resetting device (No. 34 1 531) , force the brake pistons all the way back and remove, together with adapter 22 (No. 34 1 533) .
- Replace the front brake pads after removal, if necessary.

▷ Installing front brake pads




Warning

Nature: Greasing the backing plate can allow grease to make its way onto the friction pad and the brake disc.

Avoidance: Take care to grease only the rear and the trailing end face of the backing plate.

- Grease the rear and the trailing end face of the backing plate.

 Consumables/lubricants		
Never Seez compound	Protective grease	83 23 9 407 830

- Install the brake pads.



- Install spring (1) with the arrow pointing in the forward direction of travel.
- Install screw (3).
- Install retainer (2).

Tightening torques	
Grub screw, brake pads	7 Nm



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

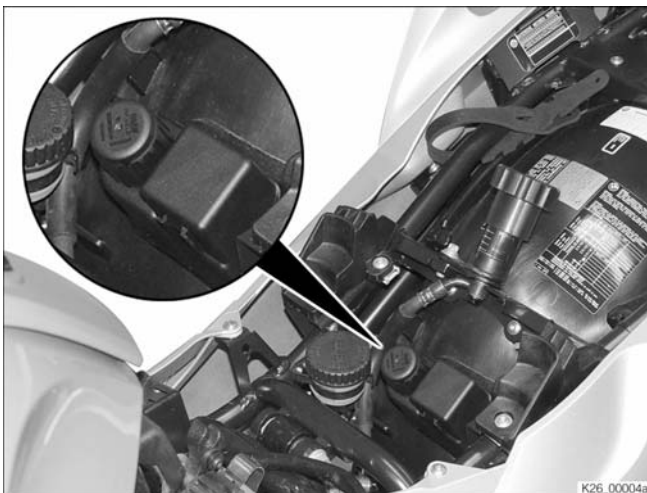
- Check operation of the brake system with the ignition switched on.

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581), (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



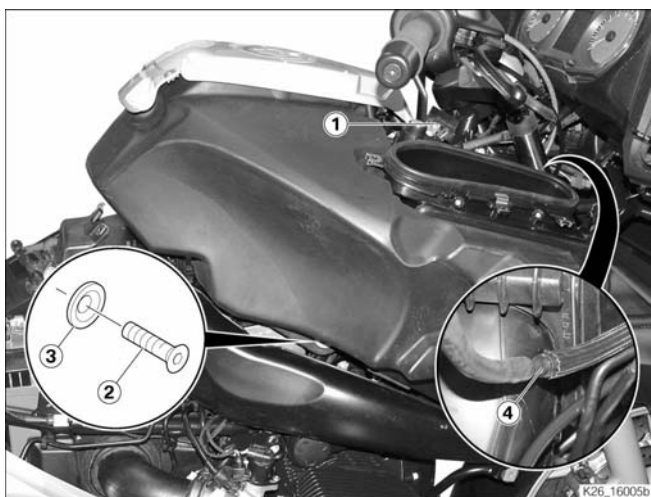
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

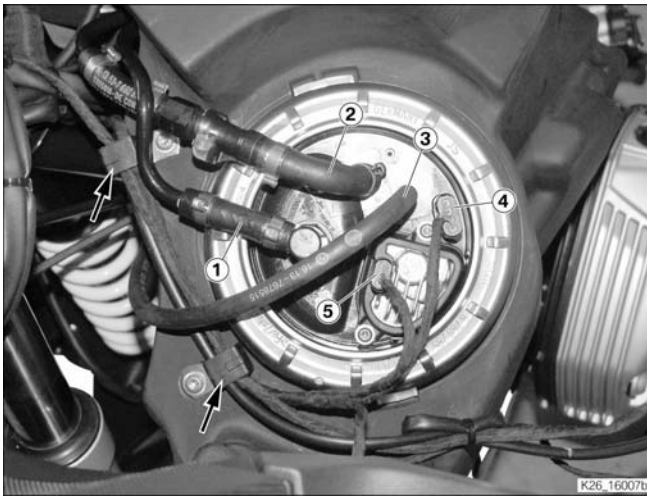
Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and



force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

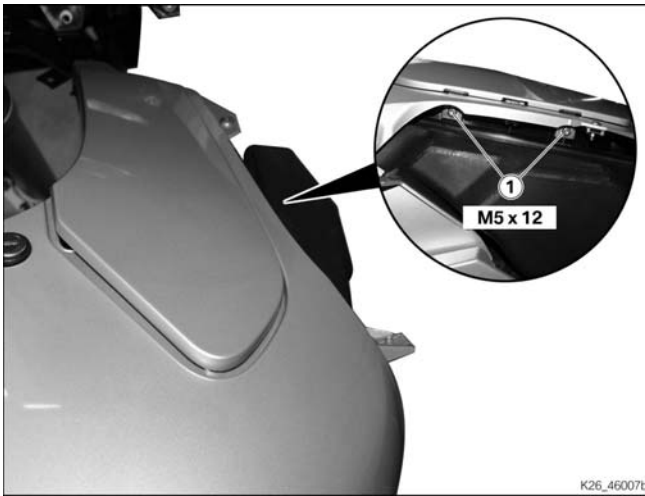
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.



- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **34 32 050 Replacing rear ABS brake pipe to pressure modulator**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_46016a

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



K26_52002b

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



K26_52001b

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

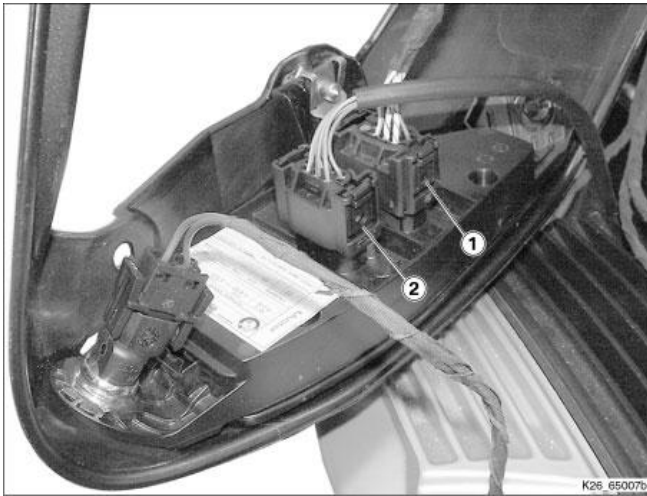


- Disconnect plug (1) from socket.

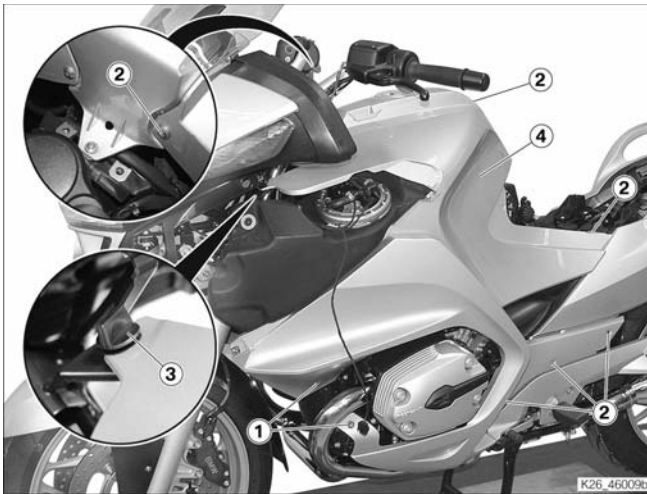


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

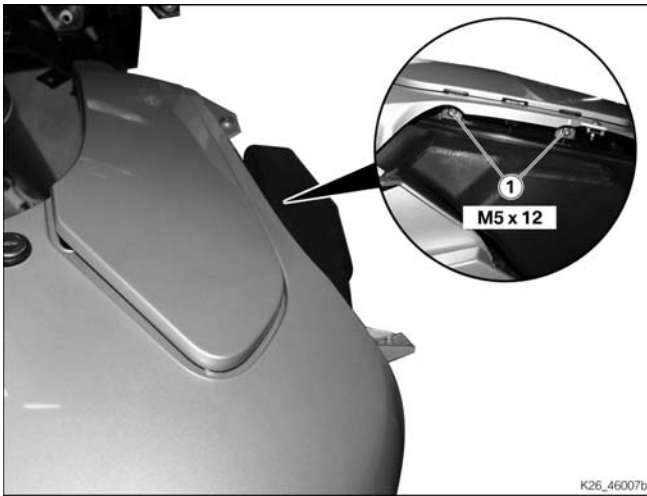
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



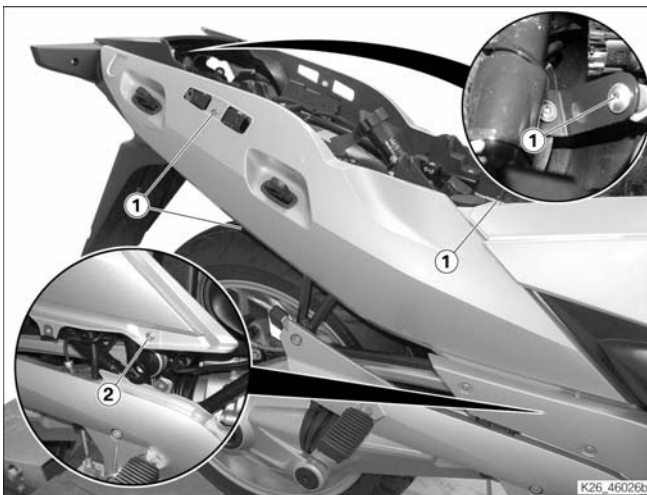
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



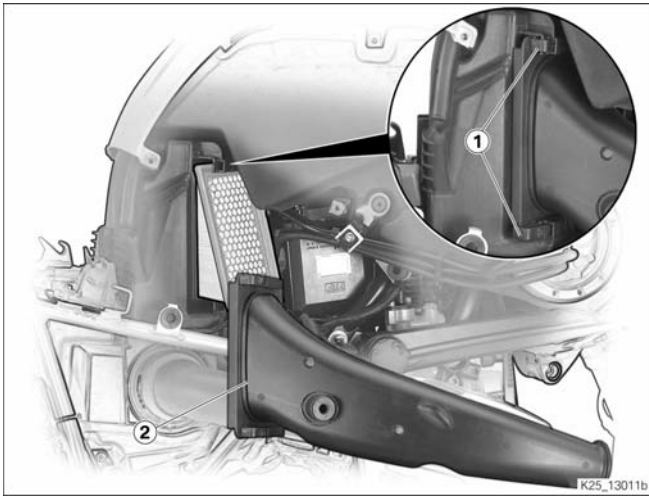
(-) Removing rear right trim panel

- Remove screw (2).



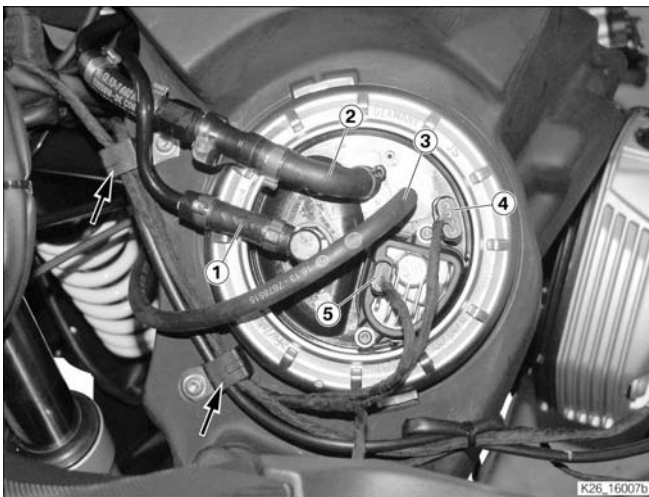
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.

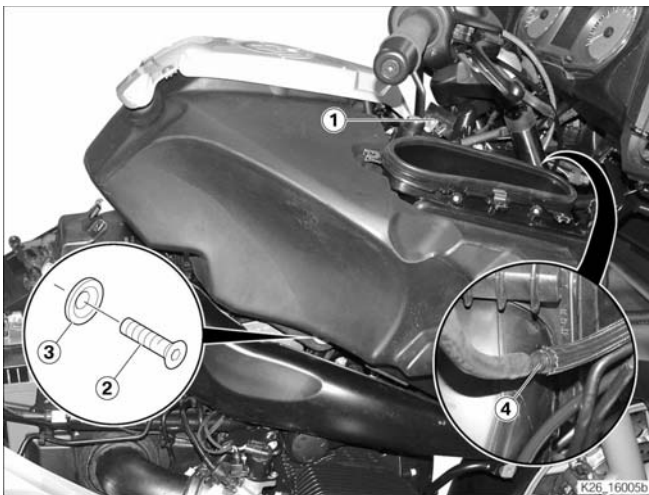


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

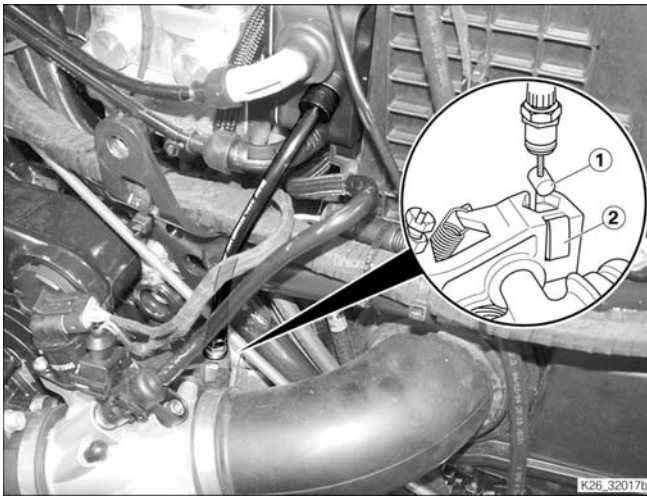


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing Bowden cables of throttle-valve stubs

- Disengage Bowden cable (1) from the right-hand throttle valve.
- Using a suitable tool, press back retaining plate (2) from above just far enough to allow the Bowden cable (1) to be pulled up and removed.



(-) Draining rear control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



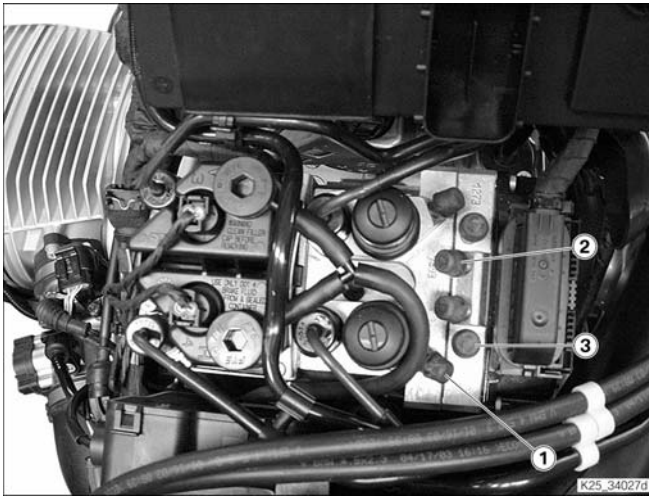
Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Remove the cap of the brake fluid reservoir and remove the rubber diaphragm.
- Draw off the brake fluid.



⚠ Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) on the rear metering cylinder.
- Draw off the brake fluid from the circuits in the correct sequence, using ring spanner (No. 34 2 532) :



Note

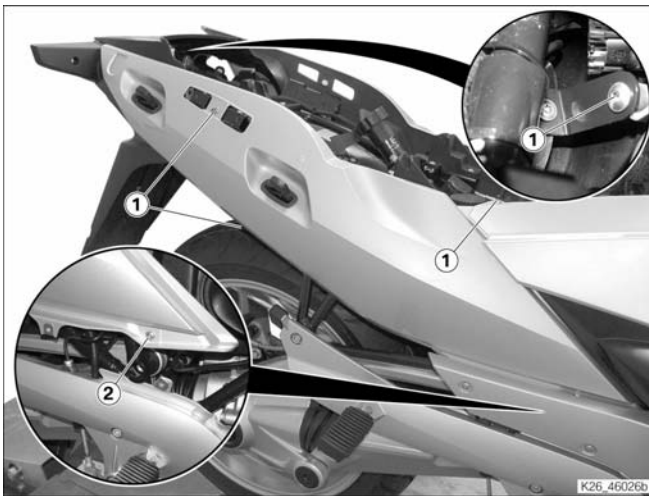
The pressure modulator has to be fully drained if it is to be removed/replaced. It is sufficient to drain the control circuit for all other tasks.

- rear metering cylinder (1)
- rear integral circuit (2)
- rear control circuit (3).

(-) Replacing brake pipe, rear control circuit

► Removing brake pipe, rear control circuit

- Remove screw (2).



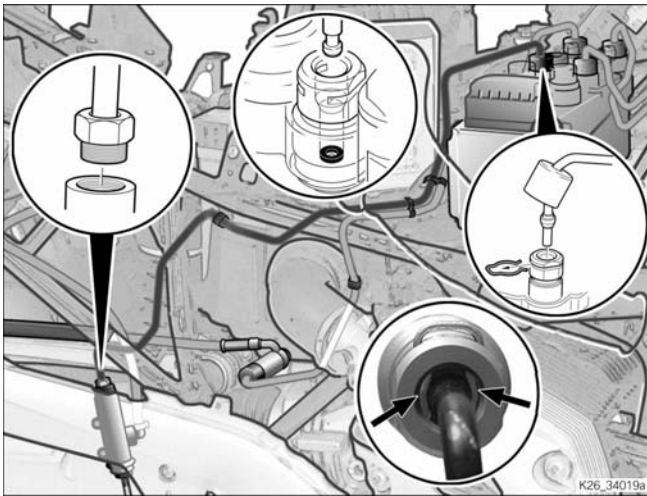
- Release pipe fastener at rear brake master cylinder.
- Push the protective cap up.
- Remove the spring clip.

⚠ Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make



sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Open the retaining clips and remove the brake pipe.



Warning

Nature: Connecting a new brake pipe to the pressure modulator using an old square-section ring can result in leaks.

Avoidance: When a brake pipe is replaced, always fit a new square-section ring in the pressure modulator.

- Using disassembly tool (No. 34 2 561), remove the square-section ring from the brake-pipe bore in the pressure modulator.
- Install a **new** square-section ring with the brake pipe.

► Installing brake pipe, rear control circuit



Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

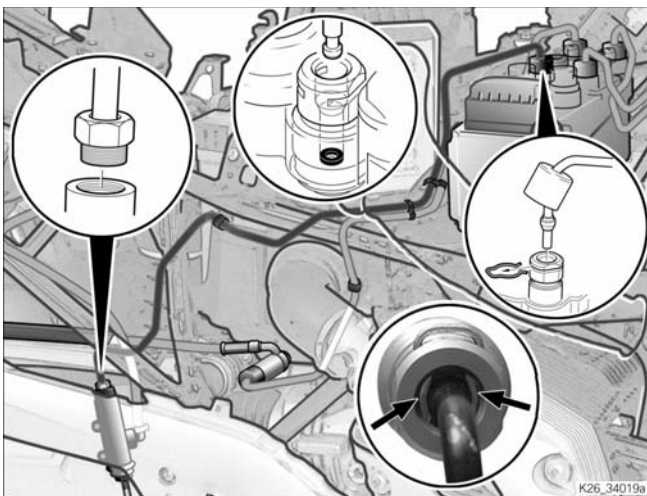
When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Thread the brake pipe into position.
- Tighten the pipe fastener at the master brake cylinder until hand-tight.
- Push the protective cap onto the brake pipe.
- Check that the square-section ring is correctly seated.



Warning


Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure



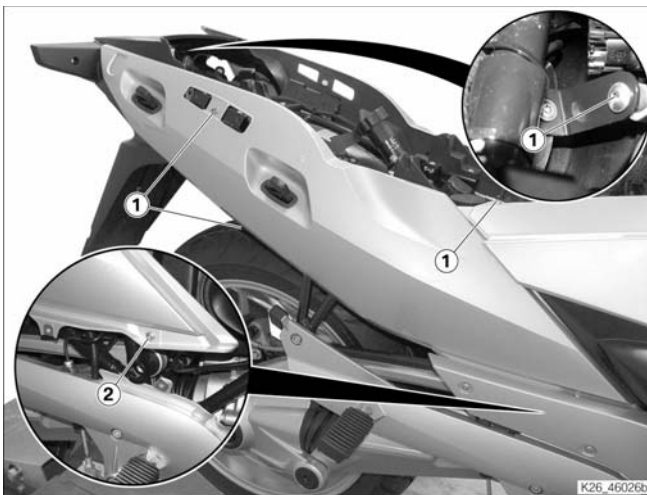
contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.

- Install **new** spring clips.
- Seat the brake pipe in the clips.
- Check that the spring clips (**arrows**) are correctly seated.
- Seat the protective cap on the connector.
- Tighten the pipe fastener at the master brake cylinder.

 Tightening torques		
Brake pipes and hoses to components, M10 x 1	18 Nm	
Brake pipes and hoses to components, M12 x 1	18 Nm	

- Press the brake pipes into the retaining clips.
- Install screw (2).



◀ **(-) Filling rear control circuit**



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.

 **Warning**

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.


 **Warning**

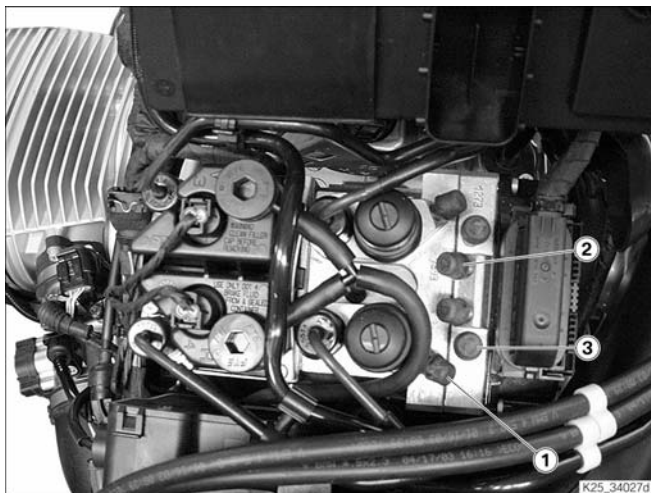
Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



- Top up the brake fluid level to the (MAX) mark.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



 **Warning**

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.

 **Attention**

Nature: If plugs are disconnected from the pressure modulator, there is a possibility

of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

-
- Connect the brake bleeding device to bleed screw (1) of the rear metering cylinder, but do not switch on.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

-
- In the following sequence, bleed:
 - bleed screw (1) rear metering cylinder
 - bleed screw (2) rear integral circuit
 - bleed screw (3) rear control circuit, and
 - for the second time, bleed screw (1) rear metering cylinder in accordance with instructions for bleeding and using special ring spanner (No. 34 2 532) .

► Instructions for bleeding

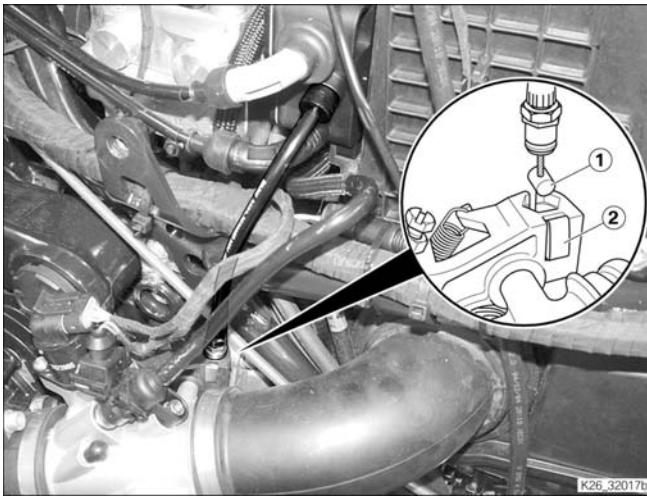
- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



- Fit the protective caps on the bleed screws.
- Top up the brake fluid level to the (MAX) mark.
- Wipe the rim of the reservoir, the diaphragm and the cap to remove brake fluid, and carefully re-assemble the components.

(-) Installing Bowden cables of throttle-valve stubs

- Using a suitable tool, press back retainer (2) from above just far enough to allow Bowden cable (1) to be inserted.
- Engage Bowden cable (1) in the throttle valve.

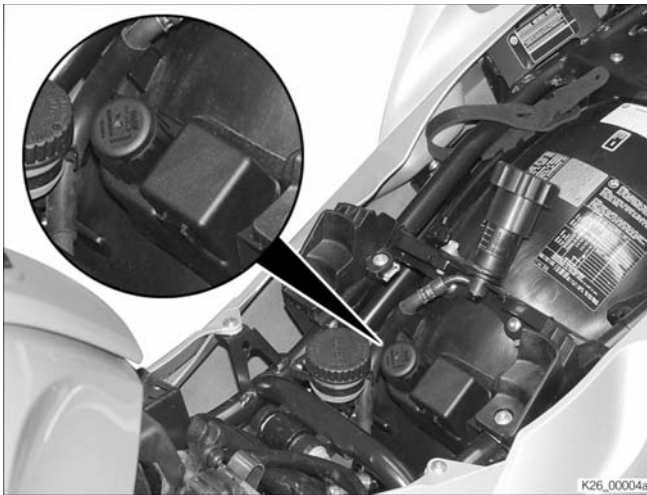


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



Warning

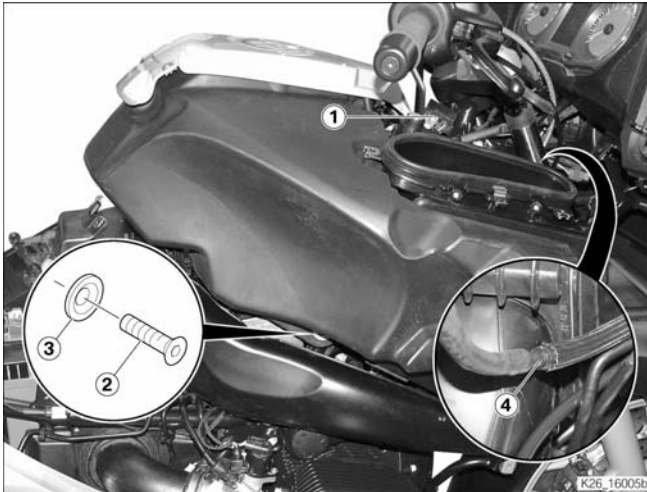
Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always

operate the brakes slowly. Do not pump quickly or vigorously.

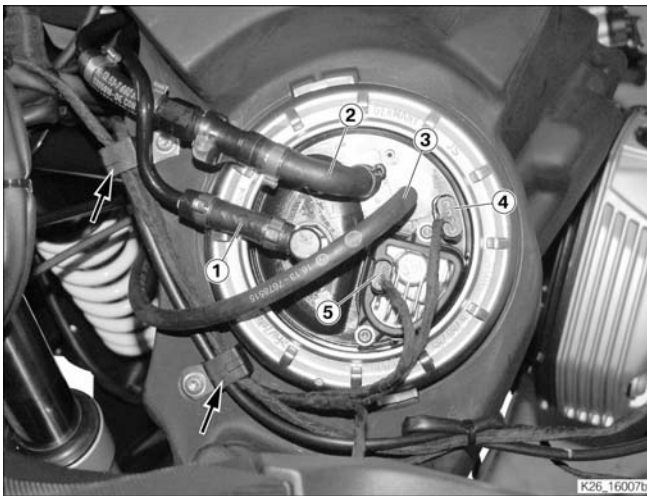
- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

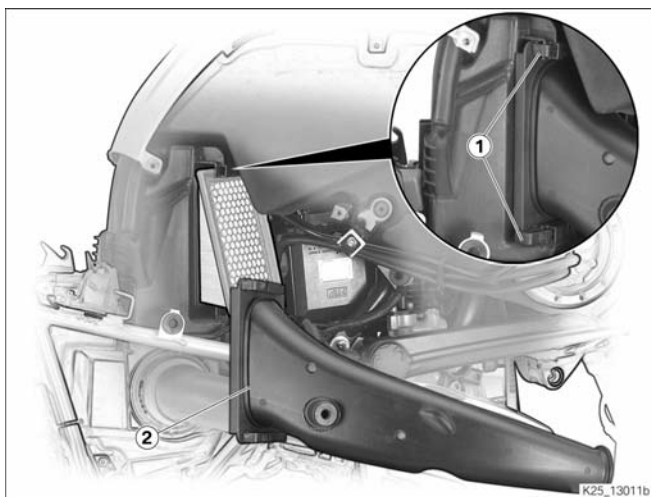
- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

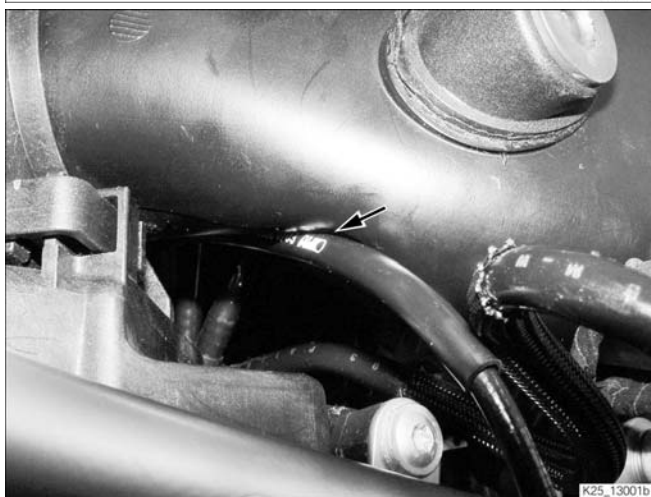
- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

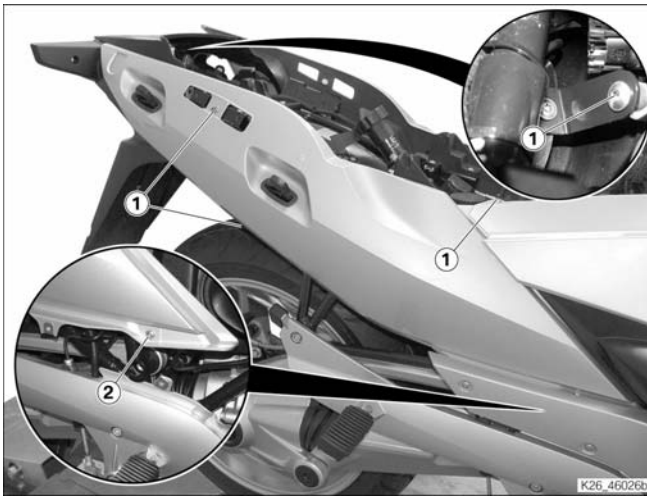


- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.



(-) Securing rear right trim panel

- Install screw (2).



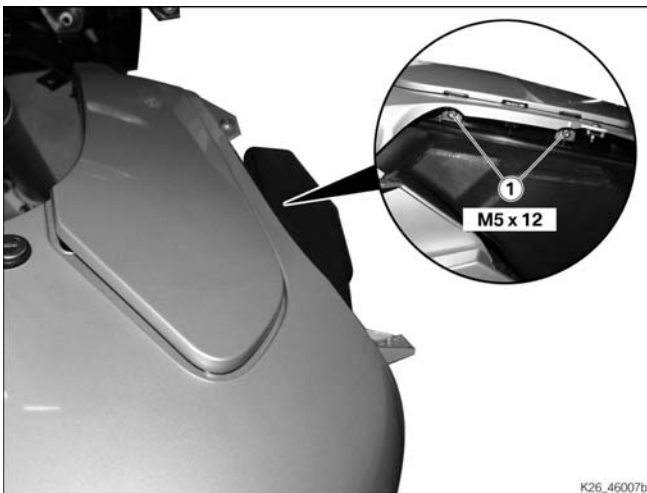
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



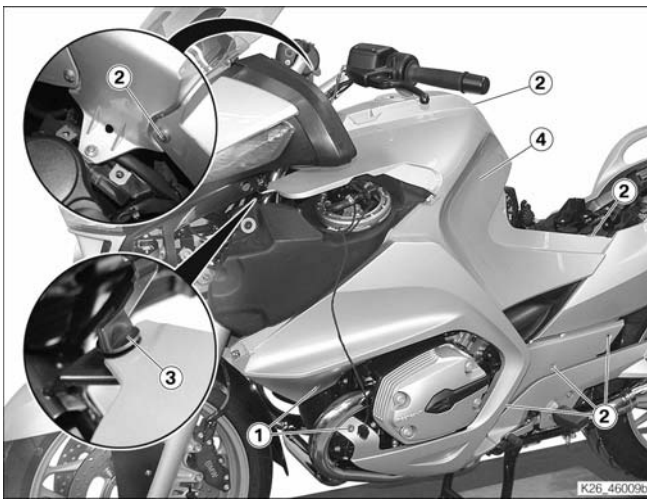
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

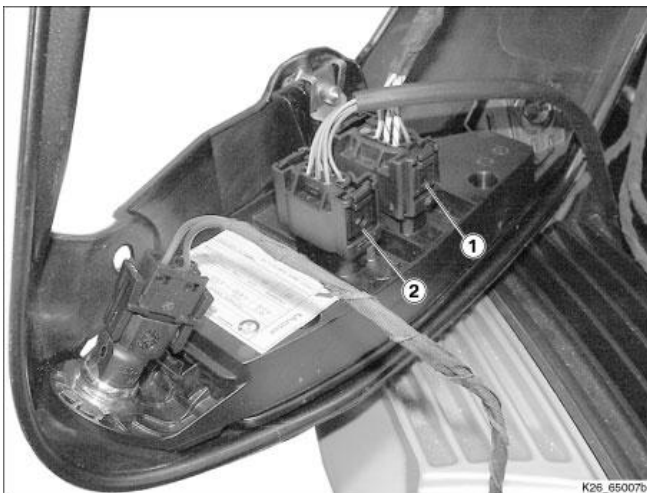
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **34 32 051 Replacing rear ABS brake pipe from pressure modulator**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

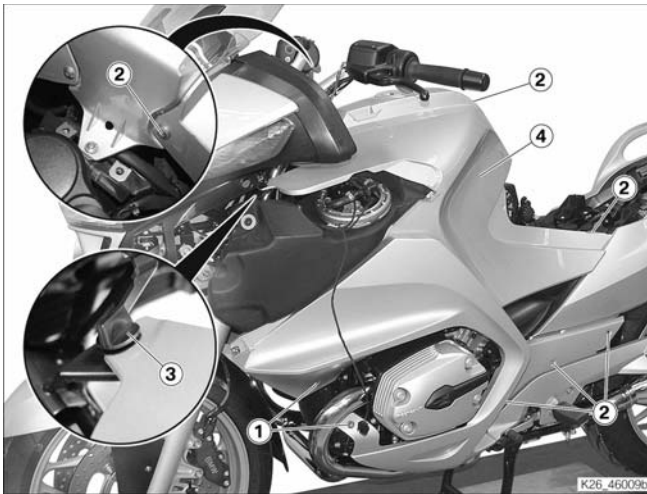


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

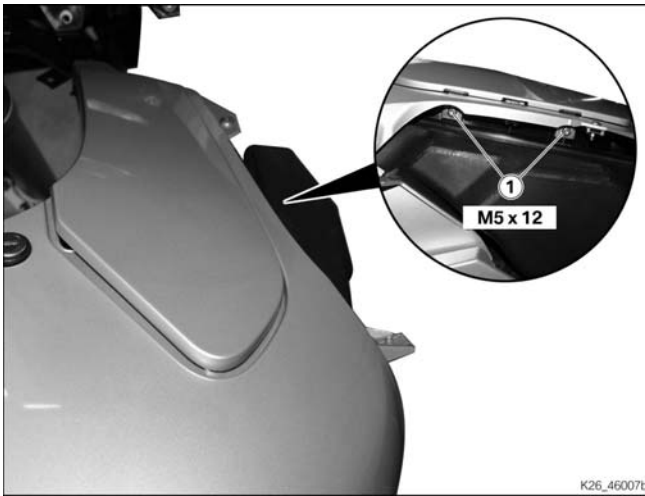
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



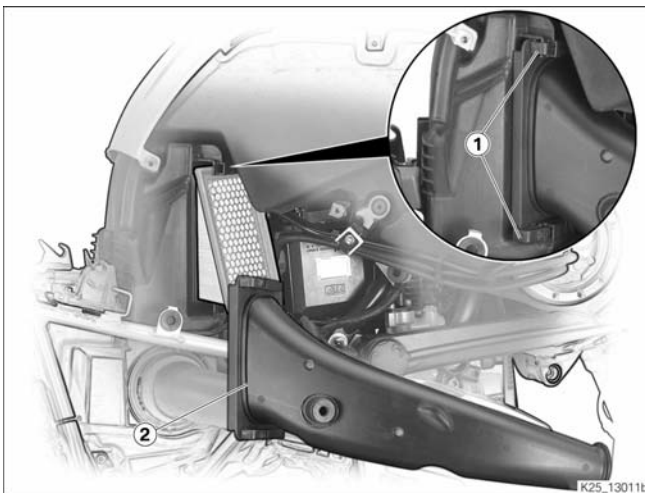
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



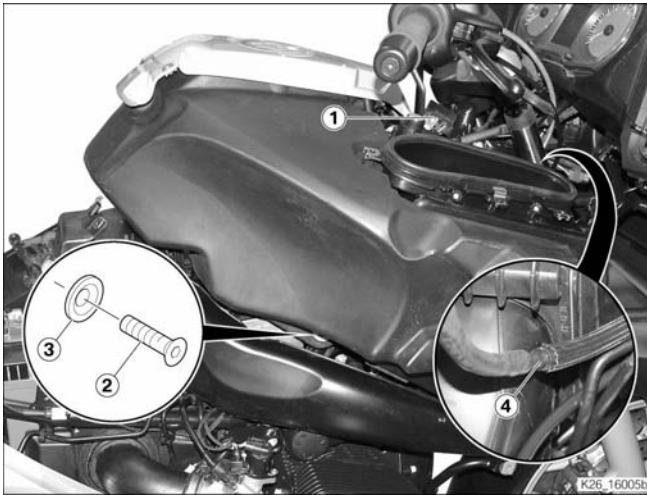
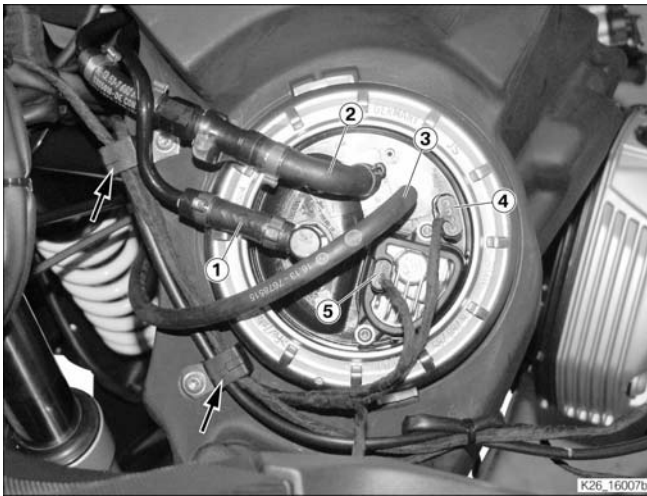
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing air intake pipe

- Use pliers (No. 13 1 512) to open the clips on the intake air silencer and the throttle-valve stub.
- Pull the intake pipe off the intake air silencer and the throttle-valve stub and remove.

(-) Draining rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.

! Attention

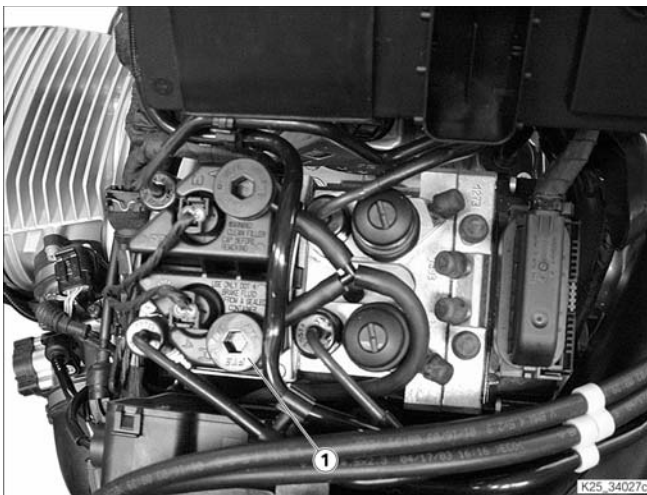
Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

! Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

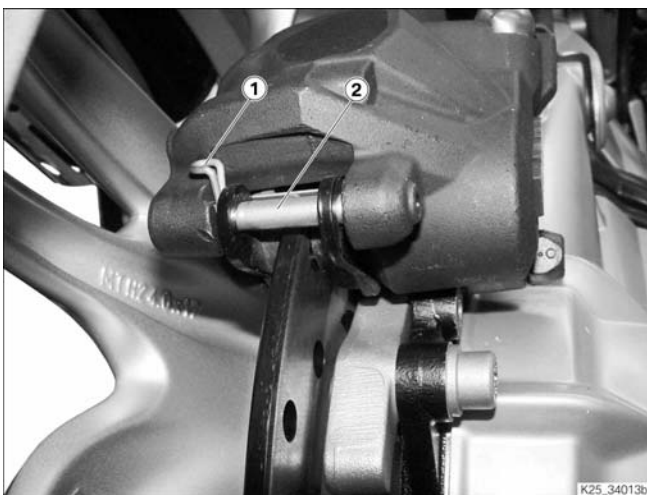
Avoidance: Do not disconnect the plugs from the pressure modulator.



- Open wheel-circuit reservoir (1).

► Removing rear brake pads

- Remove retainer (1).
- Drive retaining pin (2) out toward the wheel side.
- Remove the brake pads.

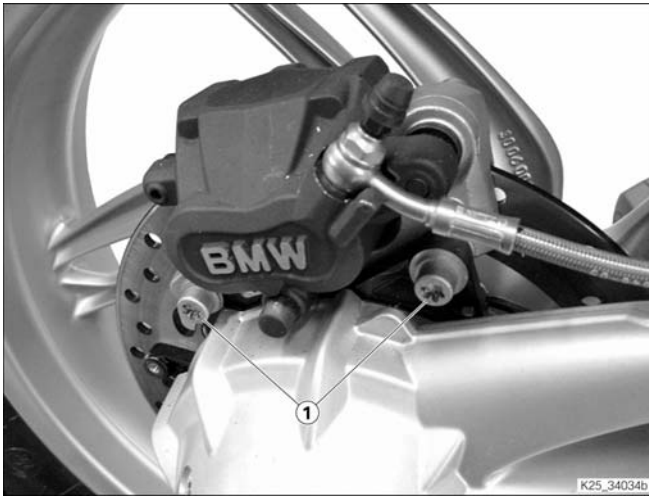


▷ Removing brake calliper

- Remove screws (1).

! Attention

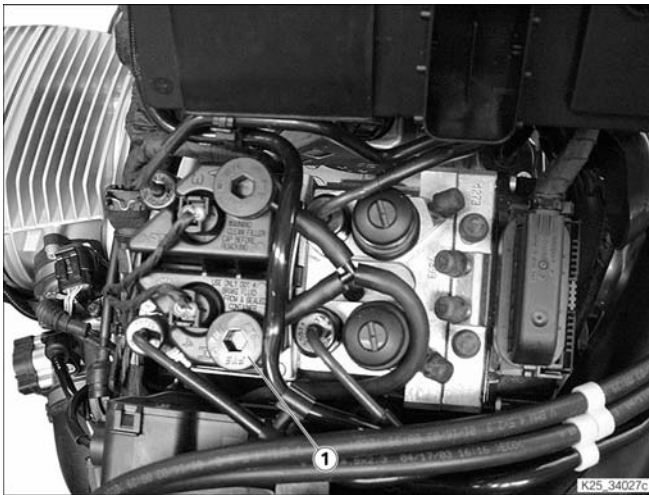
Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been



removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove the brake calliper.



- Using piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536), force the pistons of the brake caliper fully back, and secure them in this position.



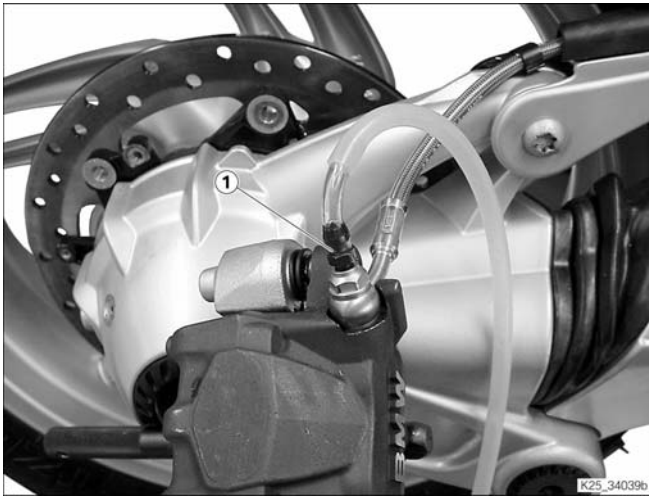
- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature:

Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL



BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.

(-) Replacing brake pipe, rear wheel circuit

► Removing brake pipe, rear wheel circuit

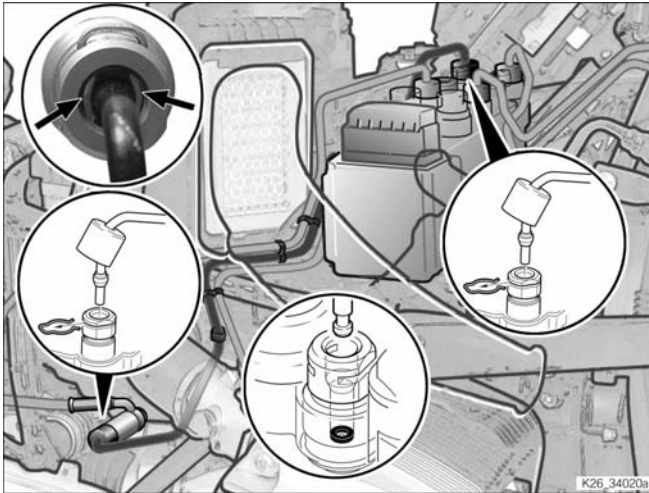
- Push the protective caps up.
- Remove the spring clips.

 **Attention**

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.



- Open the retaining clips and remove the brake pipe.

◀
 **Warning**

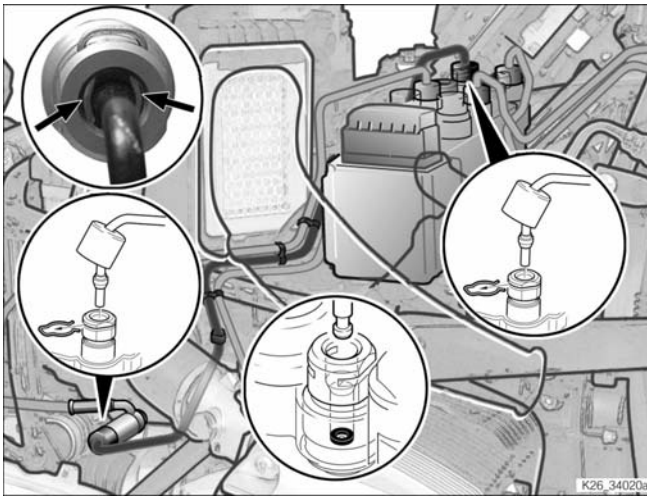
Nature: Connecting a new brake pipe to the pressure modulator using an old square-section ring can result in leaks.

Avoidance: When a brake pipe is replaced, always fit a new square-section ring in the pressure modulator.

- Using disassembly tool (No. 34 2 561), remove the square-section rings from the brake-pipe bore in the pressure modulator and the connector.
- Install **new** square-section rings with the brake pipe.

► Installing brake pipe, rear wheel circuit

 **Attention**



Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Thread the brake pipe into position.
- Push the protective caps onto the brake pipe.
- Check that the square-section rings are correctly seated.



Warning

Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.

- Install **new** spring clips.
- Seat the brake pipe in the clips on the connector and the pressure modulator.
- Check that the spring clips (**arrows**) are correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipes into the retaining clips.



(-) Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

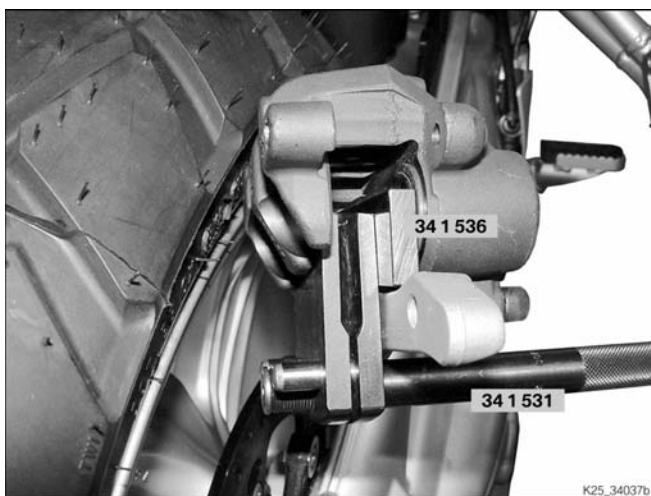
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

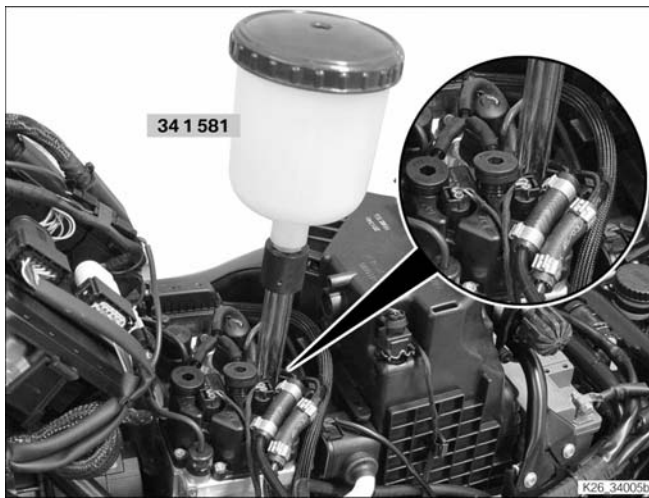
Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.




- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.

- Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.
-



Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.

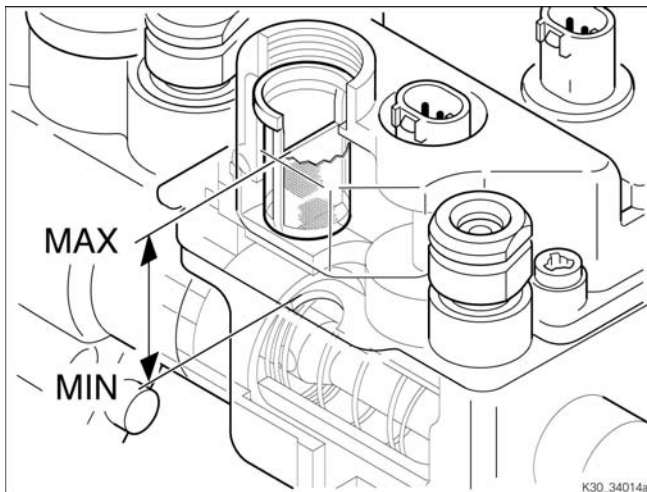


Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.



► Instructions for filling rear wheel circuit reservoir

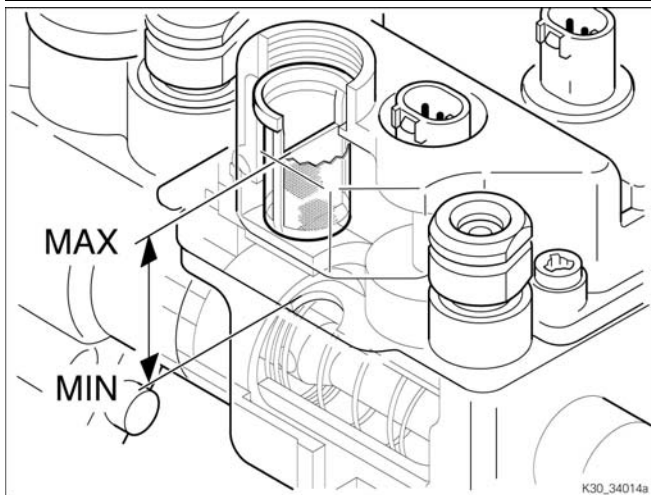
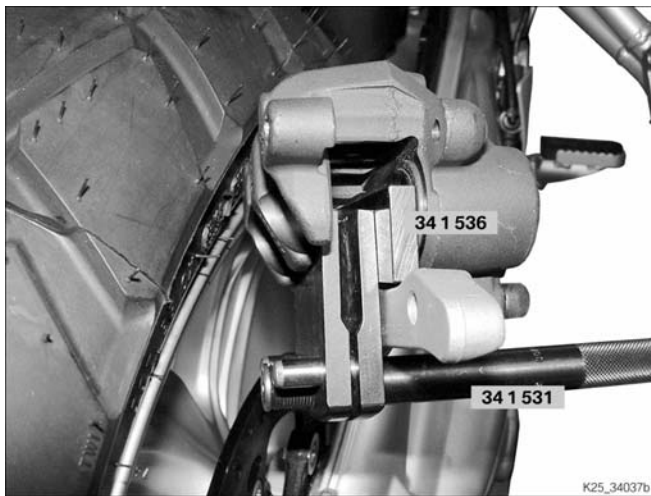
- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536), in the rear brake caliper.



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the



wheel-circuit reservoir must always be covered by the fluid.

- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

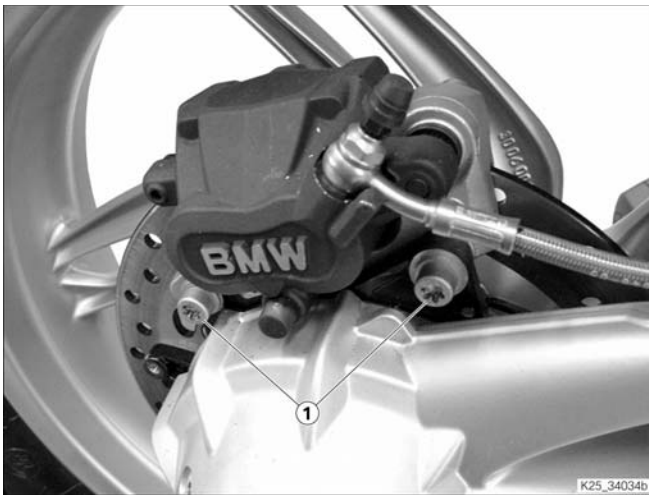
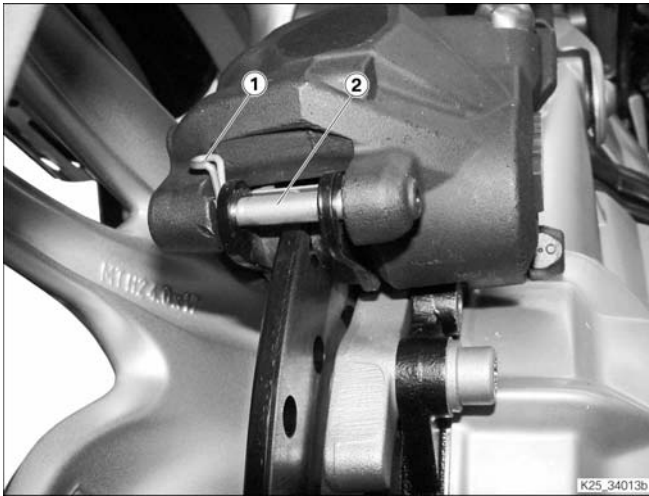


Consumables/lubricants

DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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- Hand-tighten the cap of the rear wheel-circuit reservoir.
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary
- ▷ **Installing rear brake pads**
- Check that spring (1) is correctly seated and installed right way round.
- » Arrow points in direction of travel.

- Install the brake pads.
- Manually install retaining pin (2).



▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

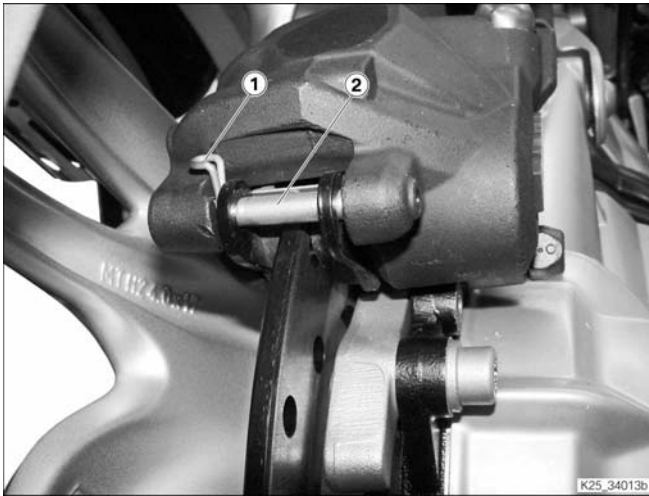
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



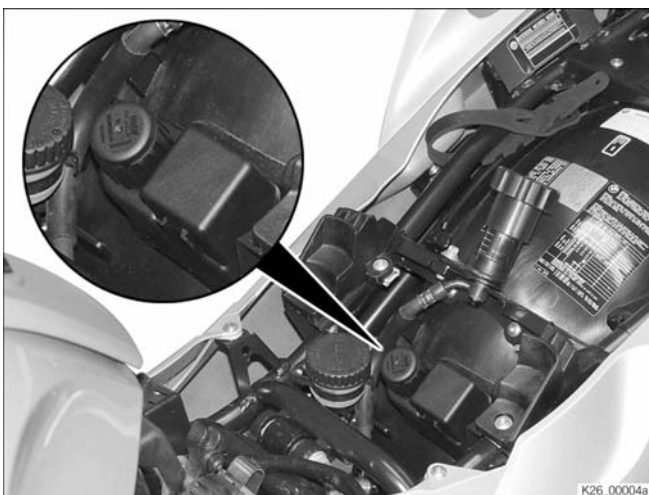
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Performing bleed test with the BMW Motorrad diagnostic system



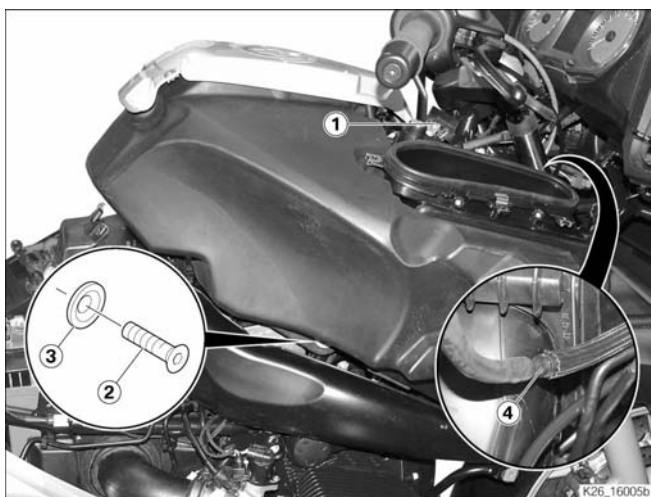
Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

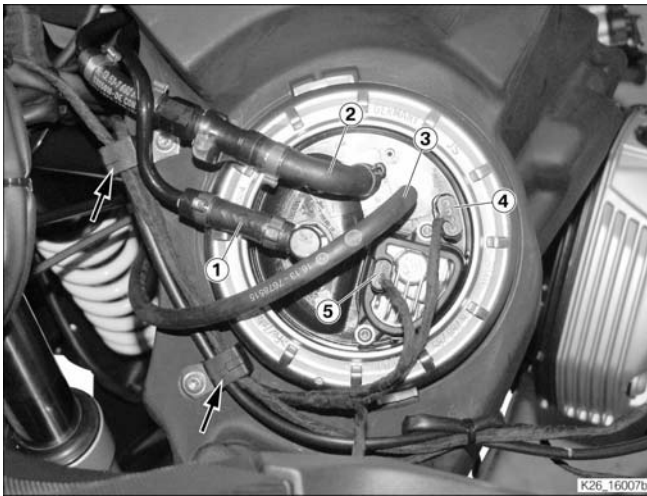
Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and



force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

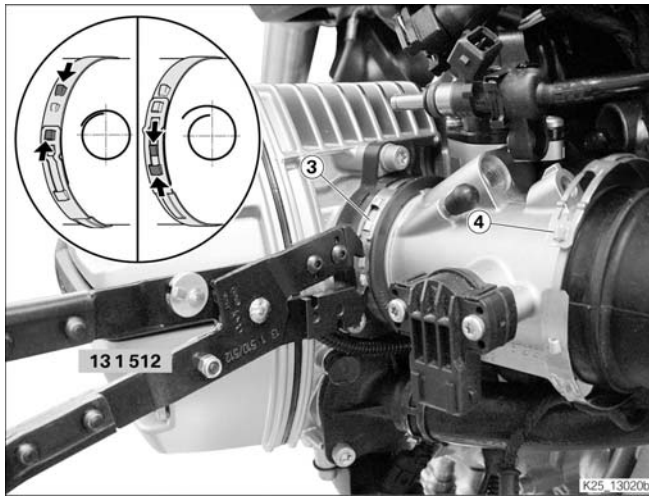
- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing air intake pipe

- Install the intake pipe between the intake air silencer and the throttle-valve stub.

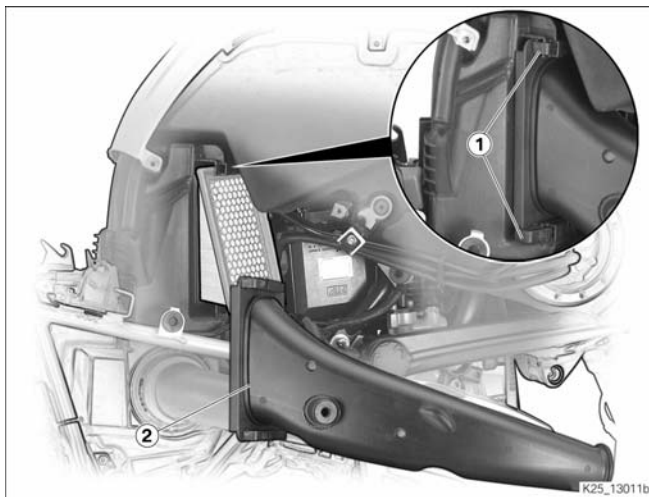


- Secure hose clips (4) on the throttle-valve stubs.
- Close hose clips with pliers (No. 13 1 512) .

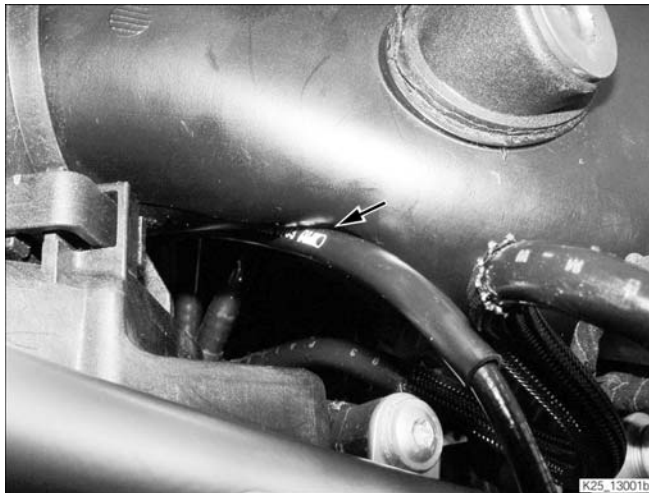


(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.



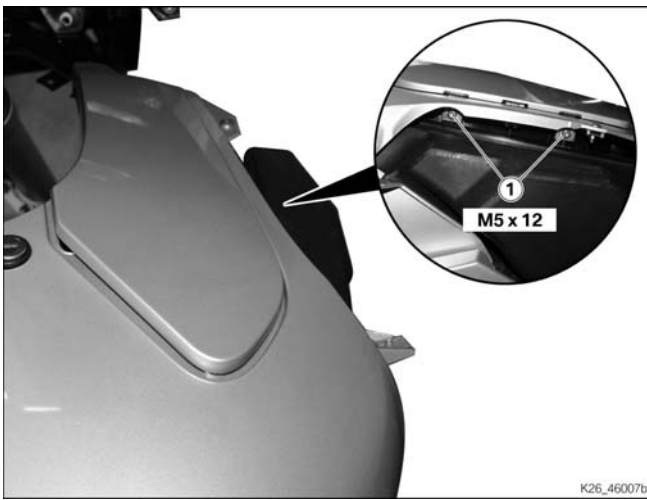
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



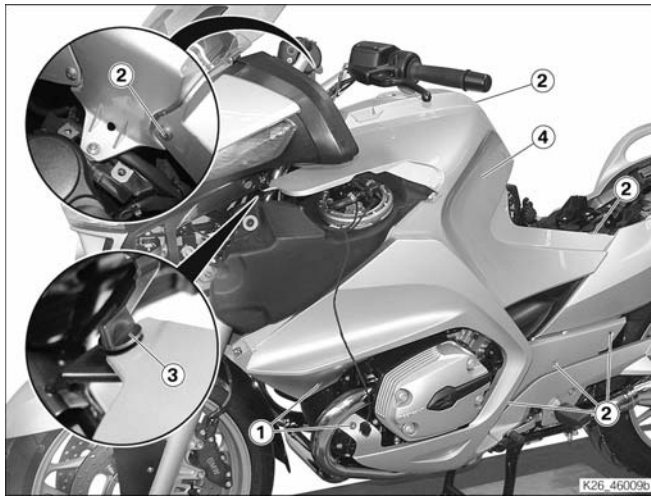
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **34 32 499 Replacing brake hose, rear, from reservoir**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



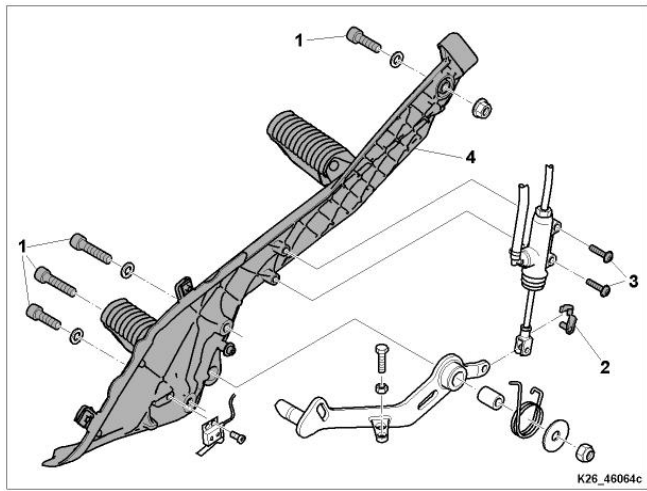
Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.




(-) Releasing right footrest plate

- Remove screws (1).

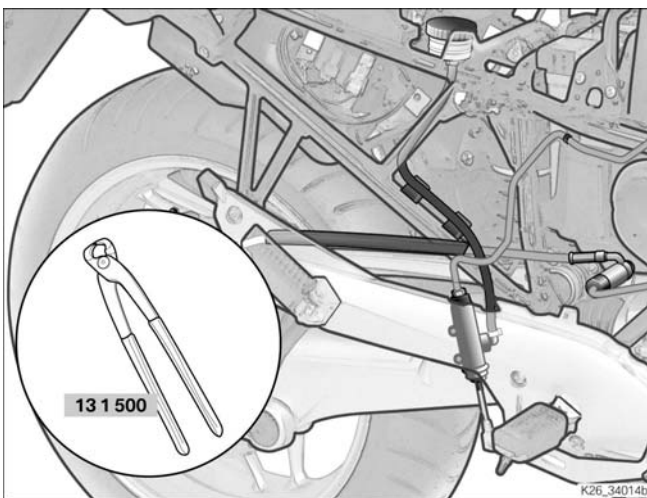


- Disengage pin (2).
- Remove screws (1).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.

 Technical data			
Release temperature, screws for rear brake master cylinder		100 °C	

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Use cable ties to secure the footrest plate to the frame.

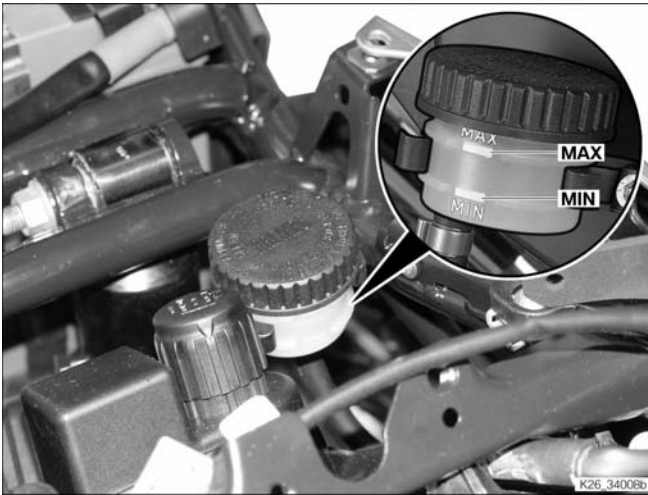
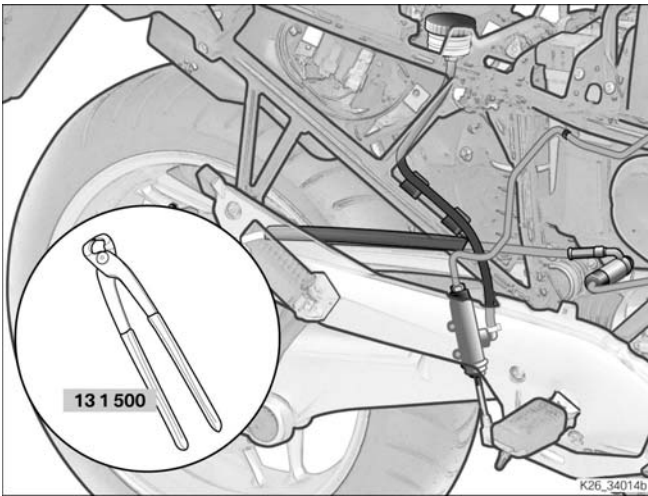
(-) Removing brake hose to master brake cylinder, rear



- Open the hose clips on the reservoir and the brake master cylinder.
- Open the retaining clips.
- Wrap cloths round the brake master cylinder.
- Either squeeze the brake hose closed by hand or use hose clamp (No. 13 3 010) for the purpose, and disconnect it from the brake master cylinder.
- Drain the brake fluid from the hose into a suitable container.
- Disconnect the hose from the reservoir.


(-) Connecting brake hose to master brake cylinder, rear

- Connect the brake hose to the reservoir and the brake master cylinder.
- Close the non-reusable hose clips with pliers (No. 13 1



500) .

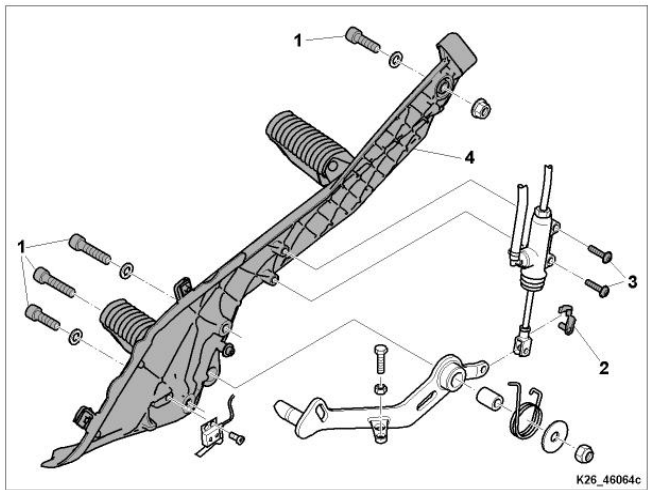
- Slowly top up with brake fluid to the (MAX) mark, making sure that the air escapes from the brake hose.


 <p>Consumables/lubricants</p>		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Lightly tap the brake hose to enable the residual air to escape from the hose into the reservoir.
- Repeatedly depress the footbrake pedal.
- Top up with fresh brake fluid, if necessary.


(-) Securing right footrest plate

- Clean the threads.
- Hold footrest plate (4) in position.
- Install master brake cylinder with new screws (3).



 <p>Tightening torques</p>		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

- Install screws (1).

 <p>Tightening torques</p>		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	



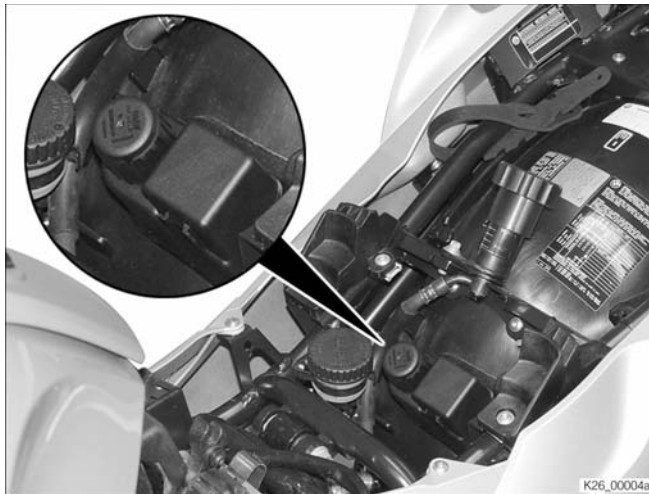
- Engage pin (2).
- Install screws (1).

(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair

work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.
- Print the record and place it in the motorcycle's files.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **34 51 050 Replacing ABS pressure modulator**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

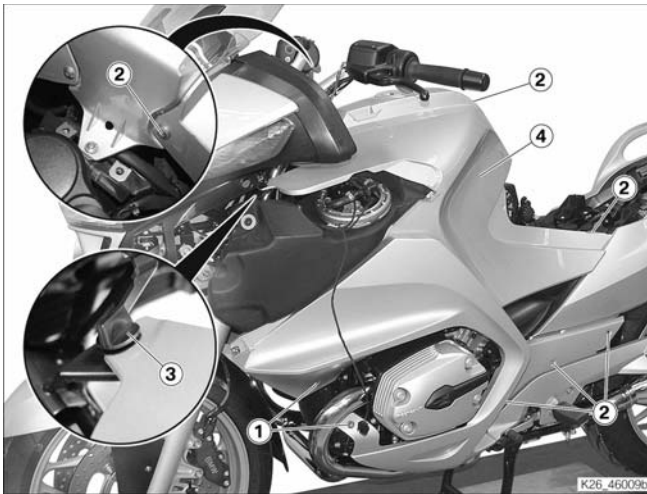


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

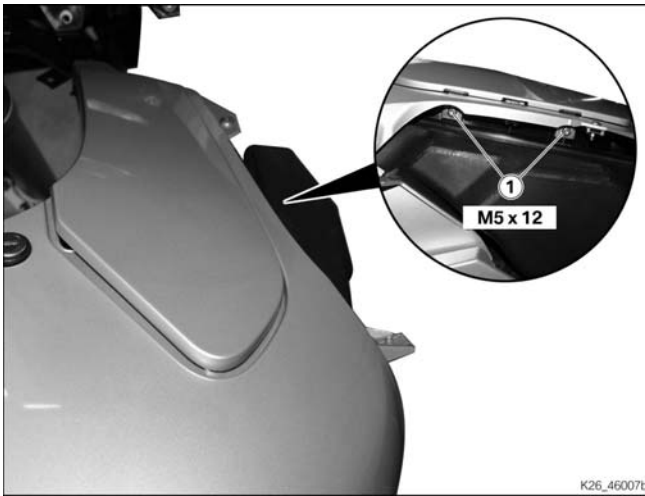
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



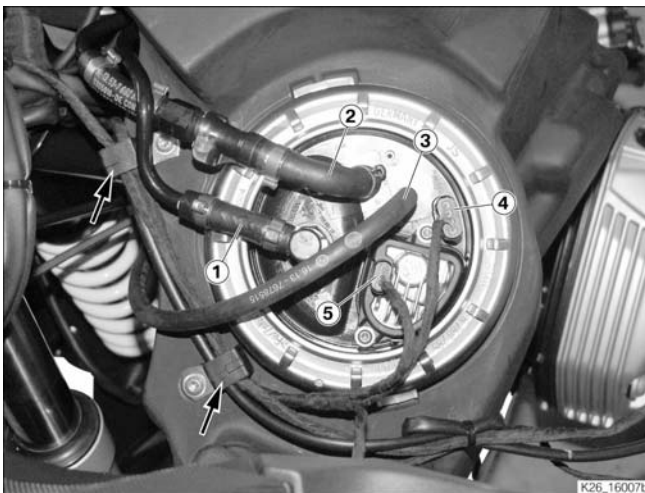
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

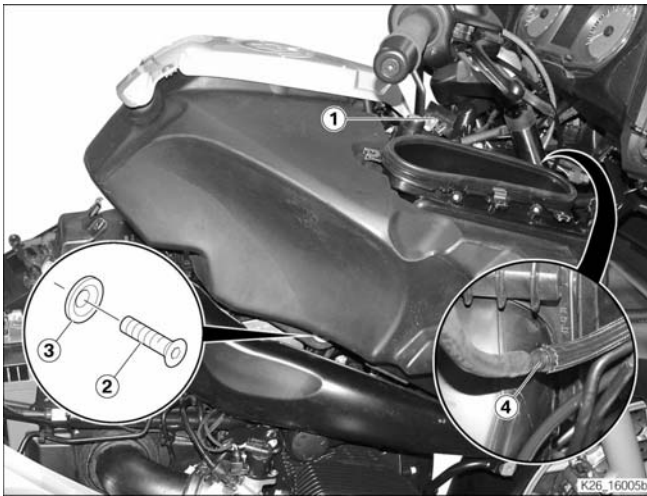


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Draining front brake system

► Draining front wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



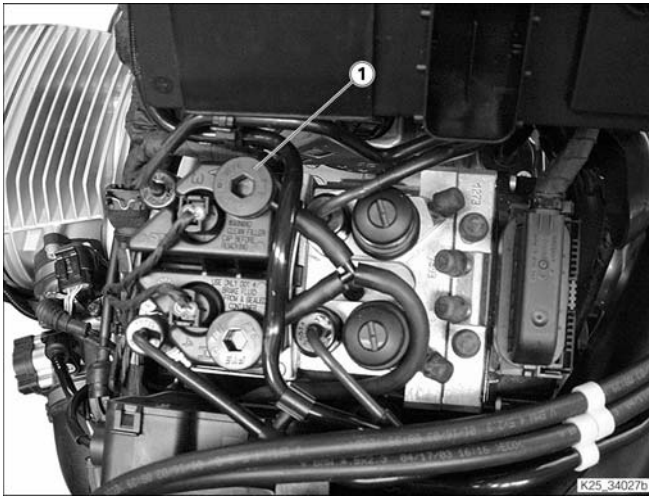
Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.



Attention



Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

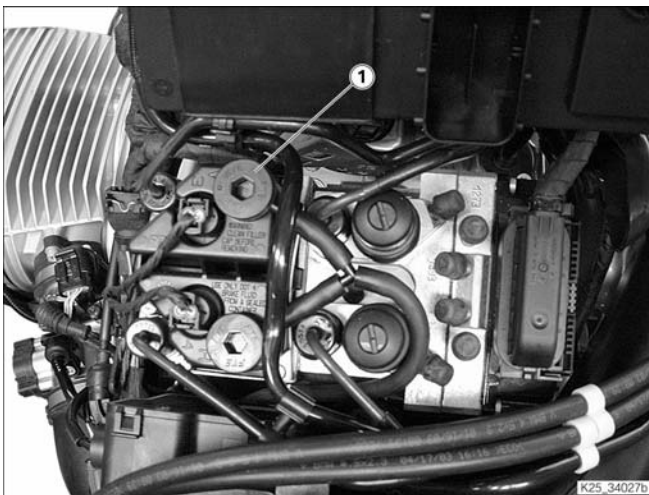
Avoidance: Do not disconnect the plugs from the pressure modulator.

- Open wheel-circuit reservoir (1).

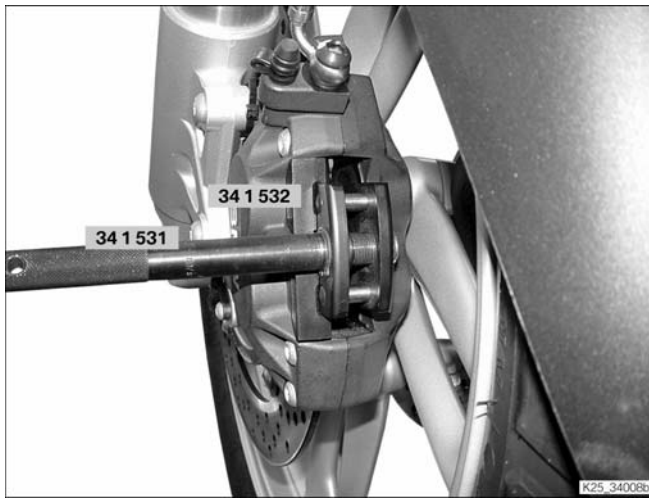


▷ **Removing front brake pads**

- Remove retainer (2).
- Remove screw (3).
- Remove spring (1).
- Remove the brake pads.



- Using piston resetting device (No. 34 1 531) and locator (No. 34 1 532), force the pistons of the brake caliper fully back, and secure them in this position.



- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Repeat this procedure with the second brake caliper.



Note

Drain the brake system only to the extent necessary for the tasks in question to be performed.



▶ Draining front control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the

BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.

! Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Turn the handlebars to a position in which the brake fluid reservoir is horizontal.

! Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

- Open the reservoir.
- Remove front reservoir cap with diaphragm, and draw off the old brake fluid.
- Set the cap on the brake fluid reservoir, but do not tighten it.

! Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

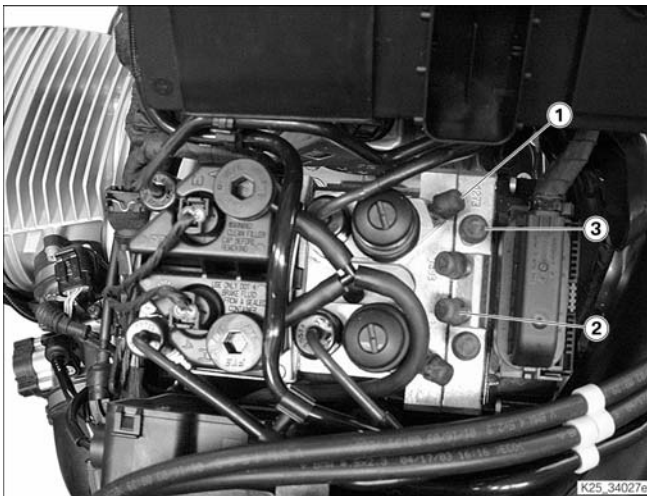
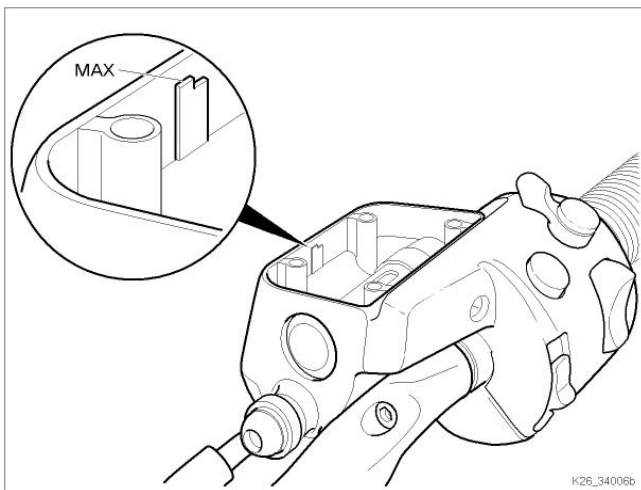
Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) on the front metering cylinder.
- Draw off the brake fluid from the circuits in the correct sequence, using ring spanner (No. 34 2 532) :

EF Note

The pressure modulator has to be fully drained if it is to be removed/replaced. It is sufficient to drain the control circuit for all other tasks.

- front metering cylinder (1)
- front integral circuit (2)
- front control circuit (3).



(-) Draining rear brake system

► Draining rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

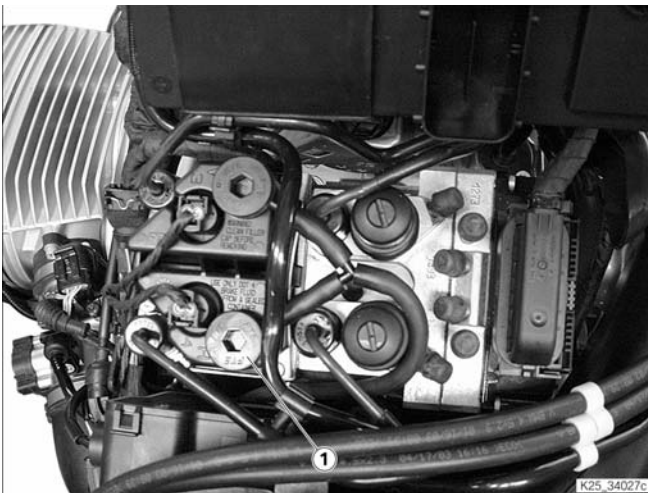
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

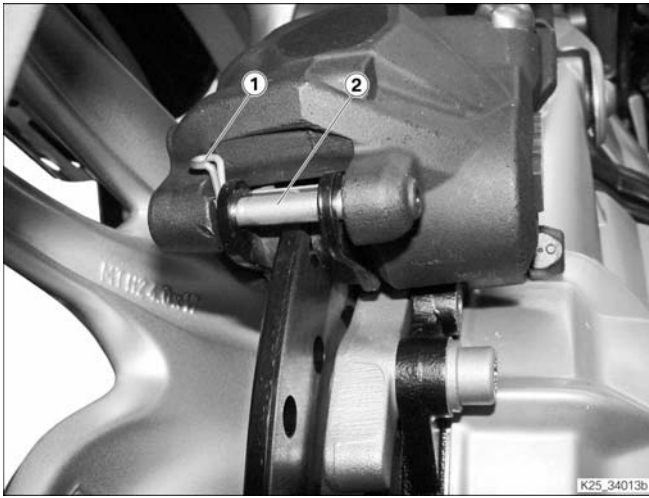
Avoidance: Do not disconnect the plugs from the pressure modulator.



- Open wheel-circuit reservoir (1).

▷ Removing rear brake pads

- Remove retainer (1).
- Drive retaining pin (2) out toward the wheel side.
- Remove the brake pads.



▷ **Removing brake calliper**

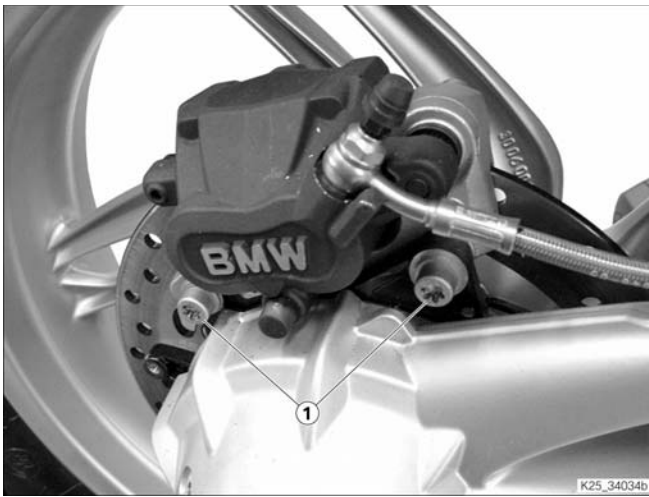
- Remove screws (1).

 **Attention**

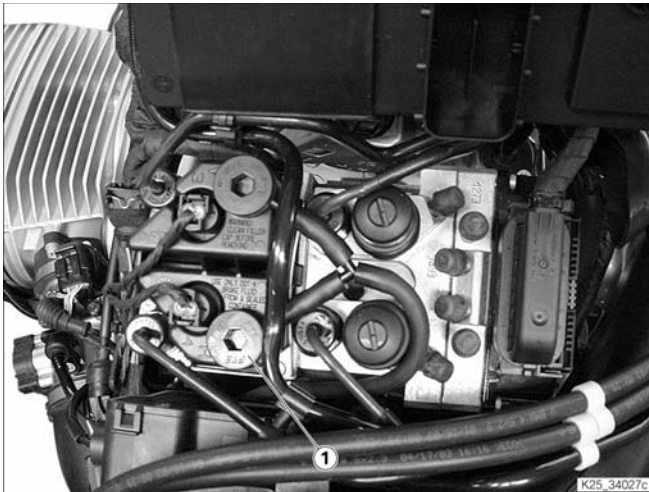
Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

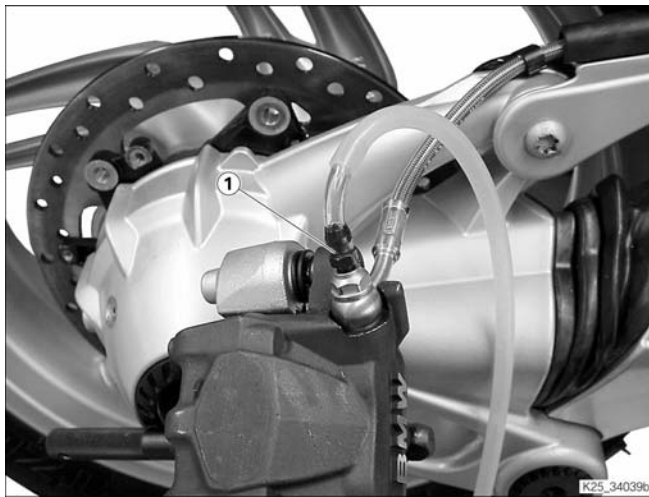
Install the brake caliper with brake pads or insert the piston resetting device.



- Remove the brake calliper.



- Using piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536), force the pistons of the brake caliper fully back, and secure them in this position.



- Connect the brake bleeding device to bleed screw (1) on the brake caliper.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw by half a turn.
- Pump out brake fluid until it ceases to emerge.
- Close the bleed screw.
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.



▶ Draining rear control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

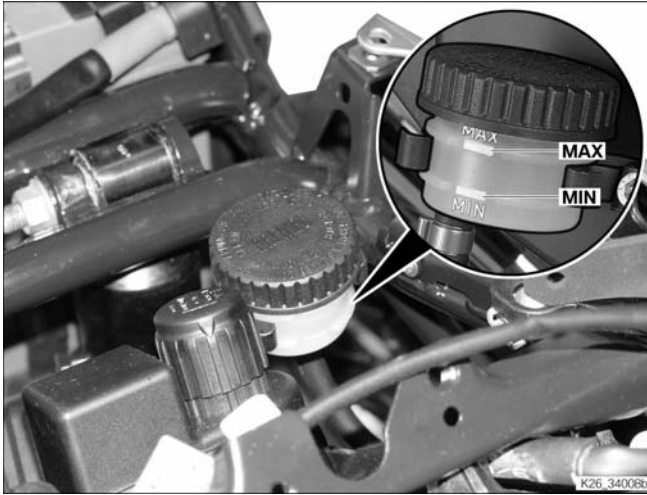
Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



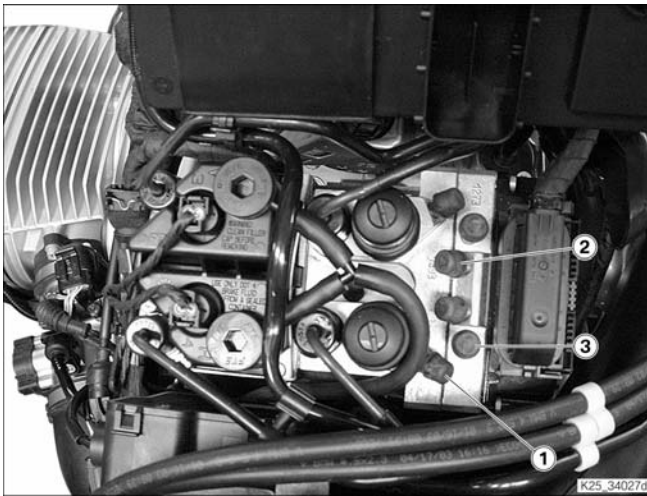
Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



- Remove the cap of the brake fluid reservoir and remove the rubber diaphragm.
- Draw off the brake fluid.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) on the rear metering cylinder.
- Draw off the brake fluid from the circuits in the correct sequence, using ring spanner (No. 34 2 532) :



Note

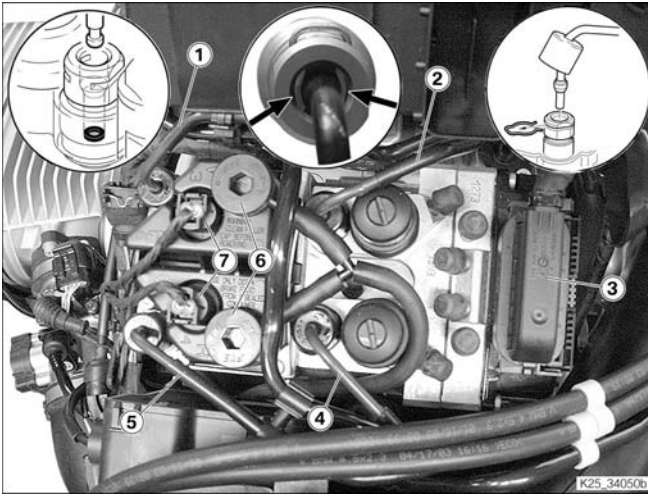
The pressure modulator has to be fully drained if it is to be removed/replaced. It is sufficient to drain the control circuit for all other tasks.

- rear metering cylinder (1)
- rear integral circuit (2)
- rear control circuit (3).



(-) Removing pressure modulator

- Open all retaining clip of brake lines (1), (2), (4) and (5).
- Push the protective caps up.
- Remove the spring clips.



Attention


Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.


- Lift brake pipes (1)(2), (4) and (5) out of the pressure modulator and catch escaping brake fluid with a cloth.
- Plug all ports in the pressure modulator.
- Disconnect plugs (3) and (7).
- Remove screws (1) on left and right.
- Remove screw (2).
- Carefully remove the pressure modulator.

(-) Installing pressure modulator

- Carefully install the pressure modulator.
- Install screws (1) and (2).
- Tighten screws (1).

 Tightening torques		
ABS pressure modulator with bracket and clutch cover to engine, M6 x 20	8 Nm	

- Tighten screw (2).

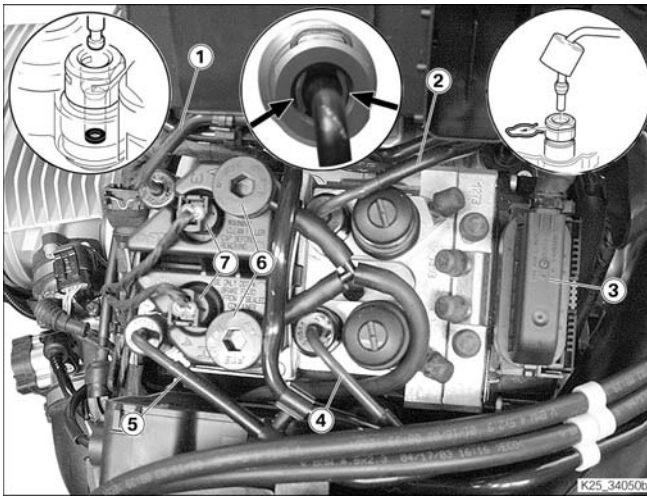
 Tightening torques		
ABS pressure modulator with bracket to engine, M6 x 16	8 Nm	

- Connect plugs (3) and (7).



Attention

Nature: Bent or badly routed brake lines can



chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Push the protective caps onto the brake pipes.
- Check that the square-section rings are correctly seated.



Warning

Nature: Used spring clips may have become weak in the course of time. Under these circumstances they cannot ensure secure contact.

Avoidance: Always install new spring clips each time the connection is opened, and make sure the installed positions are correct.

- Install new spring clips.
- Clip the brake pipe into the pressure modulator.
- Check that the spring clips (arrow) is correctly seated.
- Seat the protective cap on the connector.
- Press the brake pipe into the retaining clips.

(-) Filling front brake system

► Filling front control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

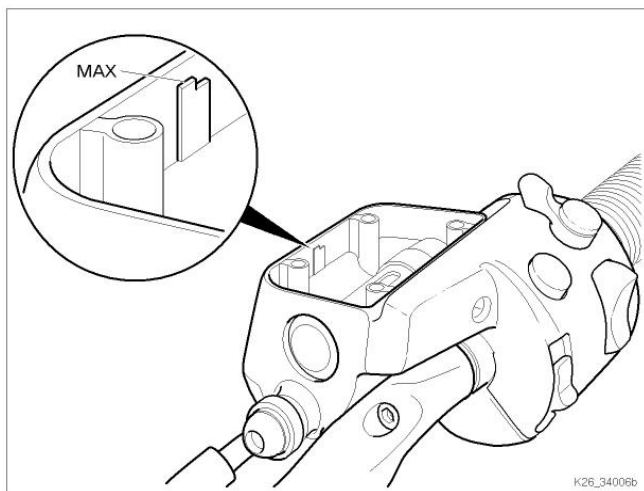
Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.




Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.

- Top up the brake fluid level to the (MAX) mark.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.

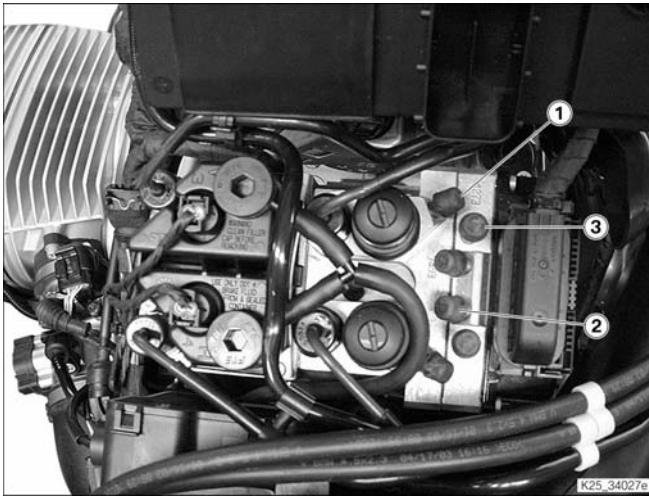
- Set the handbrake lever to the position for maximum span.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.



- Connect the brake bleeding device to bleed screw (1) of the front metering cylinder, but **do not switch on**.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

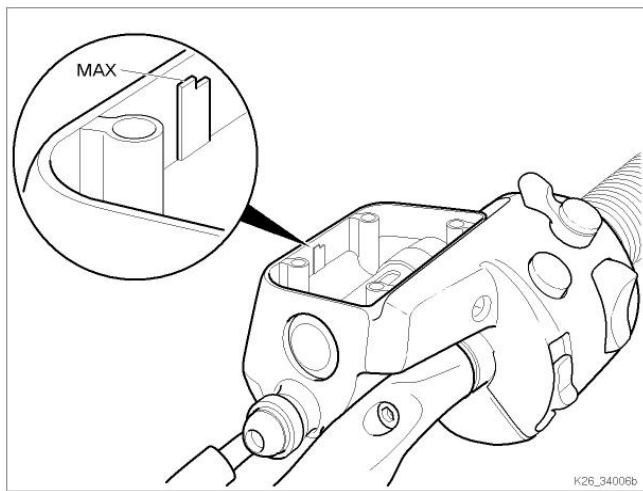
- In the following sequence, bleed:
 - front metering cylinder (1)
 - front integral circuit (2)
 - front control circuit (3) and
 - front metering cylinder (1) again in accordance with instructions for bleeding and using special ring spanner (No. 34 2 532)

▷ **Instructions for bleeding**

1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
2. Open the bleed screw.
3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
4. Slowly release the brake lever.
5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



- Fit the protective caps on the bleed screws.
- Top up the brake fluid to the (MAX) mark.
- Wipe the rim of the reservoir, the diaphragm and the cover to remove brake fluid, and carefully re-assemble the components.



▶ **Filling front wheel circuit**



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-

compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.

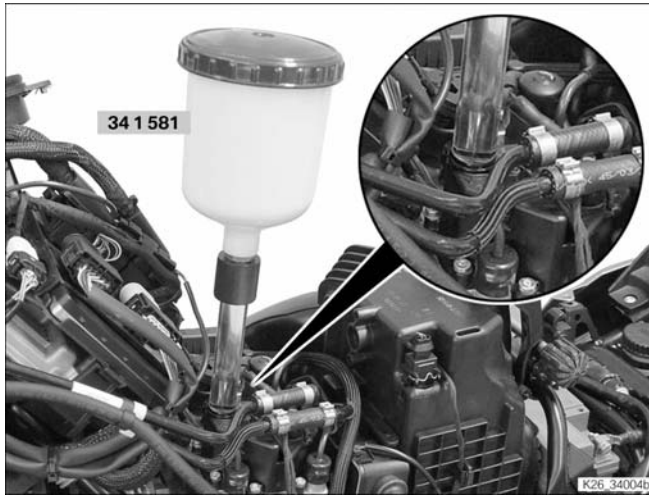
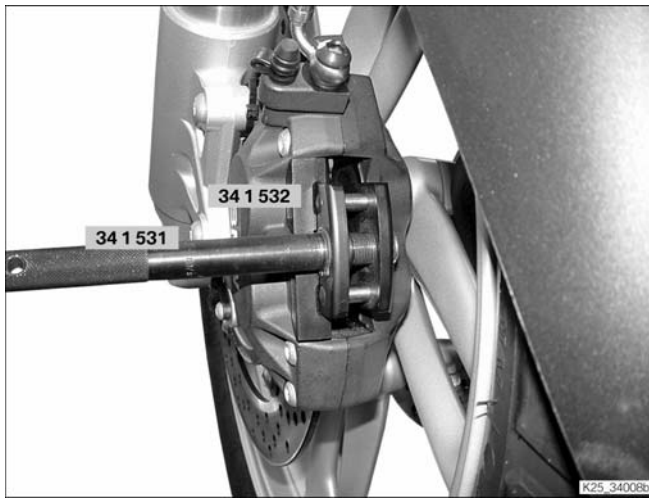


Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Wrap cloths around the left and right brake callipers.
- Use piston resetting device (No. 34 1 531) and locator (No. 34 1 532) to force the pistons in the left and right brake callipers all the way back and hold them in this



position.

- Screw container (No. 34 1 581) onto front wheel circuit reservoir.
- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/2 full.



Consumables/lubricants

DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897
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- Connect the brake bleeding device to the bleed screw of the right brake calliper, but **do not switch on**.
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.




Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Very gently pull the handbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.


- Continue pumping off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

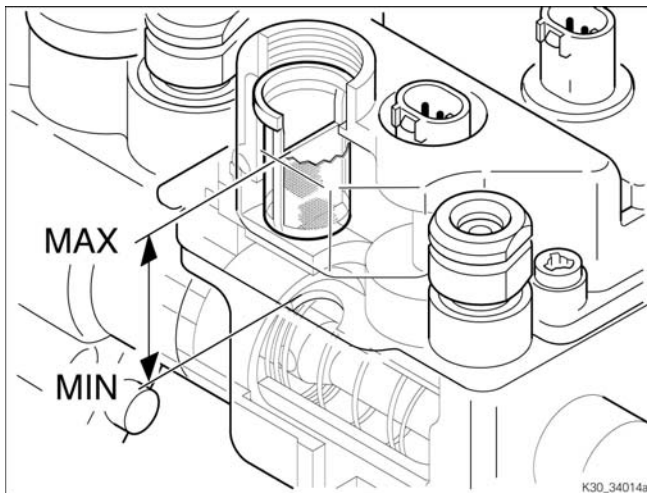
- Release the brake lever.
- Disconnect the brake bleeding device from the bleed screw.
- Connect the brake bleeding device to the bleed screw of the left brake calliper, but **do not switch on**.
- If necessary, use a cable tie to secure the hose of the brake bleeding device to the bleed screw.
- The procedure for changing the brake fluid in the left brake calliper is the same as that for the right calliper.
- When the fluid exits clear and free of bubbles,

continue pumping until the fluid in the container just disappears from view.

- Close the bleed screw.

 Tightening torques		
Front brake calliper bleed screw	5 Nm	

- Release the brake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the **MAX** mark.

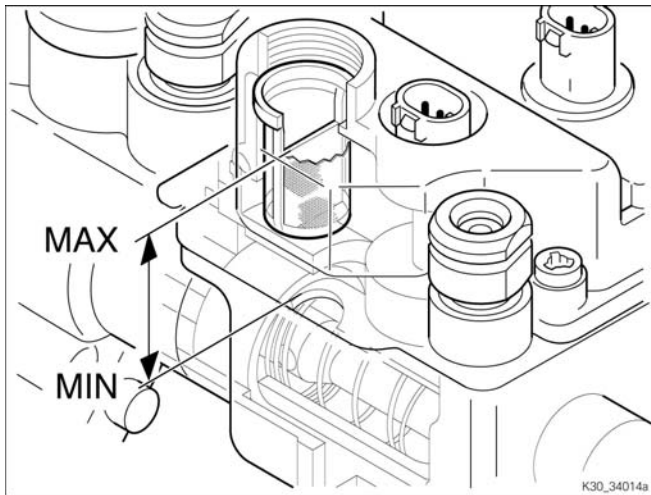
▷ **Instructions for filling front wheel circuit reservoir**

Attention


Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Install the brake caliper with brake pads or insert the piston resetting device.

- Make sure that the front wheel-circuit reservoir is topped up to the "MAX" mark.
- Install adapter 22 (No. 34 1 533) in piston resetting device (No. 34 1 531) and locator (No. 34 1 532) in both front brake callipers and **fully compress** them until the adapter cannot move.
- Switch on the ignition.
- Pull handbrake lever until the pistons of the front brake callipers are in contact with piston resetting device (No. 34 1 531) .



- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Hand-tighten the cap of the wheel-circuit reservoir.
- Using piston resetting device (No. 34 1 531) , force the brake pistons all the way back and remove, together with adapter 22 (No. 34 1 533) .
- Replace the front brake pads after removal, if necessary.

▷ **Installing front brake pads**




Warning

Nature: Greasing the backing plate can allow grease to make its way onto the friction pad and the brake disc.

Avoidance: Take care to grease only the rear and the trailing end face of the backing plate.


- Grease the rear and the trailing end face of the backing plate.

 Consumables/lubricants		
Never Seez compound	Protective grease	83 23 9 407 830

- Install the brake pads.



- Install spring (1) with the arrow pointing in the forward direction of travel.
- Install screw (3).
- Install retainer (2).

 Tightening torques	
Grub screw, brake pads	7 Nm



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



(-) Filling rear brake system

► Filling rear control circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.




Warning

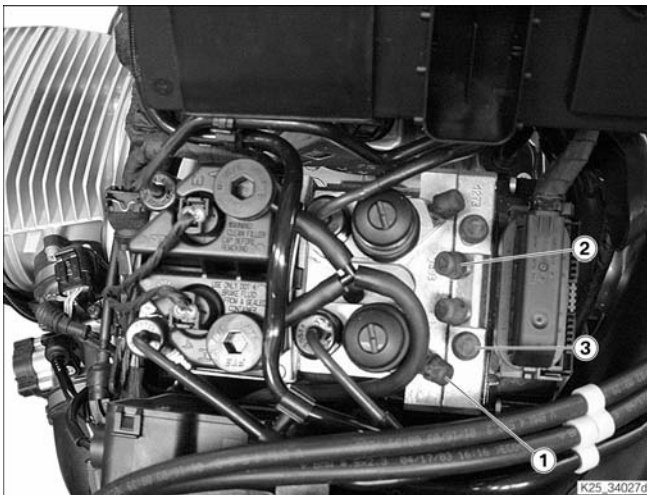
Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



- Top up the brake fluid level to the (MAX) mark.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the reservoir is too low; the system has to be bled again if this happens.

Avoidance: During the fluid-change and bleeding procedure, make sure that the fluid replenishing hole is always below the level of the brake fluid.



Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.

- Connect the brake bleeding device to bleed screw (1) of the rear metering cylinder, but do not switch on.



Warning

Nature: Vacuum extraction with conventional devices does not ensure that the control circuits are adequately bled.

Avoidance: Do not use vacuum extraction to change the fluid in the control circuits or bleed the control circuits.

- In the following sequence, bleed:
- bleed screw (1) rear metering cylinder
- bleed screw (2) rear integral circuit
- bleed screw (3) rear control circuit, and
- for the second time, bleed screw (1) rear metering cylinder in accordance with instructions for bleeding and using special ring spanner (No. 34 2 532) .

▷ Instructions for bleeding

- 1. Slowly operate brake lever until brake light switch clicks (blow-by bore closed).
- 2. Open the bleed screw.
- 3. Slowly operate brake lever to full extent of its travel and close the bleed screw.
- 4. Slowly release the brake lever.
- 5. Repeat steps 1 to 4 until the brake fluid emerges clear and free of bubbles.



- Fit the protective caps on the bleed screws.
- Top up the brake fluid level to the (MAX) mark.
- Wipe the rim of the reservoir, the diaphragm and the cap to remove brake fluid, and carefully re-assemble the components.



▶ Filling rear wheel circuit



Warning

Nature: Mistakes can be made in repair and maintenance routines if work is carried out by persons who have not received the correct training, or in the event of non-compliance with the specified instructions.

Avoidance: All repair and maintenance work on the BMW Integral ABS must be performed by trained, qualified specialists.

Comply with all maintenance and repair instructions and always work through the various steps in the correct order.



Warning

Nature: Brake fluid is hygroscopic, which means

that its wet boiling point drops once the container has been opened.

Avoidance: Use only new brake fluid from freshly opened containers.



Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.



Attention

Nature: Brake fluid attacks paintwork, plastic and rubber parts.

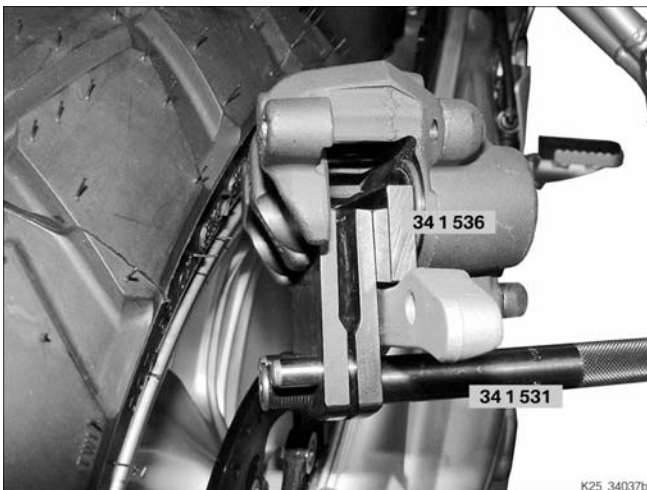
Avoidance: Do not allow brake fluid to come into contact with paintwork, plastic or rubber parts.



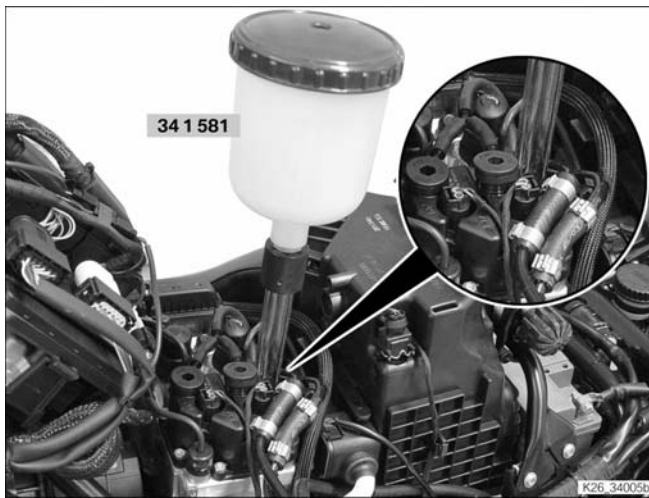
Attention

Nature: If plugs are disconnected from the pressure modulator, there is a possibility of dirt and brake fluid penetrating inside the housing and causing damage.

Avoidance: Do not disconnect the plugs from the pressure modulator.




- Install piston resetting device (No. 34 1 531) and adapter (No. 34 1 536) and force the pistons all the way back.
- Wrap a cloth around the brake caliper.



Screw container (No. 34 1 581) onto rear wheel-circuit reservoir.

- Slowly fill container (No. 34 1 581) with fresh brake fluid until it is approximately 1/3 full.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897

- Connect the brake bleeding device to the bleed screw, but **do not switch on** .
- Use a cable tie to secure the hose of the brake bleeding device to the bleed screw.




Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Switch on the ignition.
- Very gently press the footbrake lever until the pump just starts up.
- Open the bleed screw, while topping up the container with new brake fluid if necessary.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897



Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.

Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be

covered by the fluid.


- Pump out the brake fluid with virtually no pressure to begin with, then vary the brake pressure.



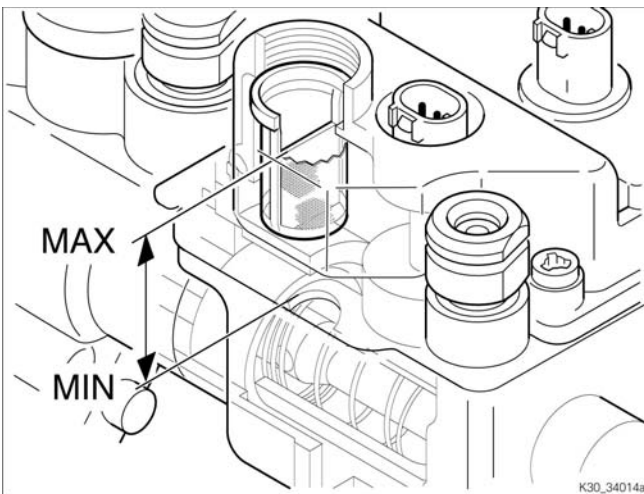
Note

The higher the brake pressure the faster the fluid is pumped through the system, which means that the level in the wheel-circuit reservoir drops all the more rapidly.

- When the emerging brake fluid is clear and free of bubbles, continue pumping until the fluid in the container just disappears from view.
- Close the bleed screw.

 Tightening torques		
Rear brake caliper bleed screw	10 Nm	

- Release the footbrake lever and switch off the ignition.
- Disconnect the brake bleeding device from the bleed screw.
- Disconnect the container from the wheel-circuit reservoir.



Warning

Nature: When the fluid is changed or the brakes bled, the fluid level in the wheel circuits is initially undefined. The level of fluid in the wheel circuit might be too high or too low.

Avoidance: After changing the fluid and/or bleeding the brakes, always bring the fluid in the wheel circuits to the correct level in accordance with the instructions.

- Top up the fluid in the wheel-circuit reservoir to the (MAX) mark.

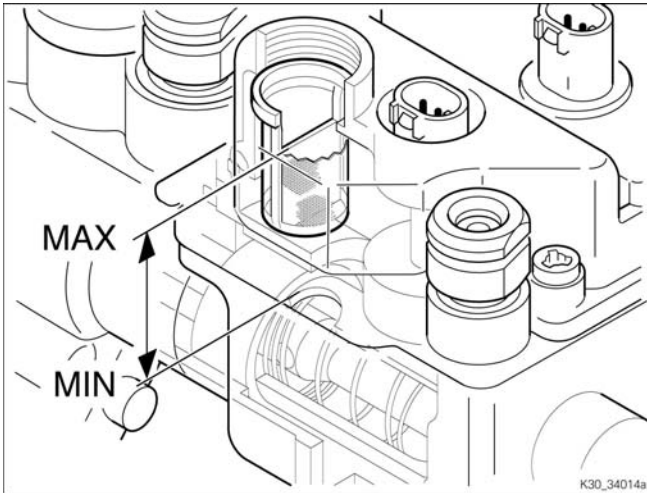
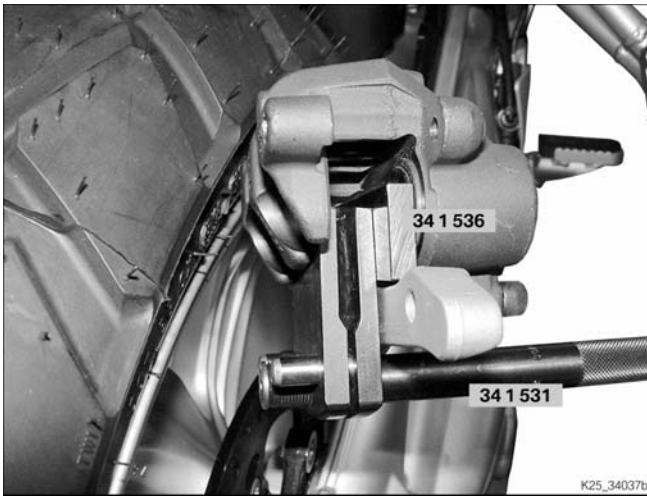
▷ **Instructions for filling rear wheel circuit reservoir**

- Make sure that the rear wheel-circuit reservoir is topped up to the "MAX" mark.
- **Fully compress** piston resetting device (No. 34 1 531) and insert it together with adapter for rear brakes, (No. 34 1 536), in the rear brake caliper.




Warning

Nature: Air can be drawn into the system through the fluid replenishing hole if the fluid level in the wheel-circuit reservoir is too low; the system has to be bled again if this happens.



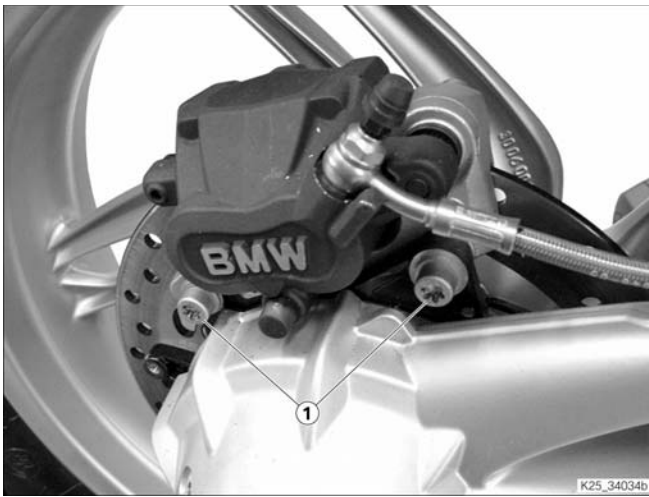
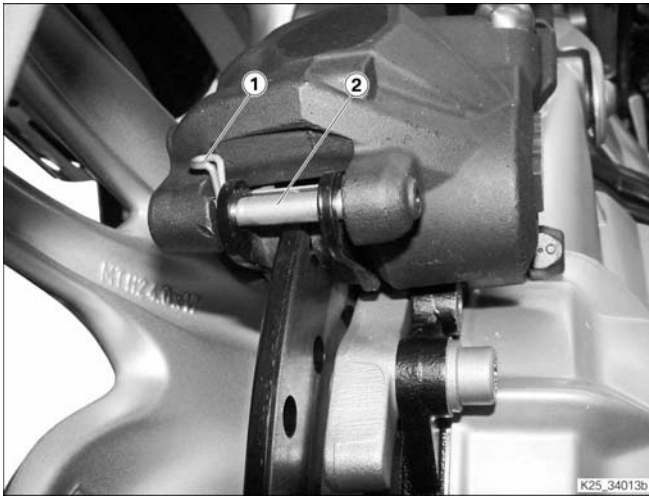
Avoidance: The brake fluid must always be visible in the container, because the piston in the wheel-circuit reservoir must always be covered by the fluid.

- Switch on the ignition.
- Operate the footbrake lever until the pistons of the rear brake caliper are in contact with piston resetting device (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Top up the brake fluid in the wheel-circuit reservoir until the (MAX) mark in the filler neck is just touching the surface of the fluid.

 Consumables/lubricants		
DOT4 brake fluid	Hydraulic systems	83 13 0 139 895, 83 13 0 139 896, 83 13 0 139 897


- Hand-tighten the cap of the rear wheel-circuit reservoir.
- Remove piston resetting device for integral brakes (No. 34 1 531) and adapter for rear brakes (No. 34 1 536) .
- Replace the rear brake pads after removal, if necessary
- ▷ **Installing rear brake pads**
 - Check that spring (1) is correctly seated and installed right way round.
 - » Arrow points in direction of travel.

- Install the brake pads.
- Manually install retaining pin (2).



▷ **Installing rear brake caliper**

- Hold the brake caliper in position and secure with screws (1).

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

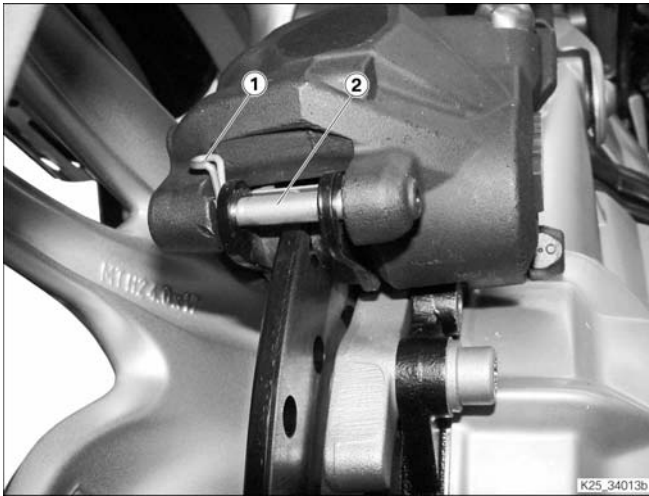
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



- Drive retaining pin (2) all the way into the brake caliper until seated.
- Install retainer (1).



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Check operation of the brake system with the ignition switched on.



(-) Preparing the motorcycle for CIP (coding, individualisation and programming)

Precondition

- Engine switched off.
- Prop the motorcycle in such a way that it cannot move while programming/coding is in progress.
- Motorcycle's battery is fully charged.



Note

Do not attempt to perform work of any other kind on the motorcycle while programming/coding are in progress.

- Switch off all electrical consumers.



Attention

Nature: Programming/coding is aborted if the voltage in the on-board system drops below 12.6 volts.

Avoidance: Connect the charger to the battery.

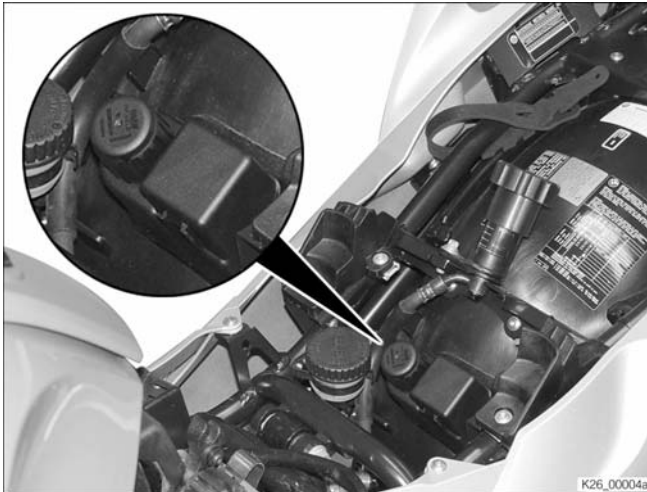
- Connect charger (No. 61 1 581) with cables (No. 61 1 582) to the battery. While programming/coding is in progress, **do not** connect or disconnect the charger.

► **Connecting BMW Motorrad diagnostic system to motorcycle**



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



- Perform diagnosis. Rectify faults, if found, **before** starting programming/coding.
- Start programming/coding with the CIP program and follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Performing bleed test with the BMW Motorrad diagnostic system

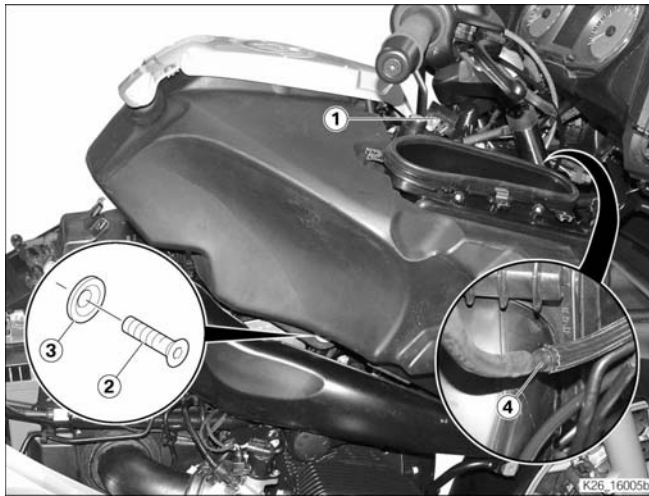


Warning

Nature: If bubbles of air are trapped in the brake system, rapid pumping could cause them to split into tiny bubbles and create foam in the brake fluid. This would mean that small quantities of entrained air would escape detection in the bleed test with the BMW Motorrad diagnostic system, and braking efficiency would be significantly impaired as a result.

Avoidance: When performing maintenance and repair work on the BMW Integral ABS, always operate the brakes slowly. Do not pump quickly or vigorously.


- Perform the bleed test with the BMW Motorrad diagnostic system.
- Perform all requisite repair work.

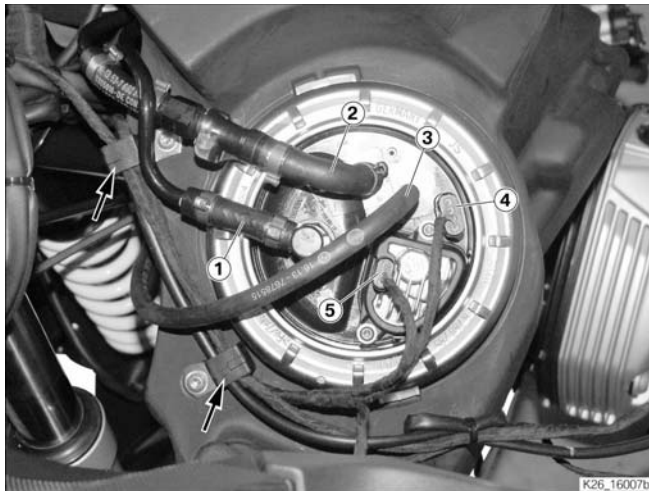


- Print the record and place it in the motorcycle's files.

(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.



Note

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

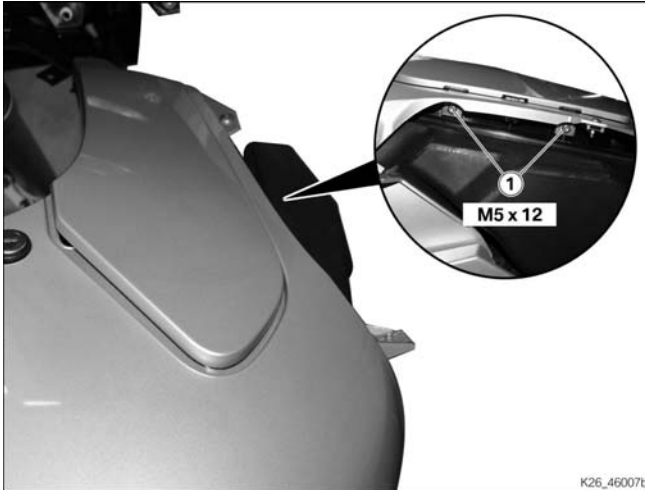
- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

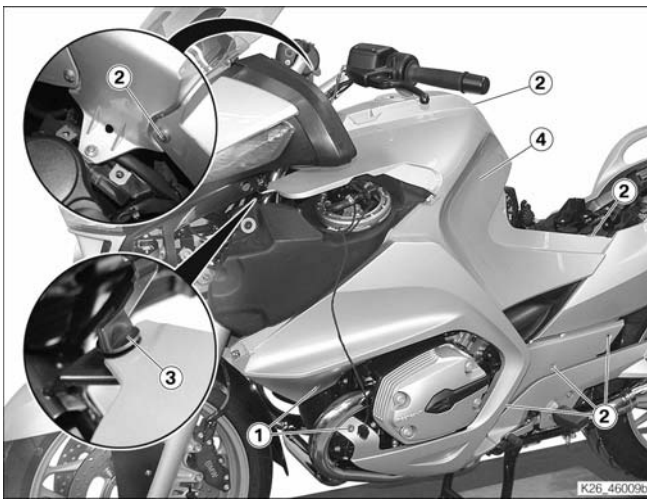
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

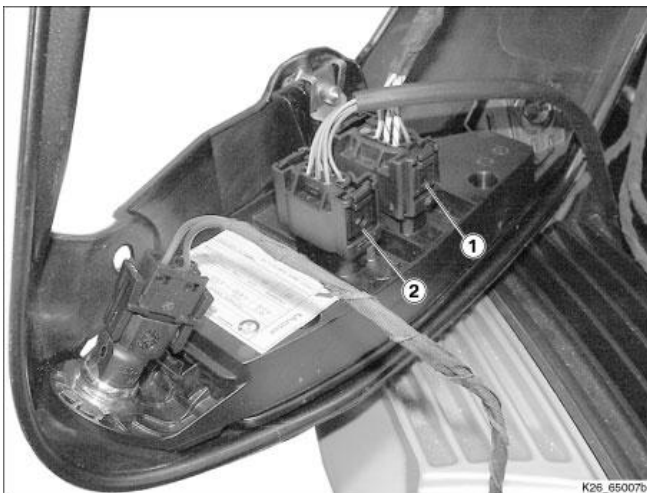
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



K26_46012b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

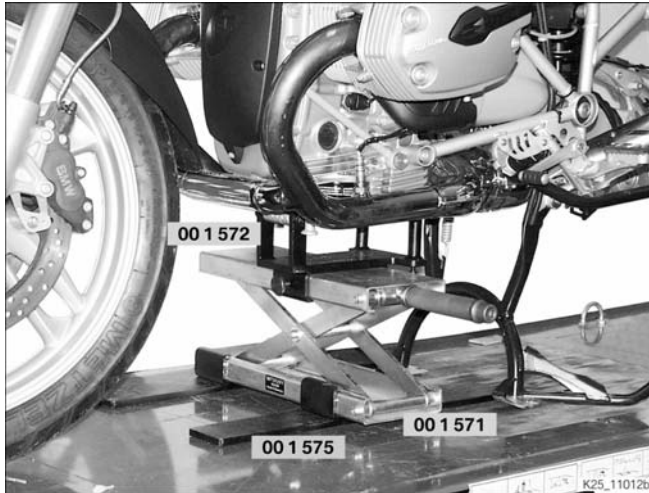
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

34 51 100 Replacing front ABS sensor ring



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

- Avoidance:** Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

- Avoidance:** Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

(-) Removing left brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

- Avoidance:** Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads



or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

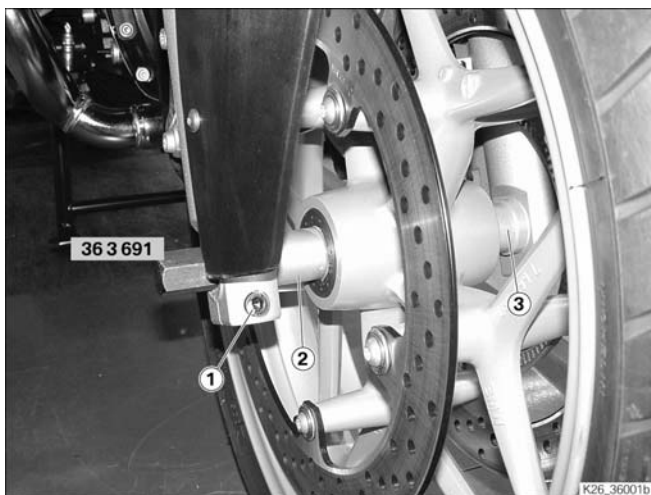
- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front section of front mudguard



- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.

(-) Removing front wheel



- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691).
- Roll the front wheel forward to remove.


📄 Note

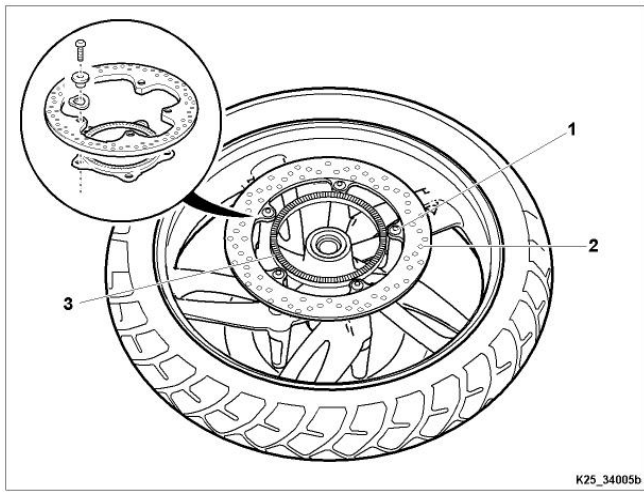
Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

(-) Removing front left brake disc

- Heat screws (1).

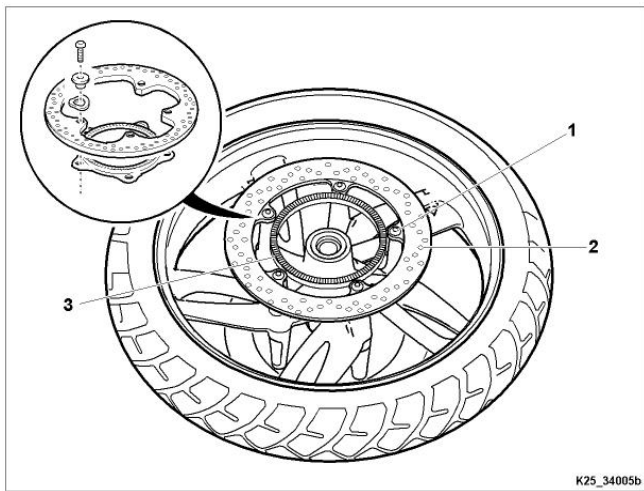
	Technical data		




Threaded fastener of front brake disc - release temperature		80 °C	
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- Remove screws (1) complete with rollers and spring washers.
- Remove brake disc (2) and sensor ring (3).

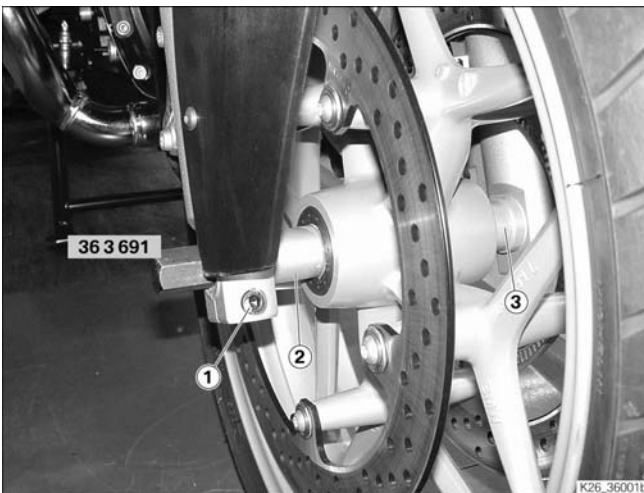
(-) Installing front left brake disc



- Clean the tapped holes in the wheel rim.
- Lay sensor ring (3) on the wheel rim.
- Lay brake disc (2) on the wheel rim with the lettering to the outside.
- Secure the brake disc with rollers, spring washers and new screws (1).

 Tightening torques		
Brake disc to front wheel, M8 x 25, Replace screws Micro-encapsulated	Initial torque,	12 Nm
	Final torque,	24 Nm

(-) Installing the front wheel




- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.



Note


Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Clean quick-release axle (2) and grease it with lubricant.


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.

- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	


(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.



(-) Securing right brake caliper

- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature:

Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until

self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

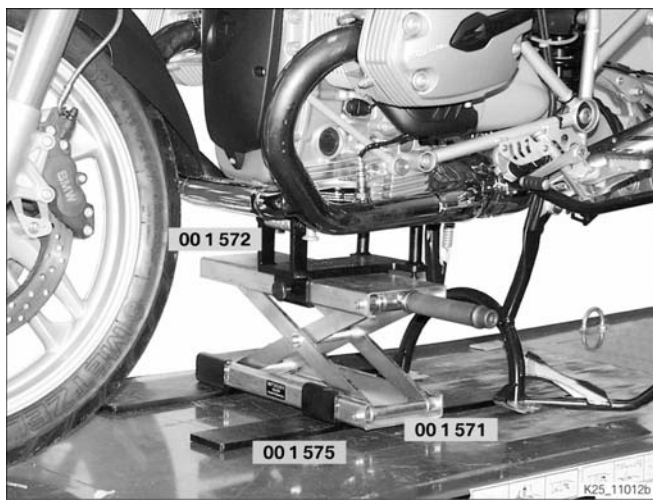
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .

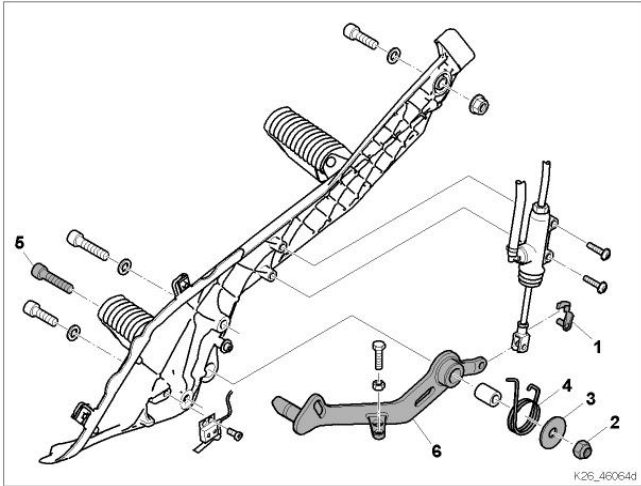


35 21 000 Replacing footbrake lever

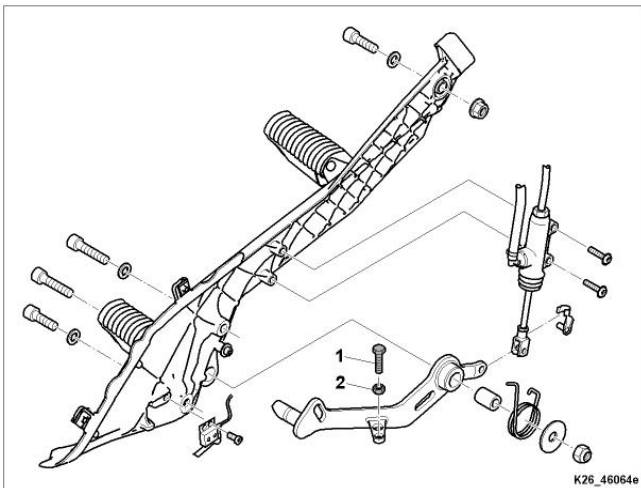
(-) Replacing footbrake lever

► Removing footbrake lever

- Disengage pin (1).
- Remove nut (2).
- Remove washer (3) and spring (4).
- Remove screw (5) with footbrake lever (6).




- Slacken locknut (2).
- Remove adjusting screw (1).
- Install the adjusting screw and locknut in the new brake lever.

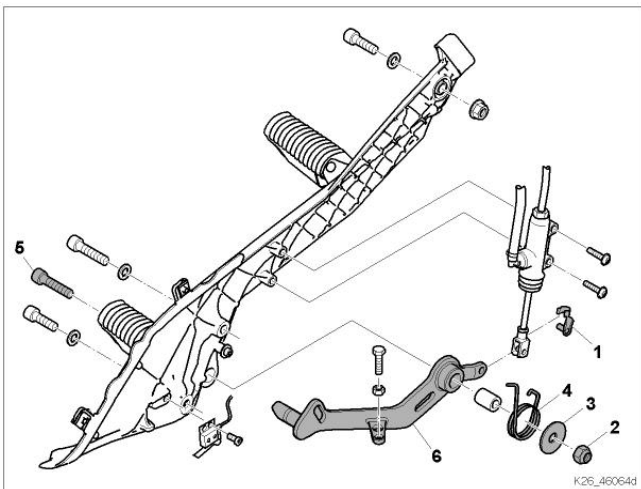


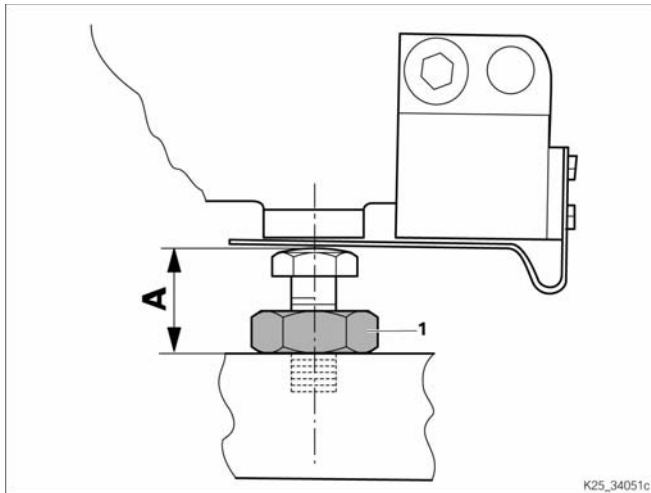
► Installing footbrake lever

- Install footbrake lever (6) with screw (5).
- Install spring (4) and washer (3).
- Install nut (2).

 Tightening torques		
Foot brake lever to footrest plate, M10	38 Nm	


- Engage pin (1).






▶ **Adjusting brake-lever stop, footbrake lever**

- Slacken locknut (1).
- Set the stop of the footbrake lever to distance "A".

 Technical data			
Basic setting, footbrake lever	Top edge of footbrake lever to top edge of adjusting screw	17 - 18 mm	

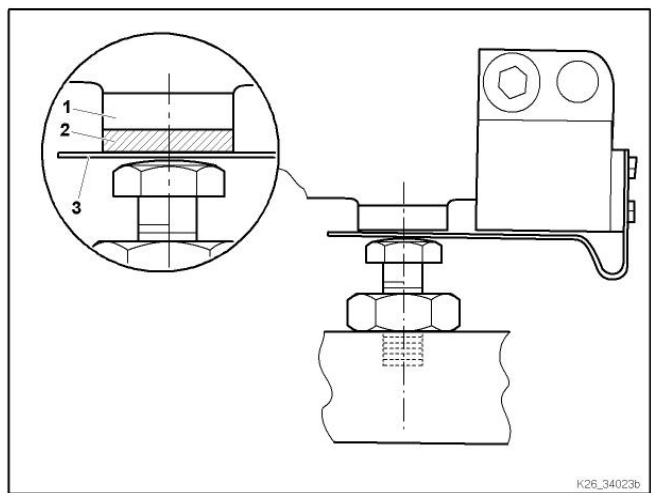
- Tighten locknut (1).


 Tightening torques		
Stop screw for foot brake lever with lock nut, M6	8 Nm	

▷ **Checking blow-by clearance at piston rod**

Test

- Check the play of the piston rod between brake-light switch tab (3) and stop of adjusting screw (1) with feeler gauge (2).



 Technical data			
Play of piston pushrod, rear brake master cylinder	Measured between brake-light switch tongue and stop of adjusting screw	2 ⁺¹ mm	

Result: Measured value is not to specification.

Measure:

▷ **Adjusting blow-by clearance at piston rod**

Precondition

- The blade of the feeler gauge must be placed transversely with respect to forward direction between the plate of the brake light switch and stop of the adjusting screw.



- Slacken nut (1) on pushrod (2).
- Turn push rod (2) to relieve the pressure until it has



- play.
- Turn pushrod (2) until all play at the pushrod is taken up.
- Lock nut (1).

Tightening torques	
Lock nut, pushrod, rear brake master cylinder, M6 Sealing lacquer	8 Nm

- When work is completed, apply coloured sealing lacquer across nut (1) and the adjacent component.

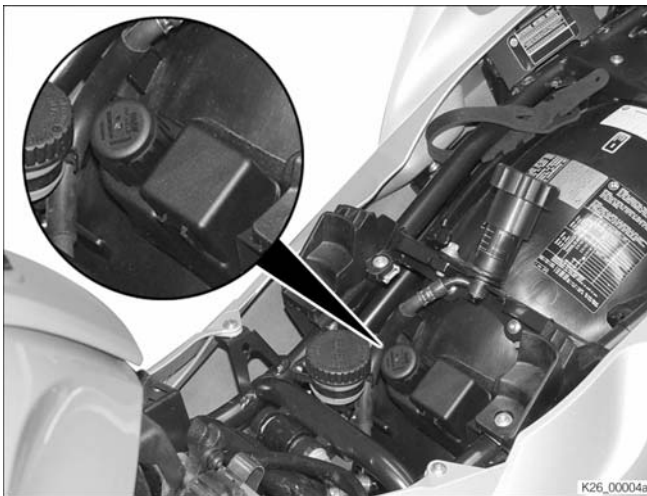


▷ **Connecting BMW Motorrad diagnostic system to motorcycle**



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581), (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



▷ **Function test, rear brake-light switch**

Test

- Test the brake-switch setting with the BMW Motorrad diagnostic system.

Result: If test result is not OK

Measure:

▷ **Adjusting blow-by clearance at piston rod**

- Slacken nut (1) on pushrod (2) at the brake master cylinder.



K25_34043c



Technical data

Play of piston pushrod, rear brake master cylinder	Measured between brake-light switch tongue and stop of adjusting screw	2 ⁺¹ mm	
--	--	--------------------	--

- Increase play in small steps to the maximum value.
- Lock nut (1).



Tightening torques

Lock nut, pushrod, rear brake master cylinder, M6 Sealing lacquer	8 Nm	
--	------	--

- When work is completed, apply coloured sealing lacquer across nut (1) and the adjacent component.

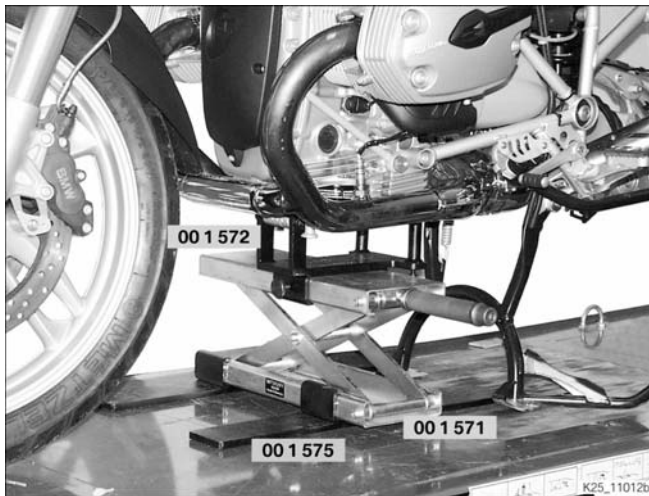


▷ **Disconnecting the BMW Motorrad diagnostic system from the motorcycle**

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.



36 30 008 Balancing front wheel



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.



- Carefully ease the brake caliper off the brake disc.

(-) Removing left brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

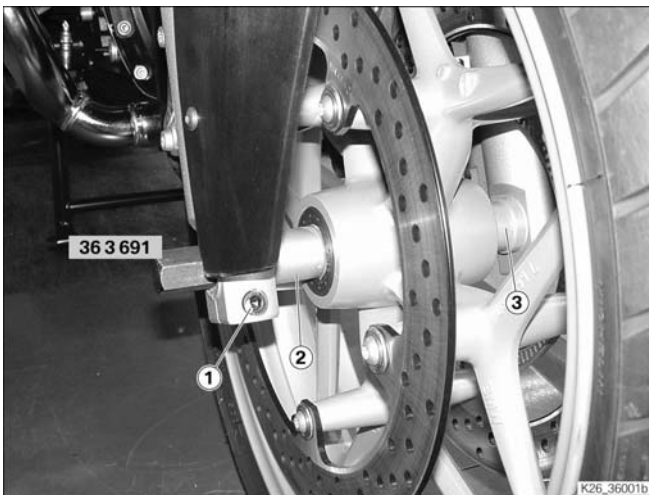
Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691) .
- Roll the front wheel forward to remove.



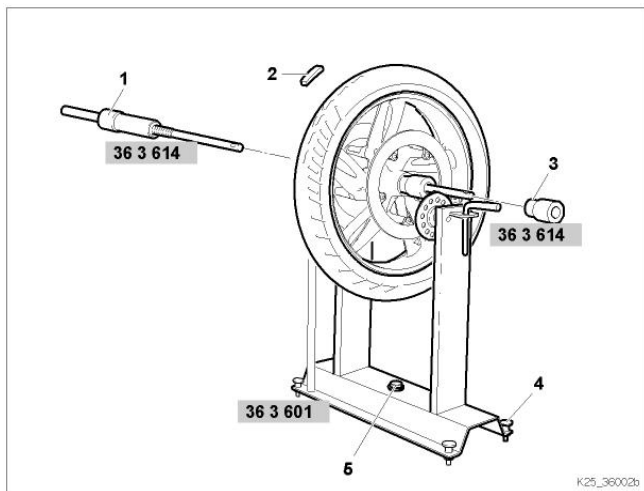
Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.


(-) Static balancing of front wheel

- Align balancer (No. 36 3 601) with knurled screw (4) and level gauge (5).
- Install balancing shaft (No. 36 3 614) in front-wheel bearing.
- Slightly preload the front-wheel bearing.
- Place the front wheel on the balancer and allow it to come to rest.
-



Clean the attachment points for the adhesive weights.

- Affix adhesive weights (2) uniformly spaced on both sides of the rim opposite the wheel's heaviest point.

 Technical data			
Front wheel - imbalance		max. 25 g	
Value definition:			
Compensation by balancing weight(s)			

- Repeat the balancing procedure as a check.

(-) Installing the front wheel

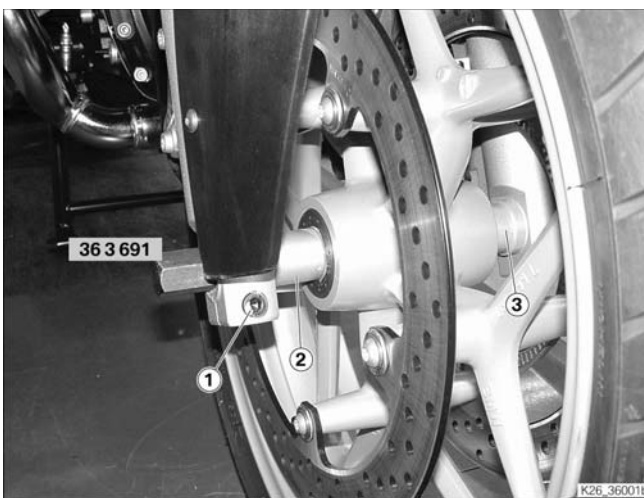
- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note


Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Clean quick-release axle (2) and grease it with lubricant.




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	


- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Securing left brake caliper



- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



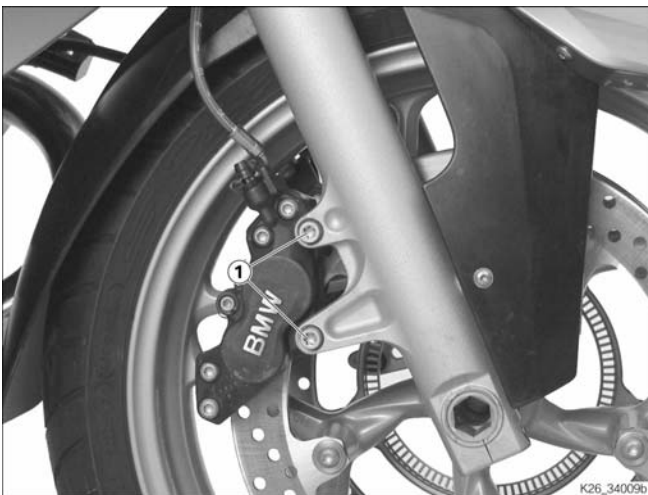
Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing right brake caliper



- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

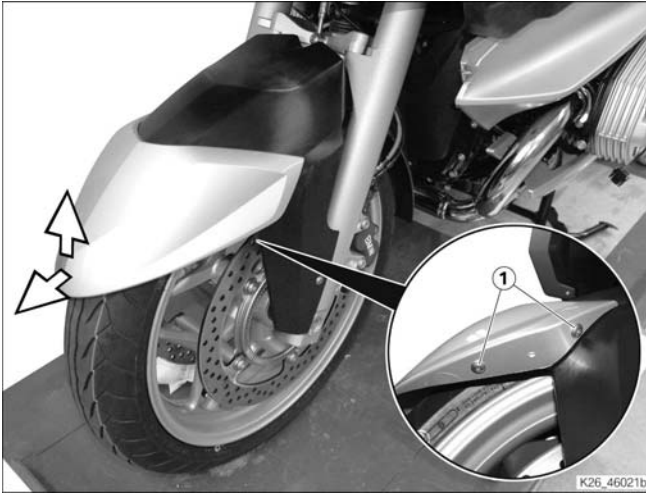
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

-
- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

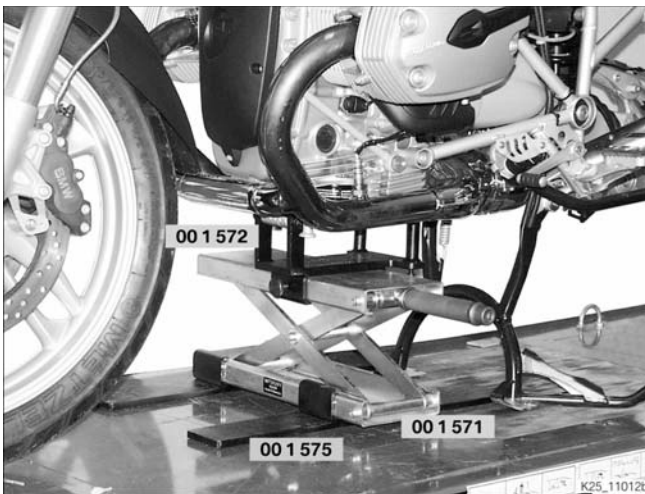
(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

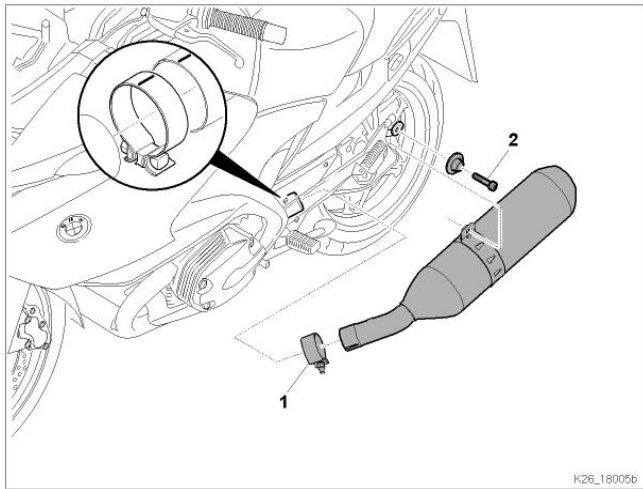


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 **36 30 018 Balancing rear wheel**



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).

 **Attention**

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Remove rear wheel.

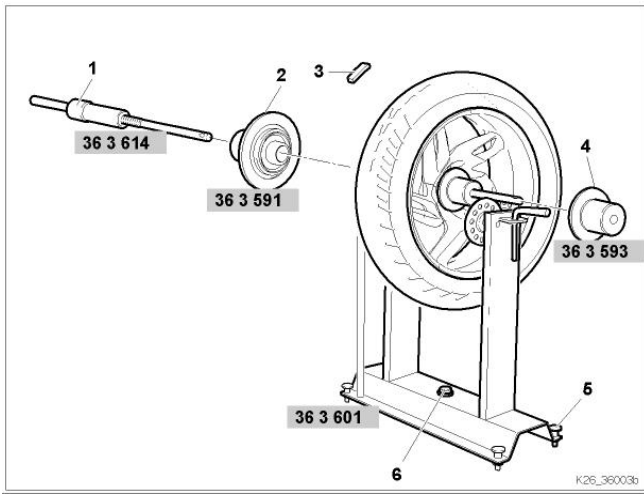


(-) Static balancing of rear wheel

- Align balancer (No. 36 3 601) with knurled screw (5) and level gauge (6).
- Install balancing shaft (No. 36 3 614) and adapters (No. 36 3 591) , (No. 36 3 593) in the rear wheel.
- Slightly preload the rear-wheel bearing.
- Place the rear wheel on the balancer and allow it to come to rest.
- Clean the attachment points for the adhesive weights.
- Affix adhesive weights (3) uniformly spaced on both sides of the rim opposite the wheel's heaviest point.



Technical data



Rear wheel - imbalance		max. 25 g	
Value definition:			
Compensation by balancing weight(s)			

- Repeat the balancing procedure as a check.

(-) Installing rear wheel




- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.


Avoidance: Avoid scratching the components; use masking tape if necessary.

- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.

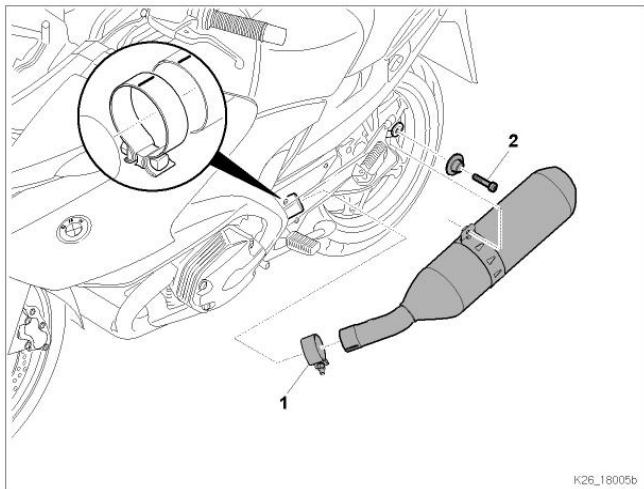
 Tightening torques		
Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite sequence	60 Nm	
Wheel flange with cut thread, M10 x 40 x 1.25, in diagonally opposite sequence	60 Nm	

(-) Installing silencer

- Grease the inner face of Torca clamp (1).


 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the




manifold and fit screw (2) in position.

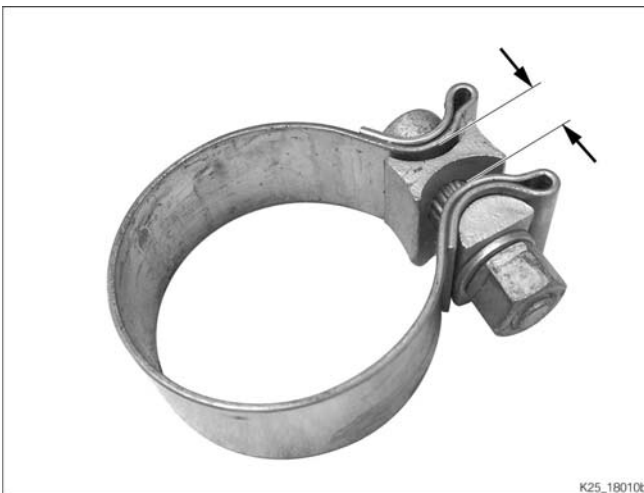
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	



- Align Torca clamp to marks (1) and secure hand-tight.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




► **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

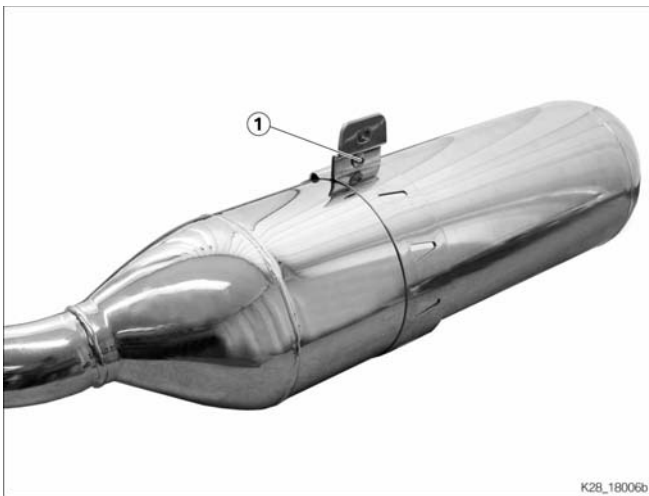
 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).




 **Attention**


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.
Open the clamp far enough and grease it lightly.


- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




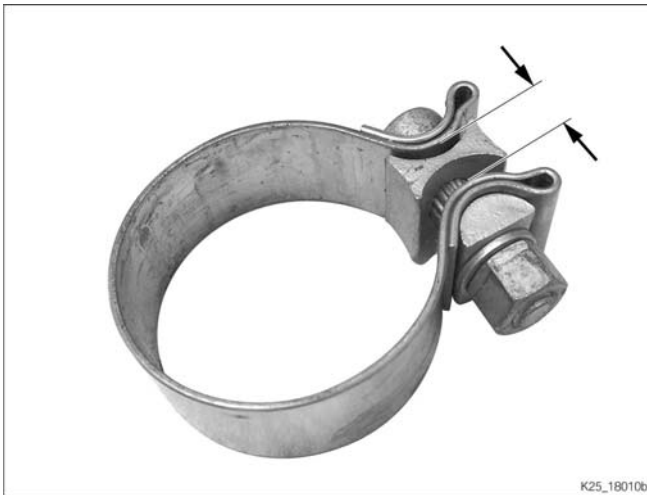
▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	




Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.

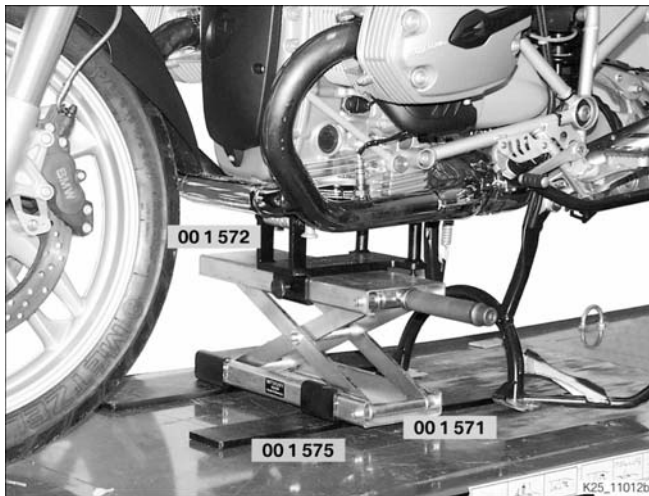


- Once again check distance ([arrows](#)) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	



36 30 341 Replacing front wheel



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.



Attention

- Carefully ease the brake caliper off the brake disc.

(-) Removing left brake caliper

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

Attention

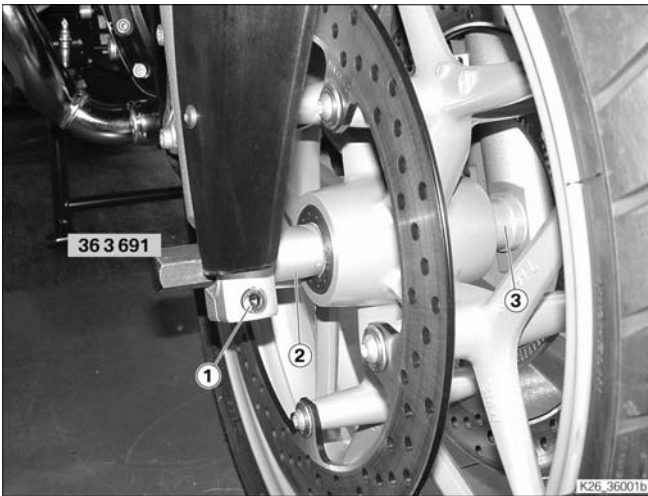
Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691) .
- Roll the front wheel forward to remove.




Note

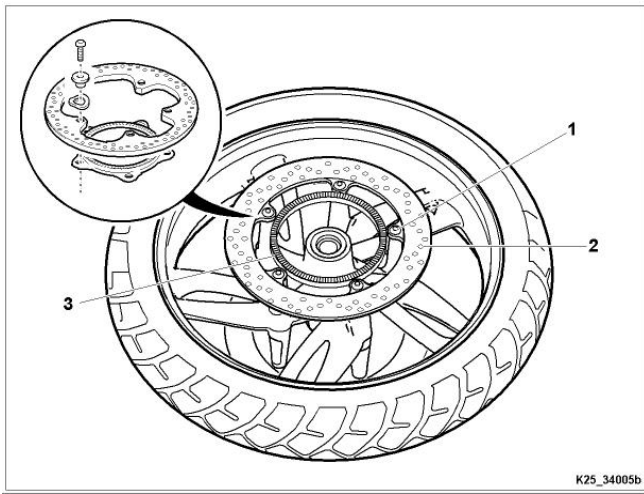
Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

(-) Removing front left brake disc

- Heat screws (1).

 Technical data			
Threaded fastener of front brake		80 °C	

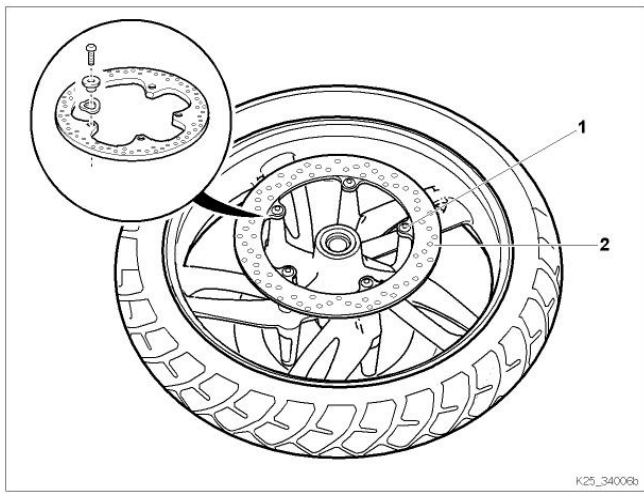



disc - release temperature			
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- Remove screws (1) complete with rollers and spring washers.
- Remove brake disc (2) and sensor ring (3).

(-) Removing front right brake disc

- Heat screws (1).



 Technical data			
Threaded fastener of front brake disc - release temperature		80 °C	

- Remove screws (1) complete with rollers and spring washers.
- Remove brake disc (2).

(-) Removing tyres

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Use commercially available tools to strip the tyre off the rim.

(-) Fitting tyres

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.


Avoidance: Avoid scratching the components; use masking tape if necessary.

- Use commercially available tools/fitting equipment and work to the manufacturer's specifications to fit tyres, and make sure that the direction-of-rotation arrows on

tyre and rim point in the same direction.

Test


- Inflate the tyre to test pressure and check the valve for leaks.

 Technical data			
Test pressure, wheel valve		4 bar	

Result: Valve leaking

Measure:


- Remove valve and clean support surfaces.
- If necessary clean thread and install new valve.

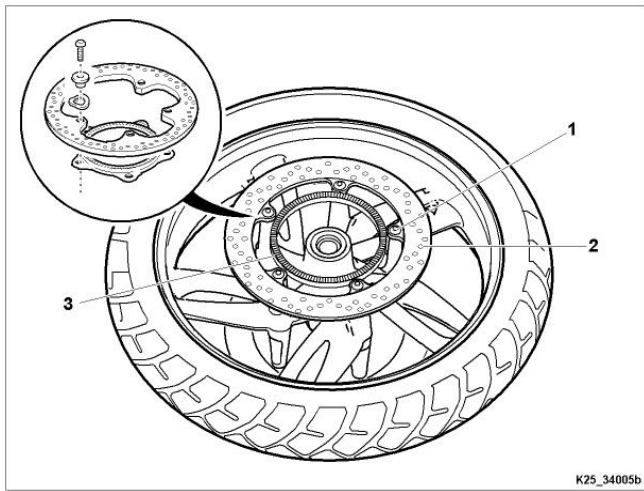
 Tightening torques		
Metal valve in rim, G 1/8" (pipe thread) , Replace metal valve Micro-encapsulated	12 Nm	

Result: Valve leaktight

Measure:

- Correct the tyre pressure


 Technical data			
Tyre pressure, front wheel, one-up	cold	2.2 bar	
Tyre pressure, front wheel cold, two-up or luggage	cold	2.5 bar	
Tyre pressure, front wheel, two-up + luggage	cold	2.5 bar	
Tyre pressure, rear wheel, one-up	cold	2.5 bar	
Tyre pressure, rear wheel, two-up or luggage	cold	2.9 bar	
Tyre pressure, rear wheel, two-up + luggage	cold	2.9 bar	

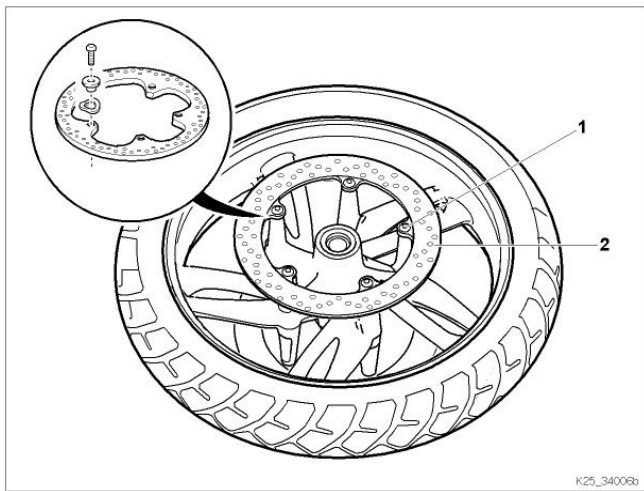


- Check the tyre and make sure the line is at a uniform distance from the rim flange all the way round.

(-) Installing front left brake disc


- Clean the tapped holes in the wheel rim.
- Lay sensor ring (3) on the wheel rim.
- Lay brake disc (2) on the wheel rim with the lettering to the outside.
- Secure the brake disc with rollers, spring washers and new screws (1).

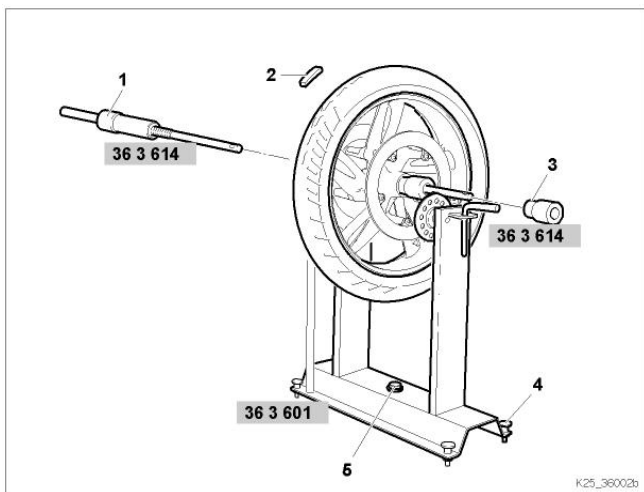
 Tightening torques		
Brake disc to front wheel, M8 x 25, Replace screws Micro-encapsulated	Initial torque, 12 Nm	
	Final torque, 24 Nm	



(-) Installing front right brake disc


- Clean the tapped holes in the wheel rim.
- Lay brake disc (2) on the wheel rim with the lettering to the outside.
- Secure the brake disc with rollers, spring washers and new screws (1).

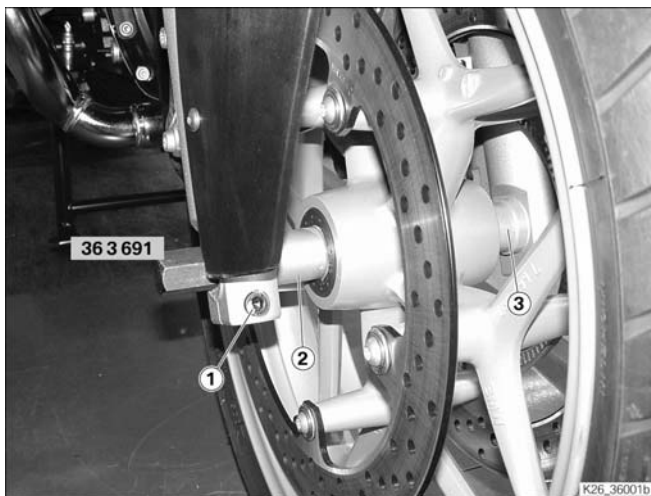
 Tightening torques		
Brake disc to front wheel, M8 x 25, Replace screws Micro-encapsulated	Initial torque, 12 Nm	
	Final torque, 24 Nm	



(-) Static balancing of front wheel

- Align balancer (No. 36 3 601) with knurled screw (4) and level gauge (5).
- Install balancing shaft (No. 36 3 614) in front-wheel bearing.
- Slightly preload the front-wheel bearing.
- Place the front wheel on the balancer and allow it to come to rest.
- Clean the attachment points for the adhesive weights.
- Affix adhesive weights (2) uniformly spaced on both sides of the rim opposite the wheel's heaviest point.

 Technical data			
Front wheel - imbalance Value definition:		max. 25 g	



Compensation by balancing weight(s)			
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- Repeat the balancing procedure as a check.

(-) Installing the front wheel


- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.


- Clean quick-release axle (2) and grease it with lubricant.

 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.


 <p>Tightening torques</p>		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

- Tighten axle clamping screw (1).

 <p>Tightening torques</p>		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).

 <p>Tightening torques</p>		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing right brake caliper

- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully

released positions.

-
- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

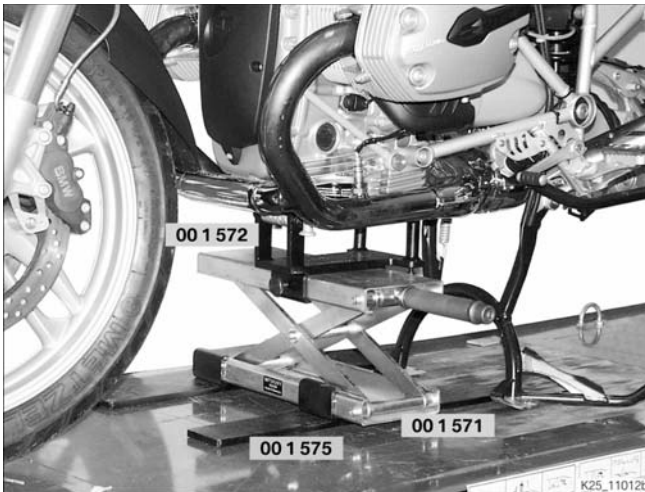
(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

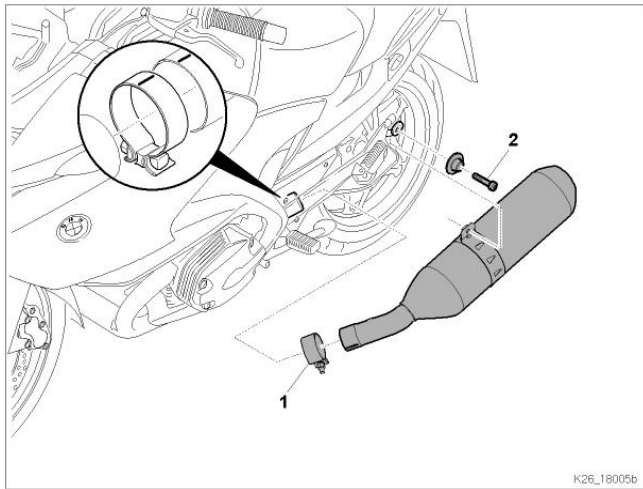


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 **36 30 351 Replacing rear wheel**



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).

 **Attention**

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Remove rear wheel.



(-) Removing tyres

 **Attention**

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Use commercially available tools to strip the tyre off the rim.

(-) Fitting tyres

 **Attention**


Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Use commercially available tools/fitting equipment and work to the manufacturer's specifications to fit tyres, and make sure that the direction-of-rotation arrows on tyre and rim point in the same direction.

Test


- Inflate the tyre to test pressure and check the valve for leaks.

 Technical data			
Test pressure, wheel valve		4 bar	

Result: Valve leaking

Measure:


- Remove valve and clean support surfaces.
- If necessary clean thread and install new valve.

 Tightening torques		
Metal valve in rim, G 1/8" (pipe thread), Replace metal valve Micro-encapsulated	12 Nm	

Result: Valve leaktight

Measure:

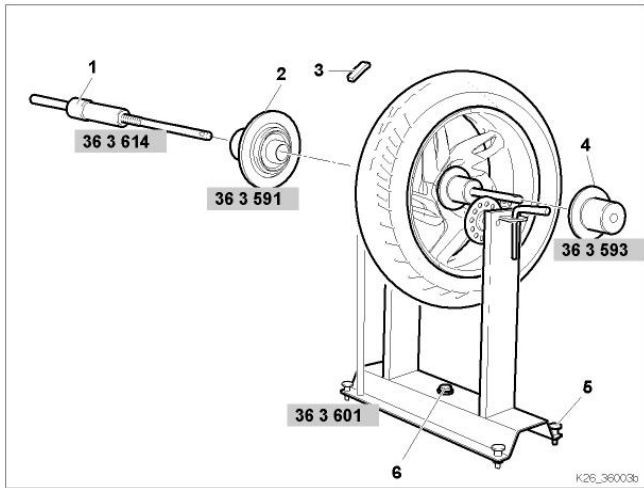
- Correct the tyre pressure

 Technical data			
Tyre pressure, front wheel, one-up	cold	2.2 bar	
Tyre pressure, front wheel cold, two-up or luggage	cold	2.5 bar	
Tyre pressure, front wheel, two-up + luggage	cold	2.5 bar	
Tyre pressure, rear wheel, one-up	cold	2.5 bar	
Tyre pressure,	cold	2.9 bar	


rear wheel, two-up or luggage			
Tyre pressure, rear wheel, two-up + luggage	cold	2.9 bar	

- Check the tyre and make sure the line is at a uniform distance from the rim flange all the way round.

(-) Static balancing of rear wheel



- Align balancer (No. 36 3 601) with knurled screw (5) and level gauge (6).
- Install balancing shaft (No. 36 3 614) and adapters (No. 36 3 591), (No. 36 3 593) in the rear wheel.
- Slightly preload the rear-wheel bearing.
- Place the rear wheel on the balancer and allow it to come to rest.
- Clean the attachment points for the adhesive weights.
- Affix adhesive weights (3) uniformly spaced on both sides of the rim opposite the wheel's heaviest point.

 Technical data			
Rear wheel - imbalance Value definition: Compensation by balancing weight(s)		max. 25 g	

- Repeat the balancing procedure as a check.

(-) Installing rear wheel




- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

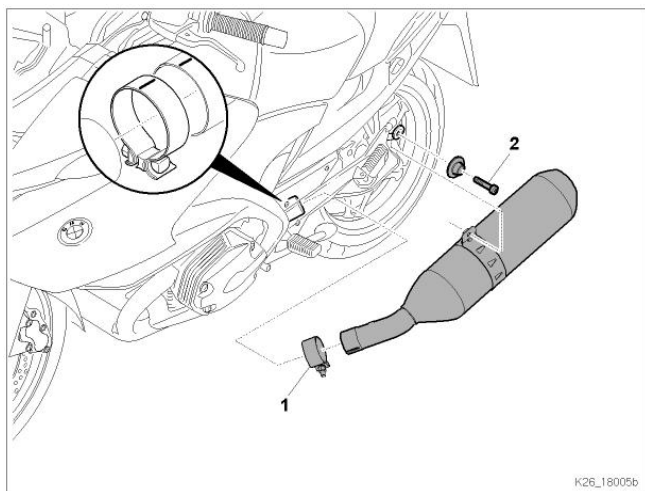
- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.


 Tightening torques		
Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite	60 Nm	

sequence		
Wheel flange with cut thread, M10 x 40 x 1.25, in diagonally opposite sequence	60 Nm	


(-) Installing silencer

- Grease the inner face of Torca clamp (1).




 <p>Consumables/lubricants</p>		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 <p>Tightening torques</p>		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.




 <p>Tightening torques</p>		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

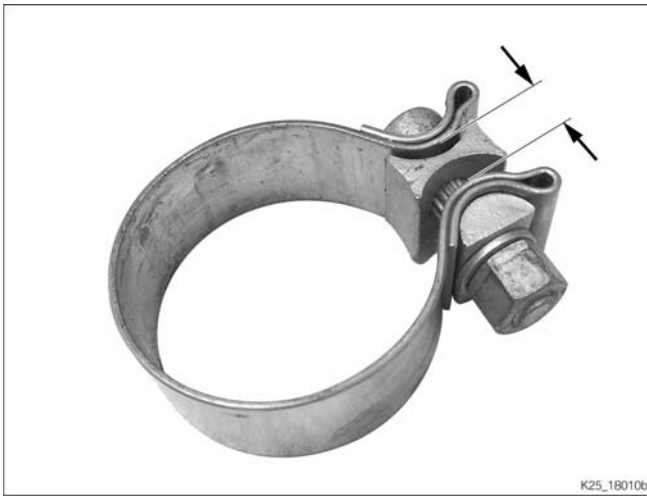
► Checking Torca clamp on silencer

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 <p>Tightening torques</p>		
Torca clamp to silencer	55 Nm	



and elbow, M8 Optimoly TA		
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Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

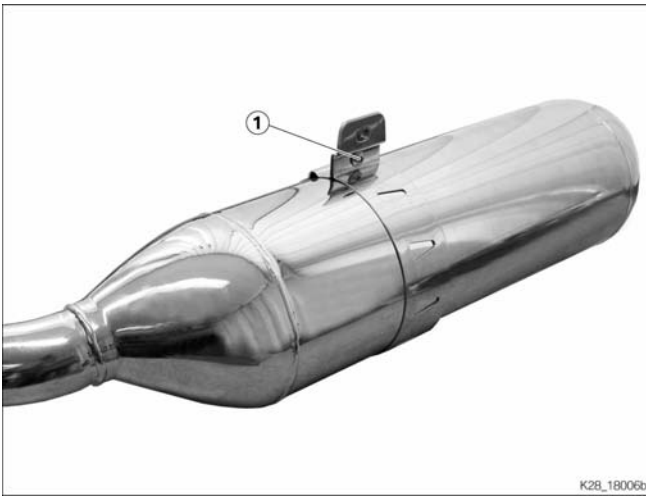


Attention


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.


Open the clamp far enough and grease it lightly.




- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

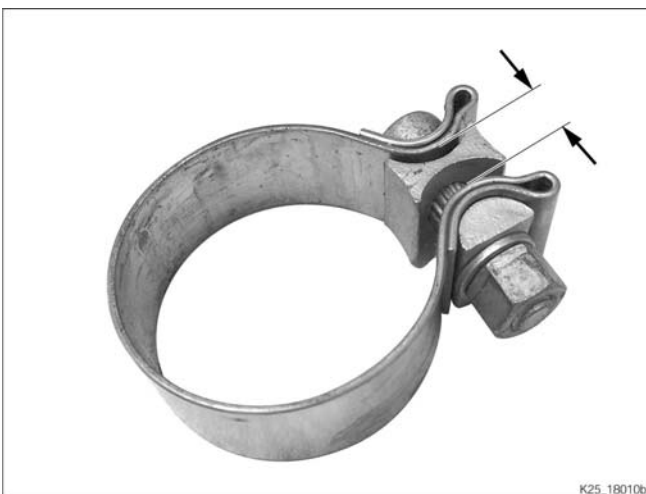



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.

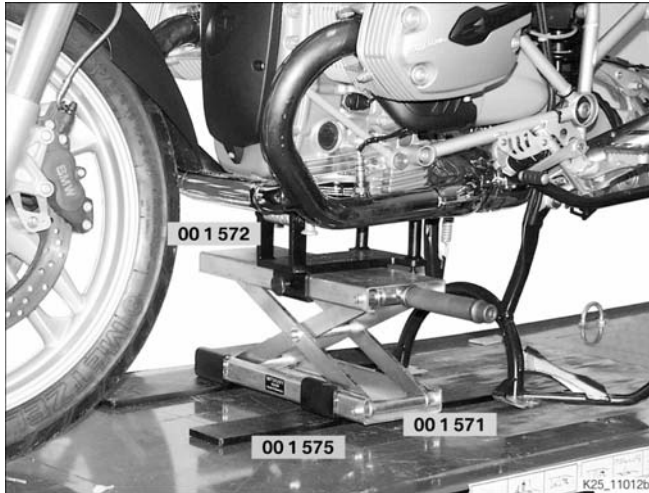


Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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36 31 351 Replacing wheel bearing for front wheel



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.



⚠ Attention

- Carefully ease the brake caliper off the brake disc.

(-) Removing left brake caliper

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

⚠ Attention

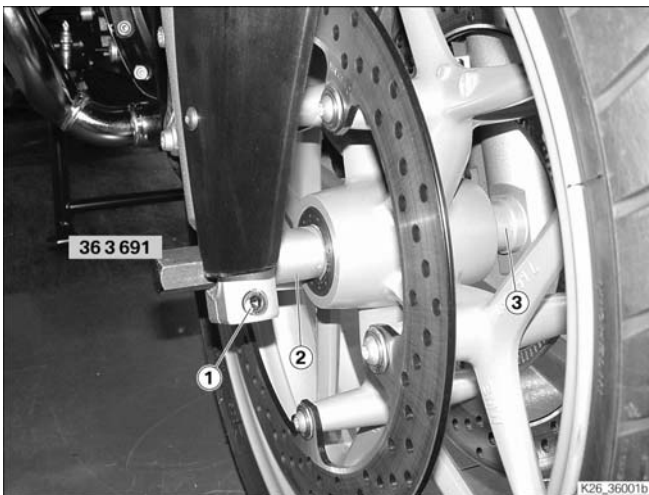
Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691) .
- Roll the front wheel forward to remove.



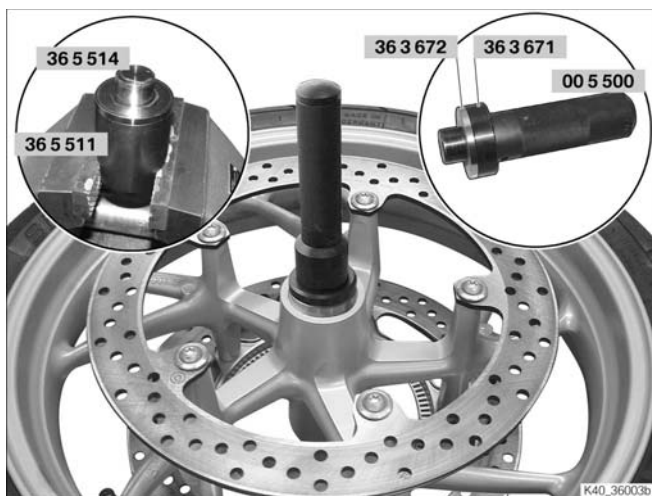
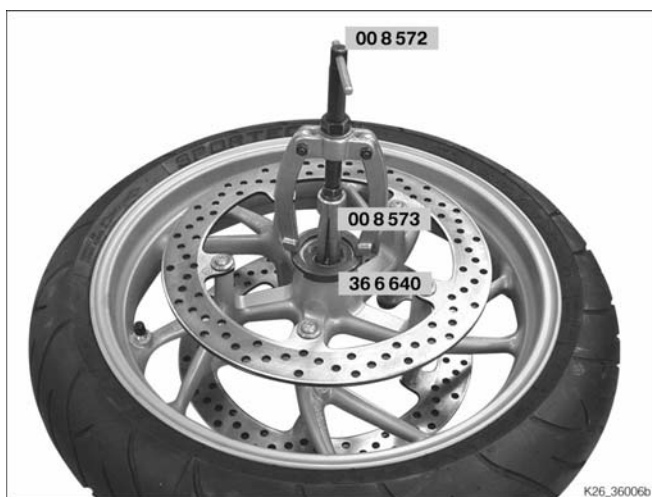
📄 Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

(-) Removing wheel bearings of front wheel

- Carefully pry out the shaft sealing rings on left and right with a screwdriver.
- Place support (No. 36 6 640) between the wheel hub on the right side of the wheel and the claws of the internal puller.
- Heat the bearing seat.



Technical data

Release temperature, wheel bearing, front		100 °C	
---	--	--------	--

- Use reaction support (No. 00 8 572) and internal puller (No. 00 8 573) to pull out the wheel bearing.
- Remove the tubular spacer.

- Press out the left wheel bearing with drift (No. 11 6 732).

(-) Installing wheel bearings of front wheel

- Degrease the bearing seats.
- Clamp drift (No. 36 5 511) with drift adapter (No. 36 5 514) in a vice and insert the front wheel left side up.
- Heat the left bearing seat.



Technical data

Mating temperature, wheel bearing, front		100 °C	
--	--	--------	--

- Using disc (No. 36 3 672), drift (No. 36 3 671) and handle (No. 00 5 500), press in the left wheel bearing until seated.
- Turn the front wheel over and install the tubular spacer.
- Heat the right bearing seat.



Technical data

Mating		100 °C	
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temperature, wheel bearing, front			
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! Attention

Nature: If the left wheel bearing lifts off its seat it can tilt in its bore. The bearing, axle or wheel rim can be damaged. If the motorcycle is equipped with ABS the wheel-speed signal might not be interpreted correctly.

Avoidance: When pressing in the right wheel bearing, make sure that the left wheel bearing does not move away from its seat.

- Using disc (No. 36 3 672) , drift (No. 36 3 671) and handle (No. 00 5 500) , press in the right wheel bearing until seated.

! Attention

Nature: The inside diameters of the shaft sealing rings differ. Bearing damage will result if the shaft sealing rings are mixed up.

Avoidance: Note correct installed locations.

- Allow the front wheel to cool and press in the rotary shaft seals, using washer (No. 36 3 672) , drift (No. 36 3 671) and handle (No. 00 5 500) until seated.
- » Left wheel bearing - large inside diameter.
- » Right wheel bearing - small inside diameter.

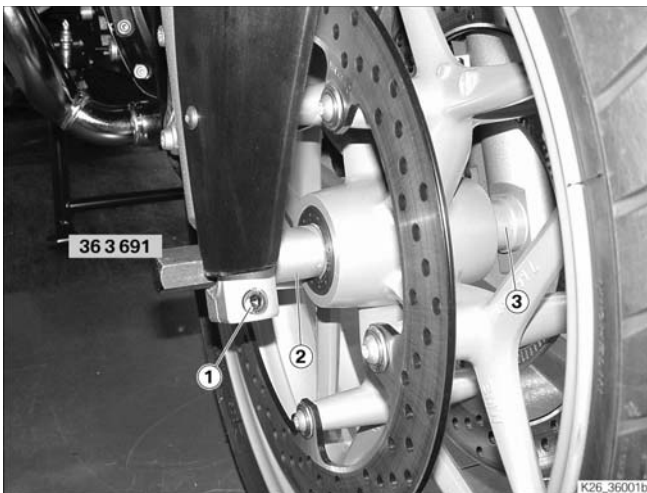
(-) Installing the front wheel


- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.

EF Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Clean quick-release axle (2) and grease it with lubricant.




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
-

Lower engine stand.

- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	


- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Checking ABS sensor gap

Test

- Use a feeler gauge to check the gap between the ABS sensor and the sensor ring.

 Technical data			
ABS speed sensor, front - clearance from sensor ring		0.2 - 1.7 mm	

Result: Gap out of tolerance


Measure:

- Check whether the left wheel bearing is fully pressed in. If necessary, change the wheel bearing again.

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature:

Self-diagnosis is not performed unless both brake levers are in their fully

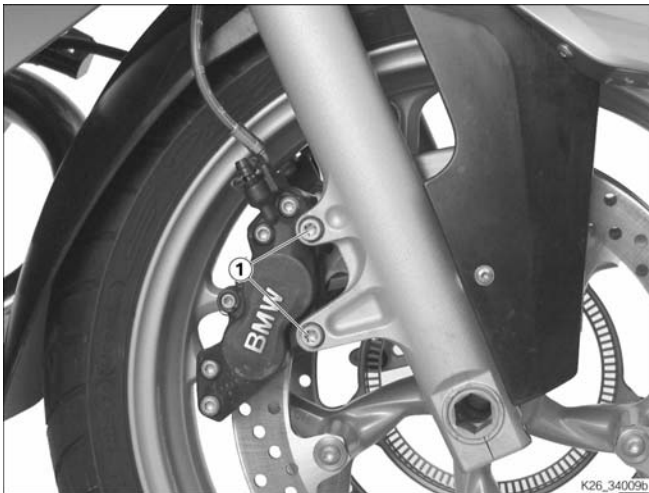
released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing right brake caliper

- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

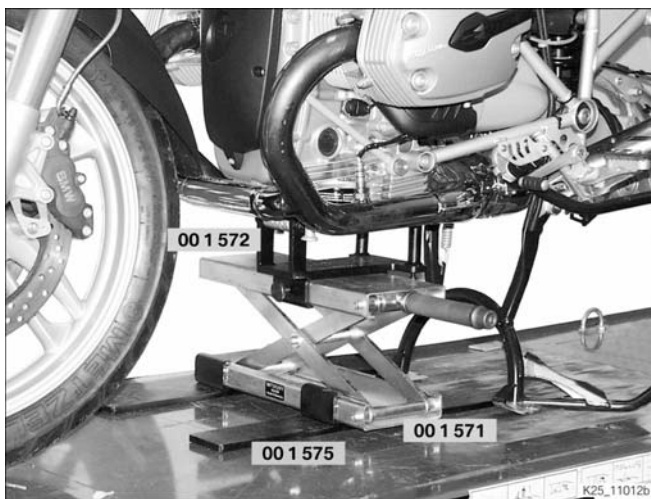
(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

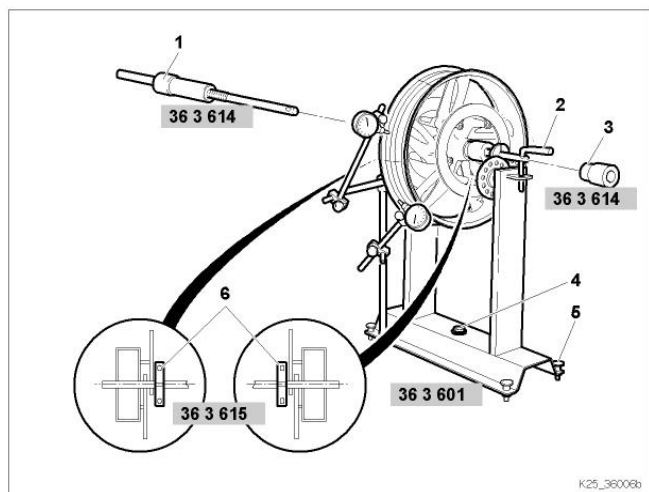


(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



36 32 528 Checking wheel rim for runout (wheel rim removed)




(-) Checking runout of front wheel rim

- Align balancer (No. 36 3 601) with knurled screw (5) and level gauge (4).
- Install counterbalance shaft (No. 36 3 614) in front-wheel bearing.
- Slightly preload the front-wheel bearing.
- Set the front wheel on the balancer.
- Clamp the counterbalance shaft on the balancer with locators (No. 36 3 615) in such a way that the counterbalance shaft cannot drift.

Test

- Set the dial gauge on the machined inner face and check lateral runout.

 Technical data			
Front wheel - lateral runout		max. 2 mm	


Result: Nominal value exceeded

Measure:

- Replace the wheel rim.

Test

- Set the dial gauge on the machined inner face and check vertical runout.

 Technical data			
Front wheel - vertical runout		max. 2 mm	

Result: Nominal value exceeded

Measure:

- Replace the wheel rim.

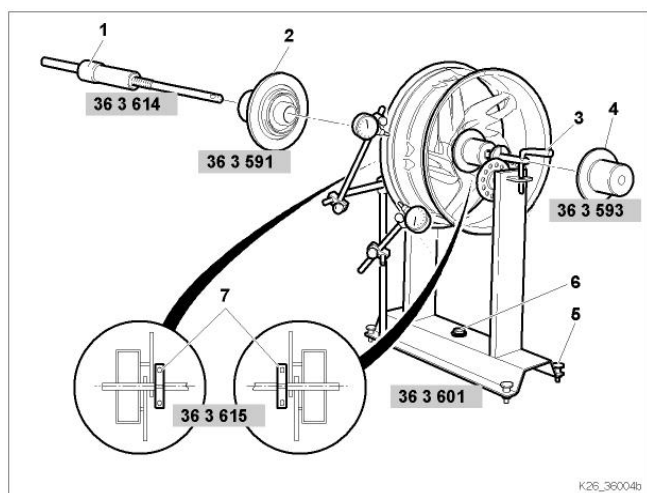
(-) Checking runout of rear wheel rim

- Align balancer (No. 36 3 601) with knurled screw (5) and level gauge (6).
- Install counterbalance shaft (No. 36 3 614) with adapters (No. 36 3 591) and (No. 36 3 593) in the rear wheel.
- Set the rear wheel on the balancer.
- Clamp the counterbalance shaft on the balancer with locators (No. 36 3 615) in such a way that the counterbalance shaft cannot drift.

Test

- Set the dial gauge on the machined inner face and check lateral runout.

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Technical data

Rear wheel - lateral runout		max. 2 mm	
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Result: Nominal value exceeded

Measure:

- Replace the wheel rim.

Test

- Set the dial gauge on the machined inner face and check vertical runout.



Technical data

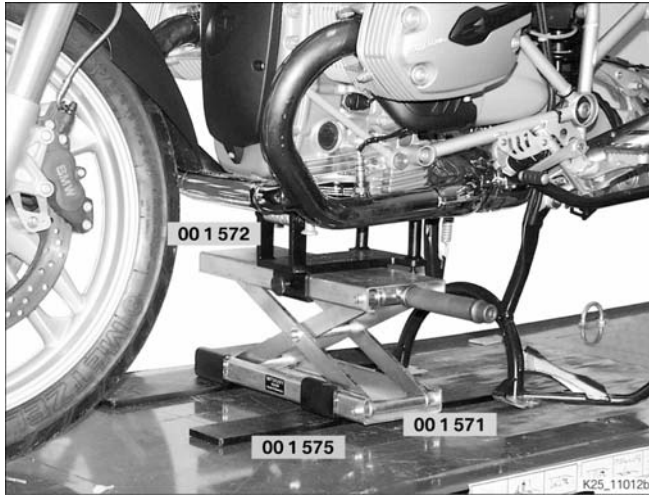
Rear wheel - vertical runout		max. 2 mm	
------------------------------	--	-----------	--

Result: Nominal value exceeded

Measure:

- Replace the wheel rim.

📁 36 32 552 Changing tyre for front wheel



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.



Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

(-) Removing left brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).



Attention

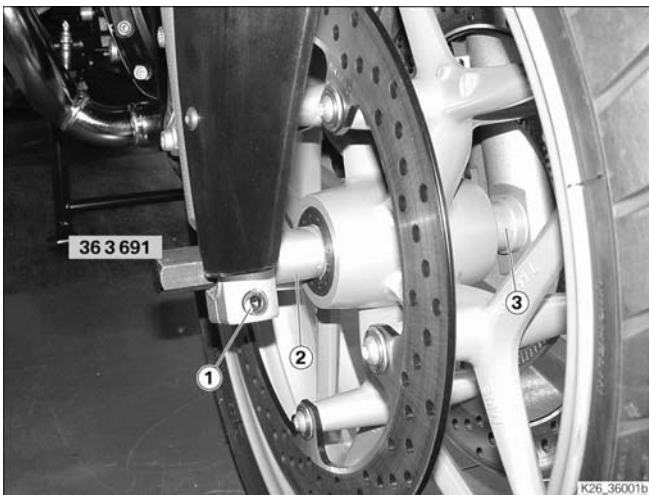
Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691) .
- Roll the front wheel forward to remove.



Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

(-) Changing tyres

► Removing tyres



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use

masking tape if necessary.

- Use commercially available tools to strip the tyre off the rim.



- Remove the old valve and install a new valve.

► **Fitting tyres**



Attention


Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Use commercially available tools/fitting equipment and work to the manufacturer's specifications to fit tyres, and make sure that the direction-of-rotation arrows on tyre and rim point in the same direction.

Test


- Inflate the tyre to test pressure and check the valve for leaks.

 Technical data			
Test pressure, wheel valve		4 bar	

Result: Valve leaking

Measure:


- Remove valve and clean support surfaces.
- If necessary clean thread and install new valve.

 Tightening torques		
Metal valve in rim, G 1/8" (pipe thread), Replace metal valve Micro-encapsulated	12 Nm	

Result: Valve leaktight

Measure:

- Correct the tyre pressure

 Technical data			
Tyre pressure, front wheel, one-up	cold	2.2 bar	
Tyre pressure, front wheel cold, two-up or	cold	2.5 bar	

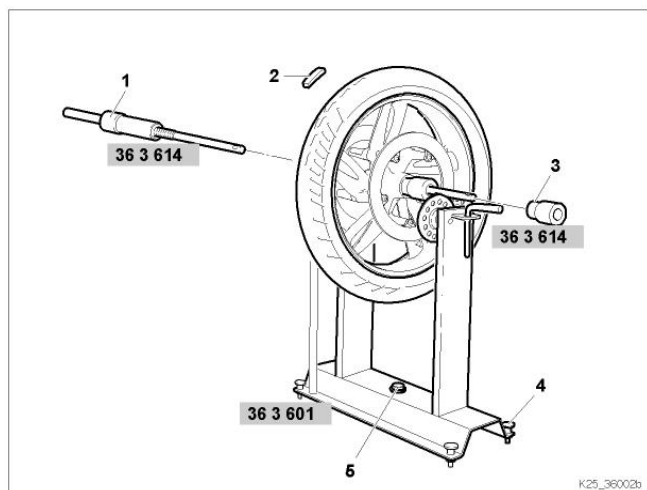
luggage			
Tyre pressure, front wheel, two-up + luggage	cold	2.5 bar	
Tyre pressure, rear wheel, one-up	cold	2.5 bar	
Tyre pressure, rear wheel, two-up or luggage	cold	2.9 bar	
Tyre pressure, rear wheel, two-up + luggage	cold	2.9 bar	


- Check the tyre and make sure the line is at a uniform distance from the rim flange all the way round.



(-) Static balancing of front wheel

- Align balancer (No. 36 3 601) with knurled screw (4) and level gauge (5).
- Install balancing shaft (No. 36 3 614) in front-wheel bearing.
- Slightly preload the front-wheel bearing.
- Place the front wheel on the balancer and allow it to come to rest.
- Clean the attachment points for the adhesive weights.
- Affix adhesive weights (2) uniformly spaced on both sides of the rim opposite the wheel's heaviest point.



 Technical data			
Front wheel - imbalance		max. 25 g	
Value definition:			
Compensation by balancing weight(s)			

- Repeat the balancing procedure as a check.

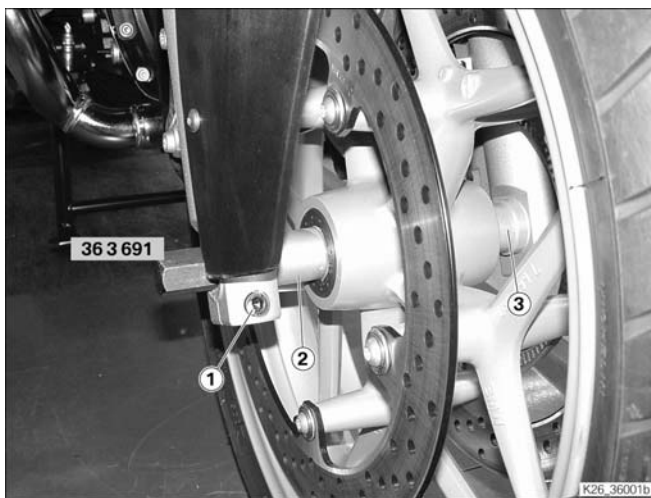
(-) Installing the front wheel

- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note


Do not damage the ABS sensor when rolling the front wheel in or out between the forks.




- Clean quick-release axle (2) and grease it with lubricant.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.

 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	


- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure


to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Securing right brake caliper

- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).



 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

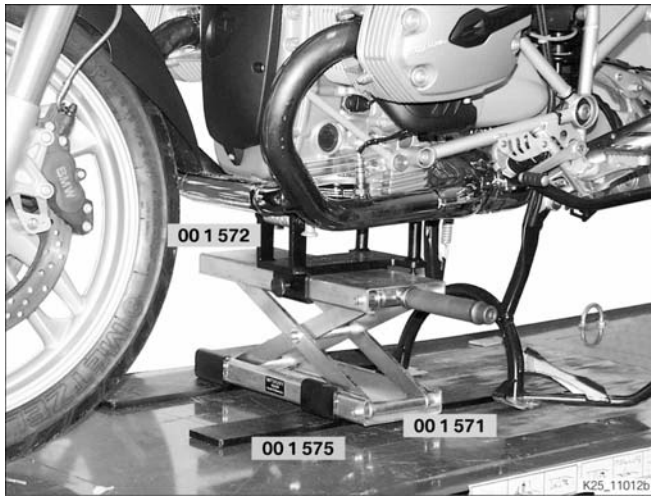
- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.

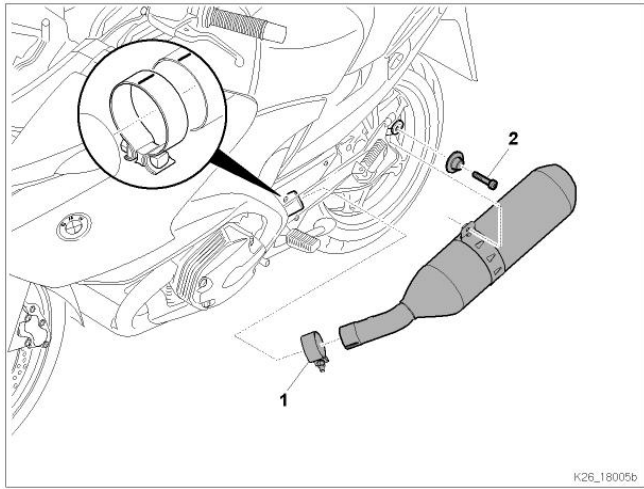


(-) Removing engine stand



- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .

 **36 32 553 Changing tyre for rear wheel**



(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.

(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).

 **Attention**

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Remove rear wheel.



(-) Changing tyres

▶ Removing tyres

 **Attention**

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Use commercially available tools to strip the tyre off the rim.



- Remove the old valve and install a new valve.

► **Fitting tyres****Attention**


Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Use commercially available tools/fitting equipment and work to the manufacturer's specifications to fit tyres, and make sure that the direction-of-rotation arrows on tyre and rim point in the same direction.


Test

- Inflate the tyre to test pressure and check the valve for leaks.

 Technical data			
Test pressure, wheel valve		4 bar	


Result: Valve leaking**Measure:**

- Remove valve and clean support surfaces.
- If necessary clean thread and install new valve.

 Tightening torques		
Metal valve in rim, G 1/8" (pipe thread) , Replace metal valve Micro-encapsulated	12 Nm	

Result: Valve leaktight**Measure:**

- Correct the tyre pressure

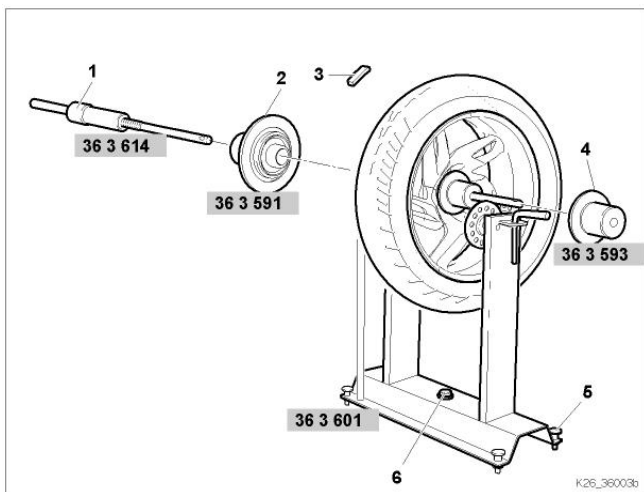
 Technical data			
Tyre pressure, front wheel, one-up	cold	2.2 bar	
Tyre pressure, front wheel cold, two-up or luggage	cold	2.5 bar	
Tyre pressure, front wheel, two-up + luggage	cold	2.5 bar	

Tyre pressure, rear wheel, one-up	cold	2.5 bar	
Tyre pressure, rear wheel, two-up or luggage	cold	2.9 bar	
Tyre pressure, rear wheel, two-up + luggage	cold	2.9 bar	


- Check the tyre and make sure the line is at a uniform distance from the rim flange all the way round.



(-) Static balancing of rear wheel



- Align balancer (No. 36 3 601) with knurled screw (5) and level gauge (6).
- Install balancing shaft (No. 36 3 614) and adapters (No. 36 3 591) , (No. 36 3 593) in the rear wheel.
- Slightly preload the rear-wheel bearing.
- Place the rear wheel on the balancer and allow it to come to rest.
- Clean the attachment points for the adhesive weights.
- Affix adhesive weights (3) uniformly spaced on both sides of the rim opposite the wheel's heaviest point.

 Technical data			
Rear wheel - imbalance Value definition: Compensation by balancing weight(s)		max. 25 g	

- Repeat the balancing procedure as a check.

(-) Installing rear wheel

- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.



Attention


Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.

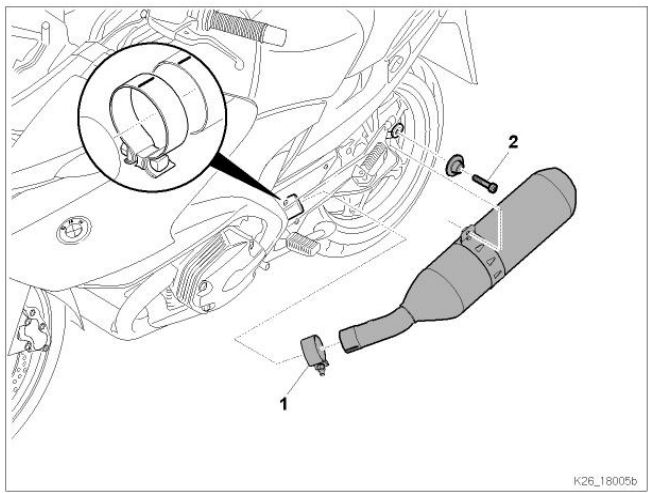


K26_36005b


 Tightening torques		
Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite sequence	60 Nm	
Wheel flange with cut thread, M10 x 40 x 1.25, in diagonally opposite sequence	60 Nm	

(-) Installing silencer


- Grease the inner face of Torca clamp (1).



K26_18005b

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599


- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.

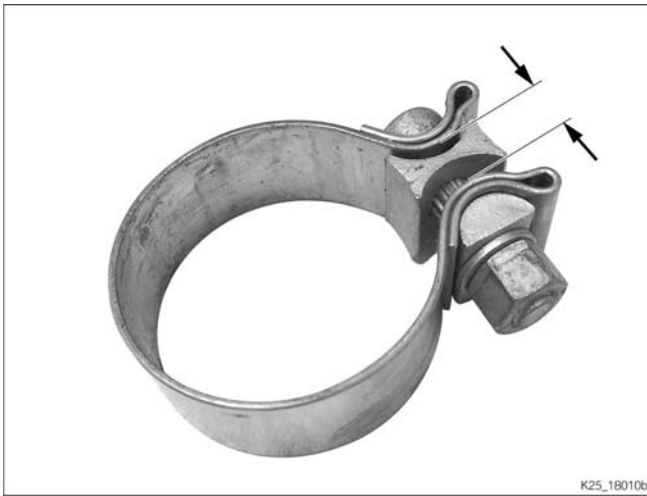


K28_18007b

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	


► Checking Torca clamp on silencer

- Tighten the Torca clamp.



Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




► **Checking distance between silencer and rear wheel**



Test

- Check distance (arrows) between silencer and rear wheel.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ **Adjusting silencer**

- Undo Torca clamp.
- Remove screws (1).

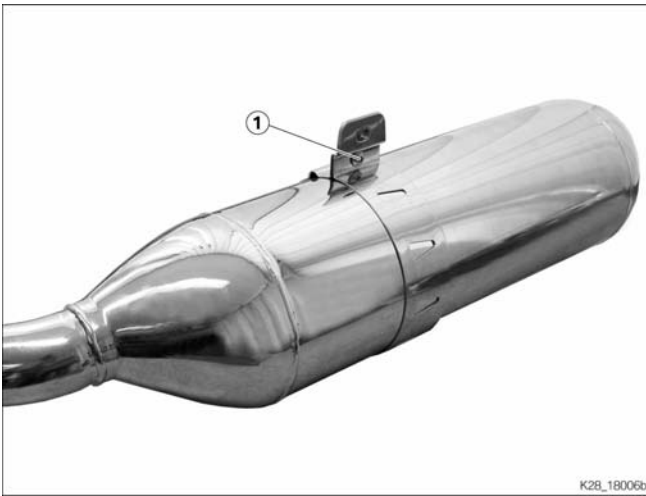


Attention


Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.


Open the clamp far enough and grease it lightly.




- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.

 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Tighten Torca clamp.

 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

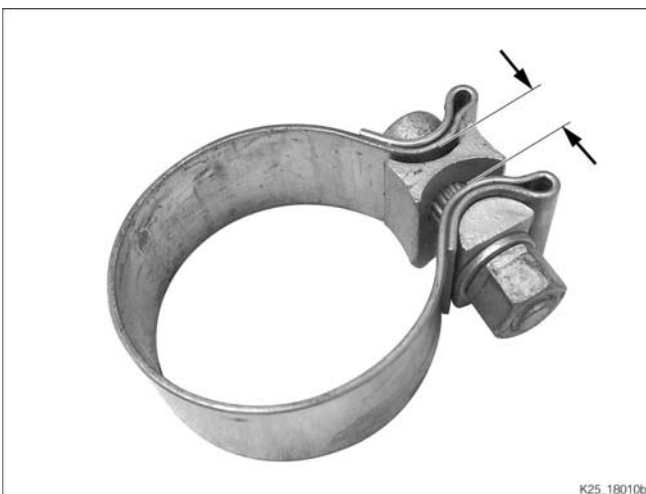



▷ **Checking Torca clamp on silencer**

- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.



 Tightening torques		
Torca clamp to silencer and elbow, M8 Optimoly TA	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.



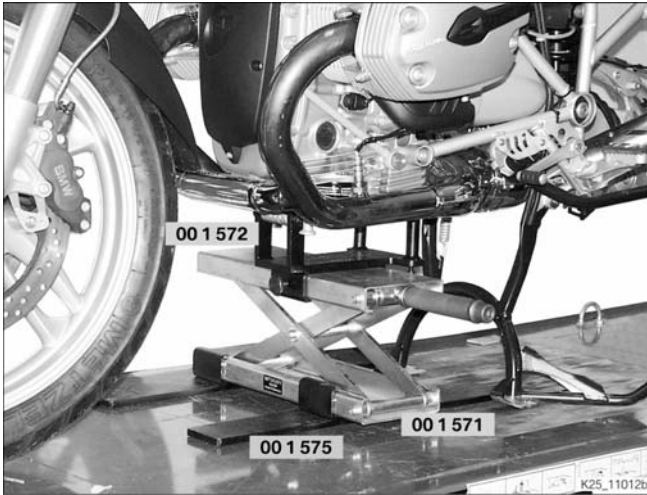
Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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 **46 51 030 Removing and installing front frame section**

(-) Installing engine stand



- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.

Variant, Seat heating



- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



K26_46017b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



K26_65007b

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

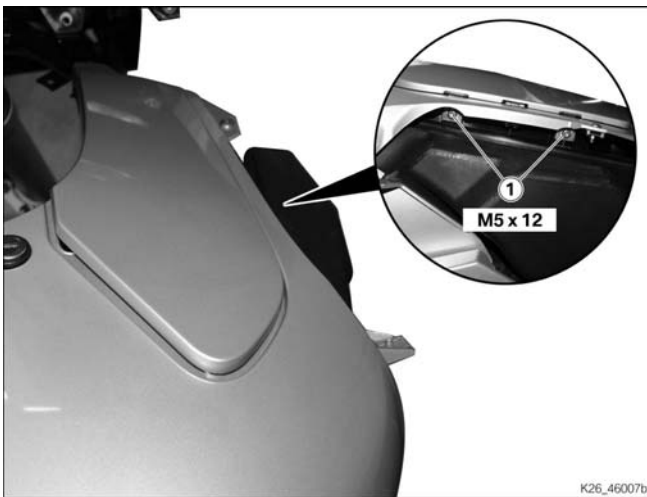
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



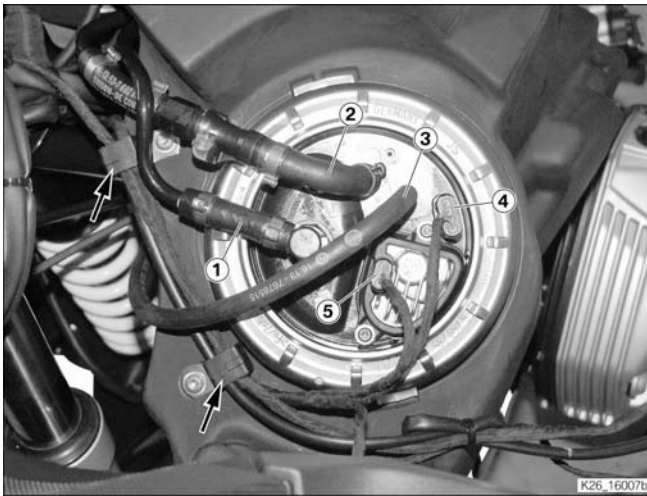
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

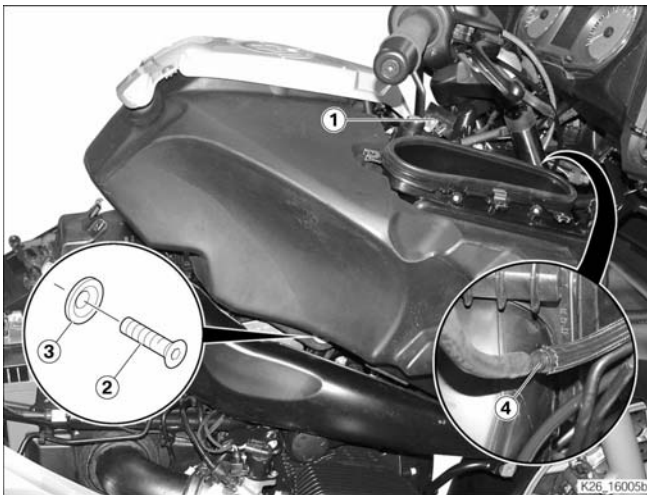


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

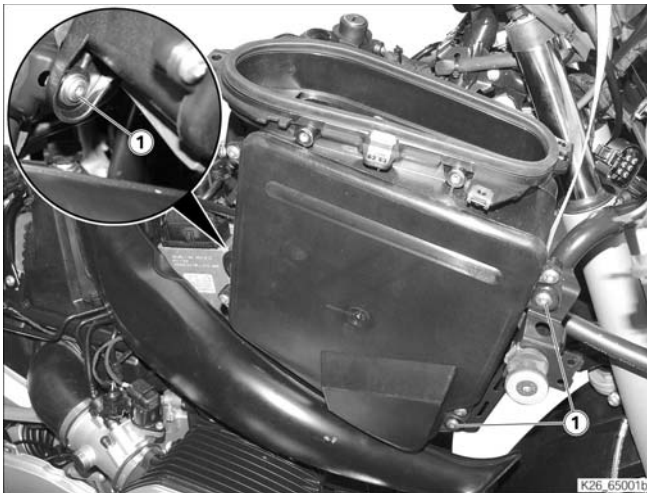


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing stowage compartment

- Remove screws (1).
- Remove the stowage compartment.



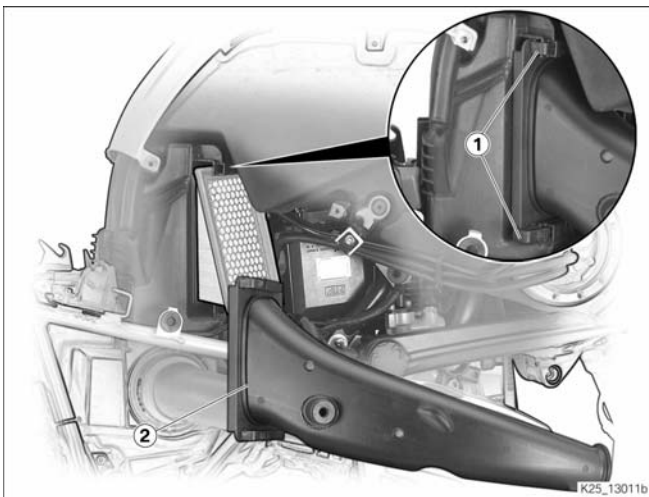
Variant, Radio with CD player

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



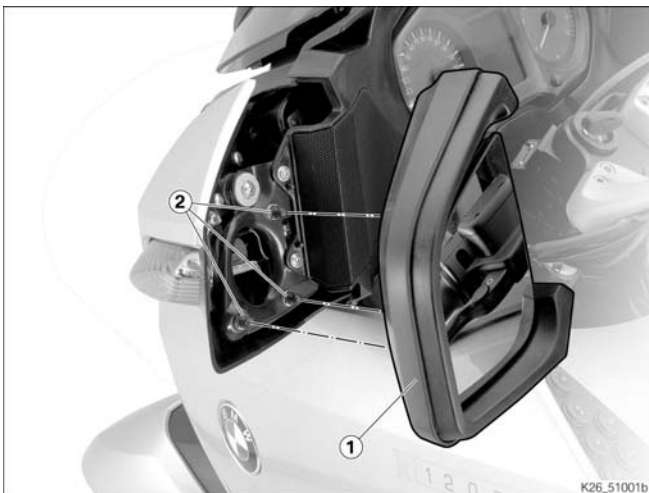
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Removing mirror

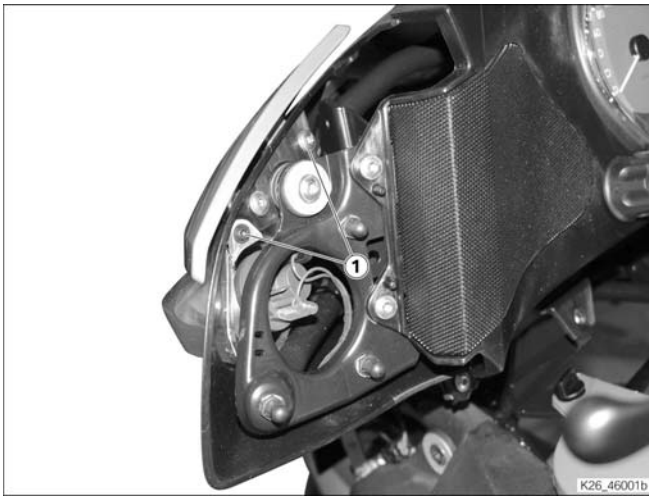
- Detach mirror (1).



Variant, Radio with CD player

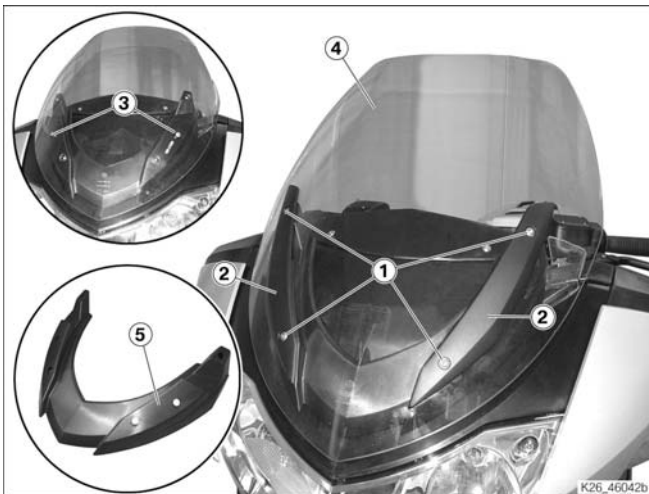
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



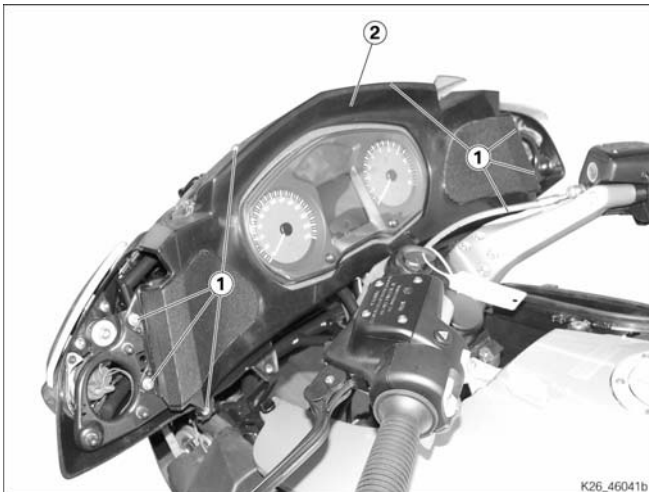
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).



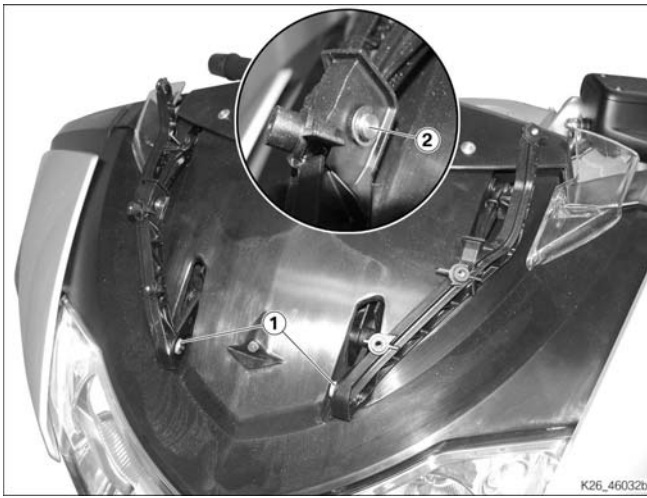
(-) Removing inner trim for instruments

- Remove screws (1).
- Remove inner trim (2).



(-) Partially removing holder for windscreen

- Remove clips (1).
- Press out pin (2).

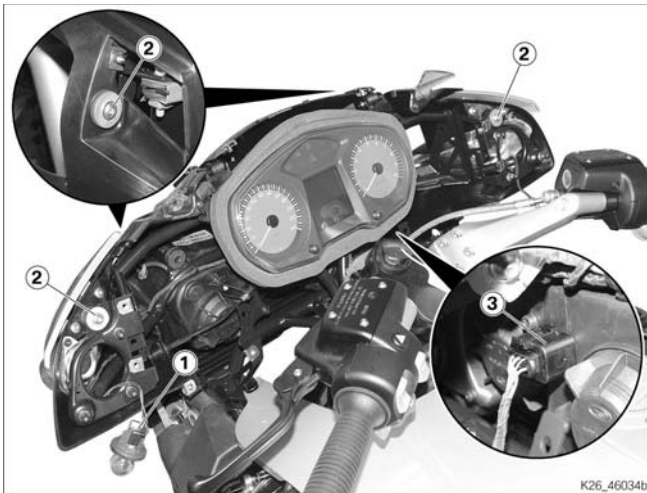


- Use a strap to keep holder (1) back out of the way.



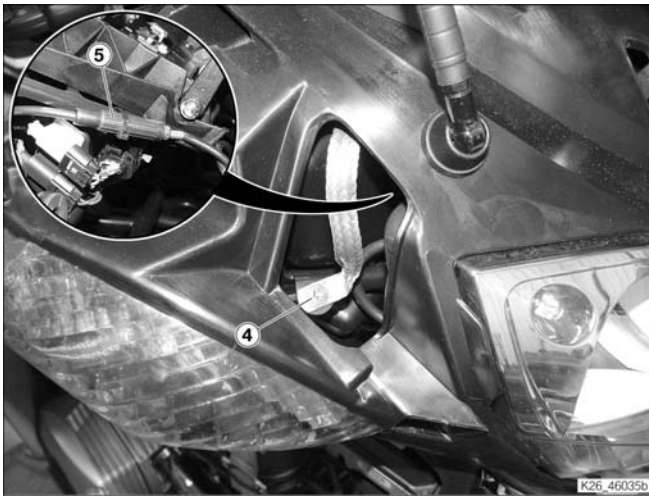
(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

- Remove screw (4).
- Disconnect plug (5).



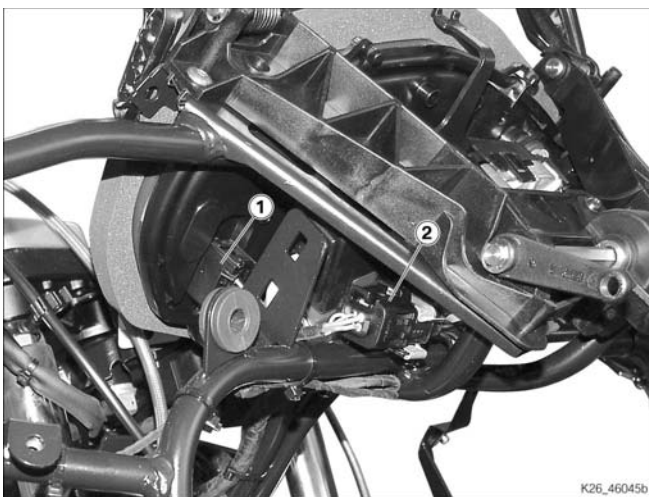
- Carefully pull upper section of fairing in forward direction to remove.

(-) Removing oil cooler



- Remove screws (1).
- Carefully lower oil cooler (2) to the floor.

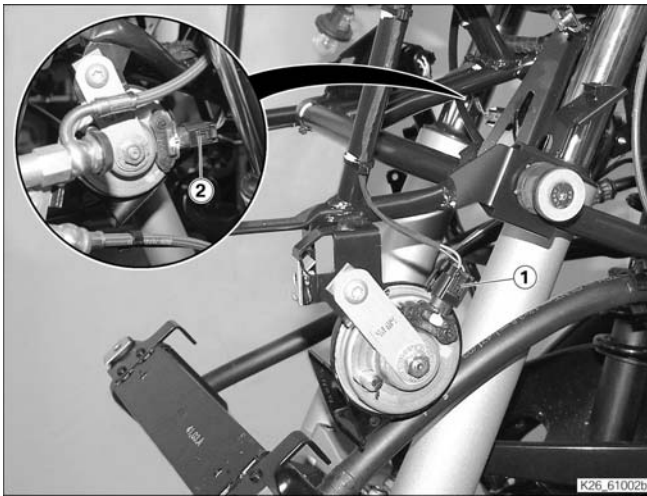
(-) Removing fairing bracket



- Disconnect plugs (1) and (2).

► Removing horn

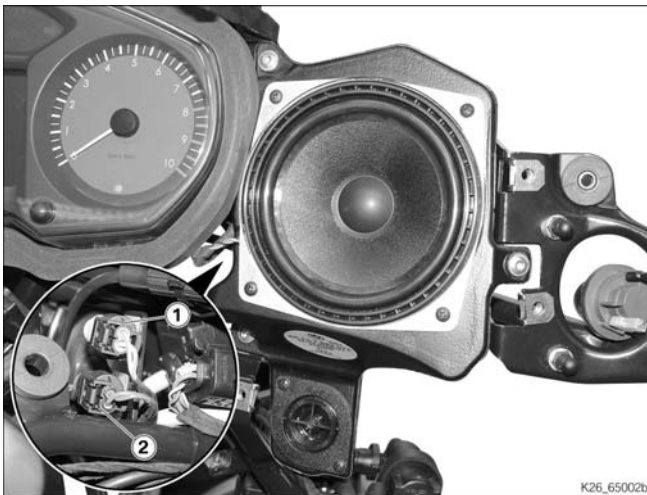
- Disconnect plugs (1) and (2).



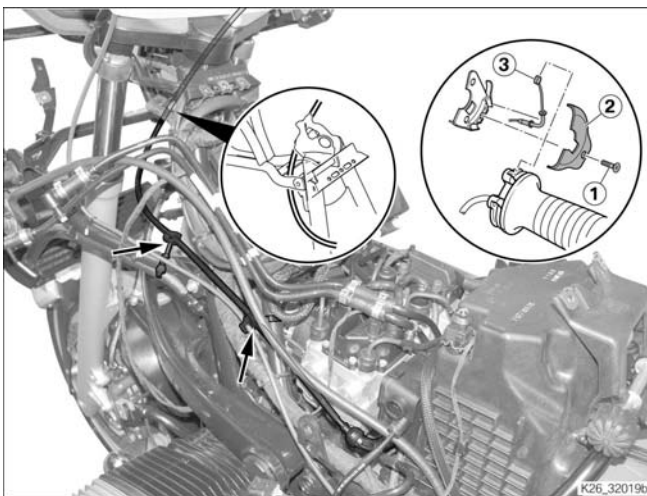
◀ **Variant, Radio with CD player**

▶ **Removing left and right speakers**

- Disconnect plug (1).
- Disconnect plug (2).

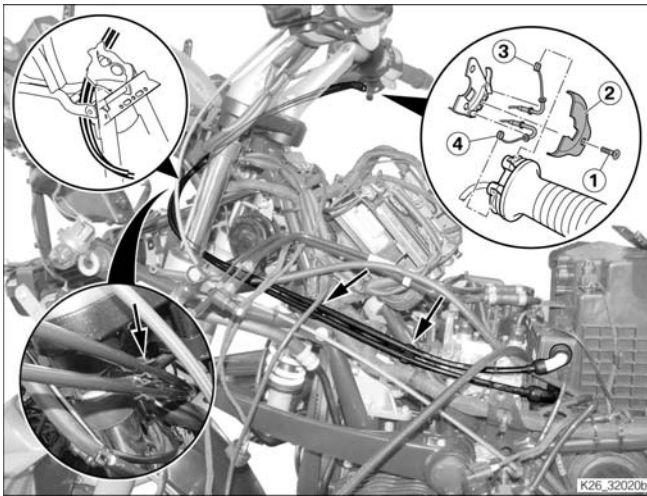


- ◀
- Remove screw (1).
 - Remove cover (2) from throttle twistgrip.
 - Disengage Bowden cable (3).
 - Unclip Bowden cable (3) from retainers (arrows) on frame.



Variant, cruise control

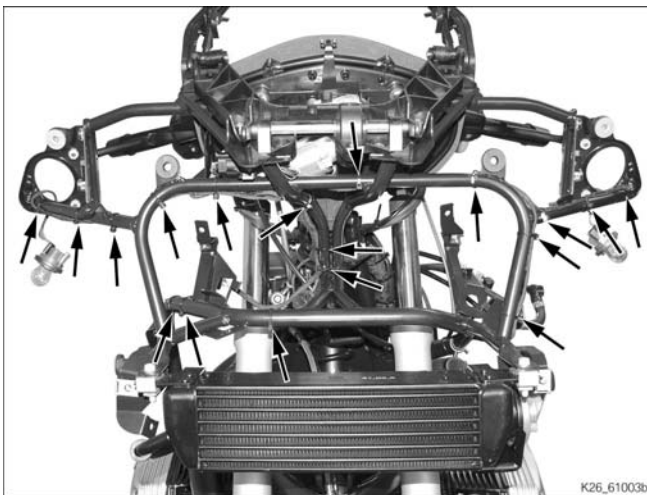
- Remove screw (1).
- Remove cover (2) from throttle twistgrip.
- Disengage Bowden cables (3) and (4).
- Unclip Bowden cables (3) and (4) from retainers



(arrows) on frame.



- Release left and right retaining clips (1).
- Release retaining clip (2).
- Cut through cable ties (3).



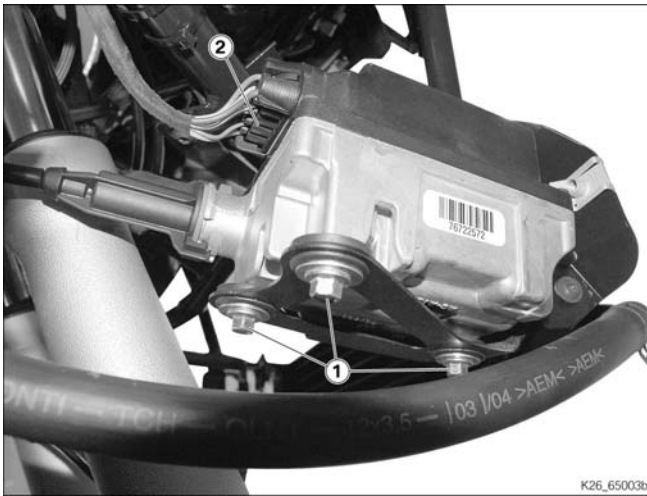
► **Disengaging wiring harness at front**

- Cut through all cable ties (arrows) on the fairing bracket.
- Thread the cable clear of the fairing bracket.

◄ **Variant, cruise control**

► **Removing control unit for cruise control**

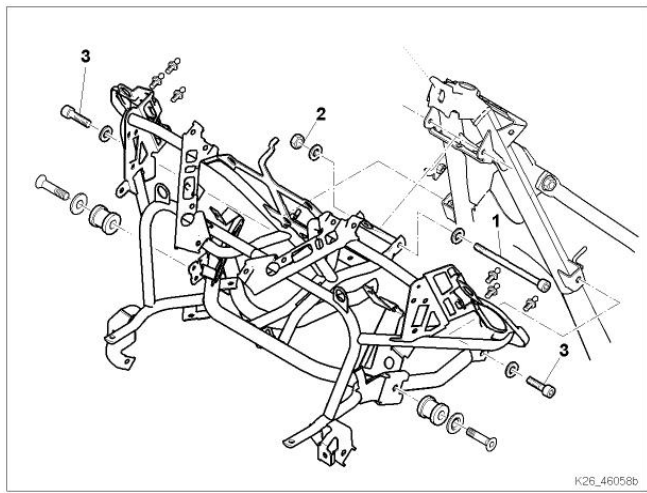
- Remove screws (1).
- Disconnect plug (2).
- Use cable ties to hold the control unit out of the way.



K26_65003b



- Remove quick-release axle (1) with nut (2).
- Remove screws (3) on left and right.
- Carefully pull fairing bracket in forward direction to remove.



K26_46058b

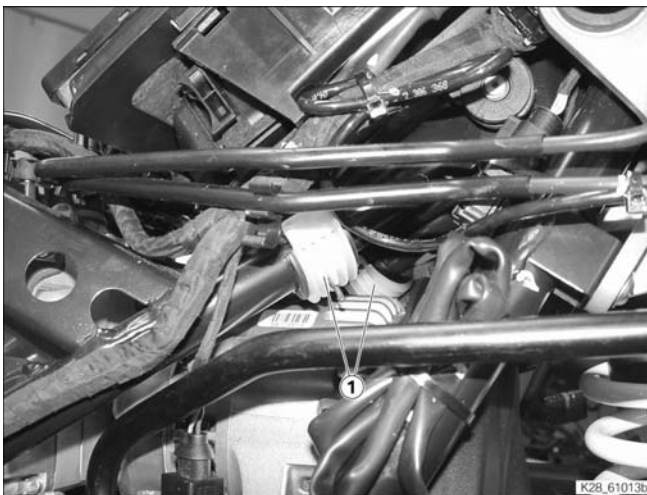
(-) Replacing front frame section

► Removing frame front section

- Release the wiring harness from the frame front section.

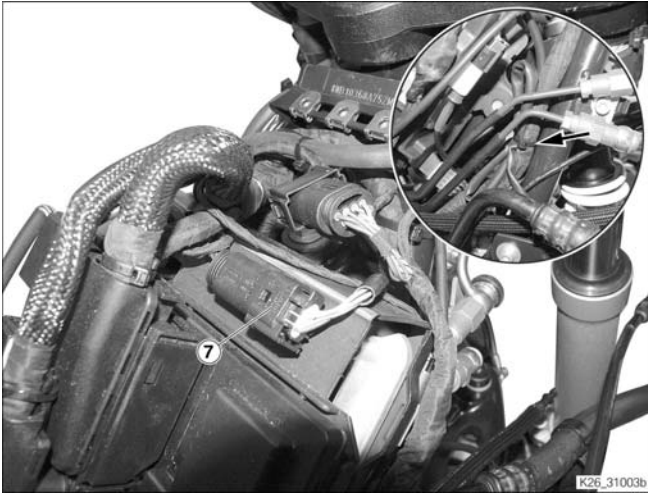
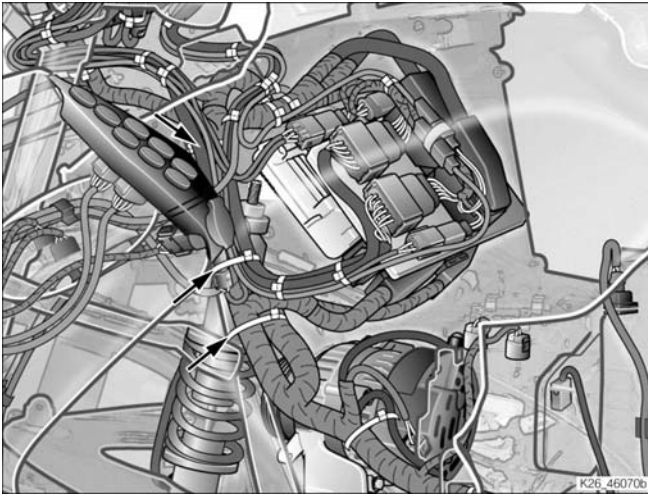
▷ Removing control unit box

- Open latches of control unit box (1) on left and right.



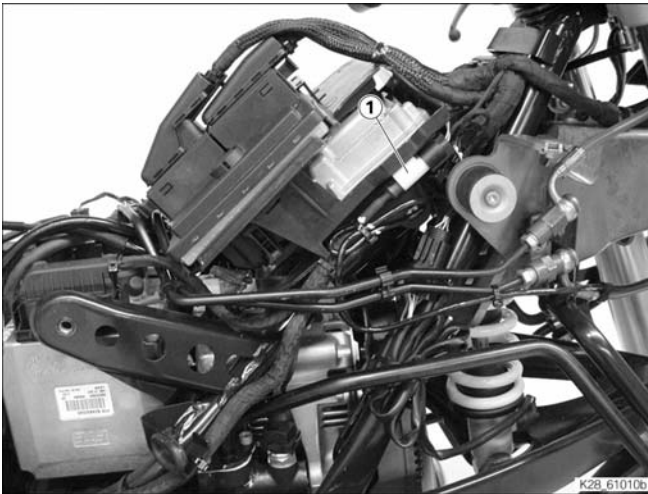
K28_61013b

- Open cable ties (arrows) on the left link.



Variant, ESA

- Cut through the cable tie (arrow) on the link.
- Disconnect plug (7) of the spring strut.

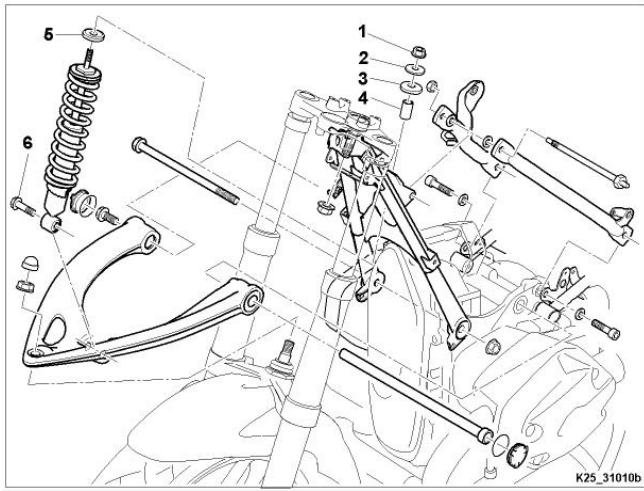


- Disconnect plug for ABS sensor (1) and remove it from the control unit box.
- Release the control unit box from the link and remove it.



Removing spring strut

- Remove nut (1) at top.
- Remove washer (2), rubber buffer (3) and sleeve (4).



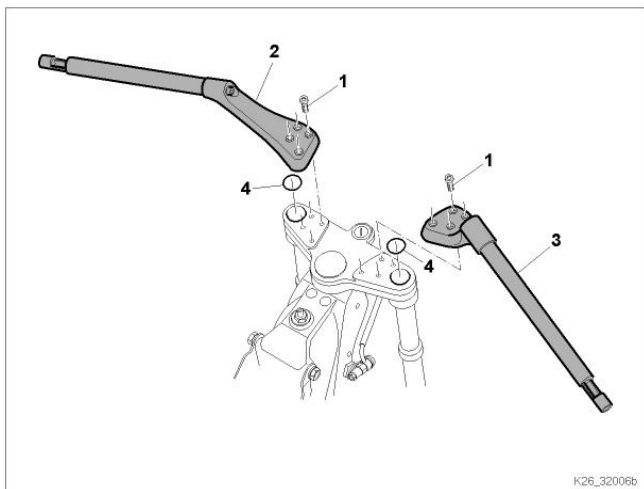
▷ **Removing front distributor**

- Remove screw (1).



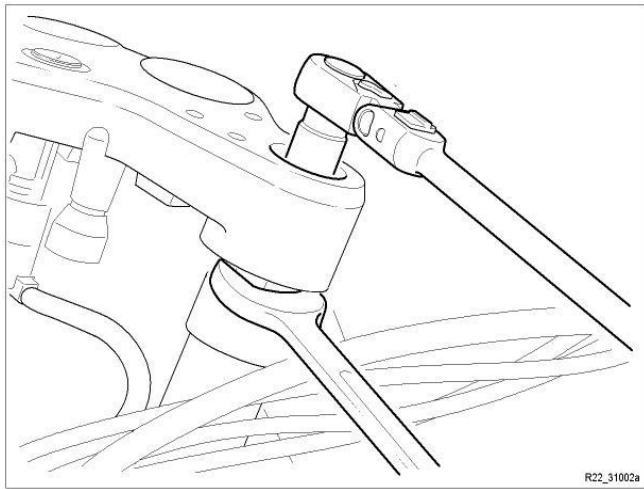
▷ **Releasing stub handlebars**

- Raise the engine until the spring strut is clear.
- Remove screws (1) from the stub handlebars.
- Lay stub handlebars (2) back out of the way.

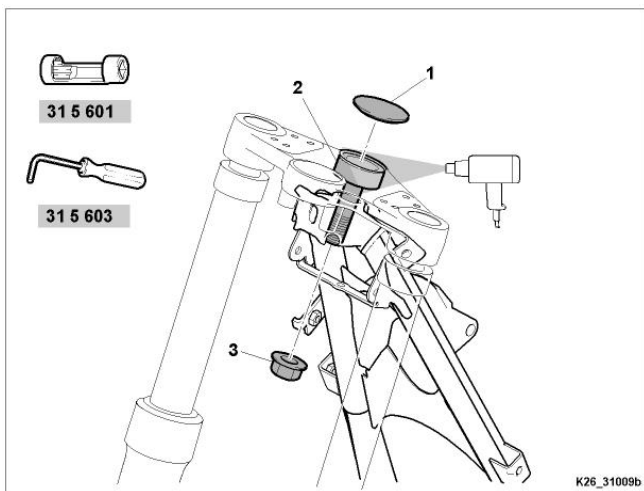


▷ **Removing upper fork bridge**


▷ **Releasing fixed fork tubes**



- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



- Remove cap (1).
- Heat threaded fastener (2) of the fork bridge from above.

 Technical data			
Release temperature, top fork bridge		120 °C	

- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, remove nut (3) with socket wrench insert (No. 31 5 601) .



Attention

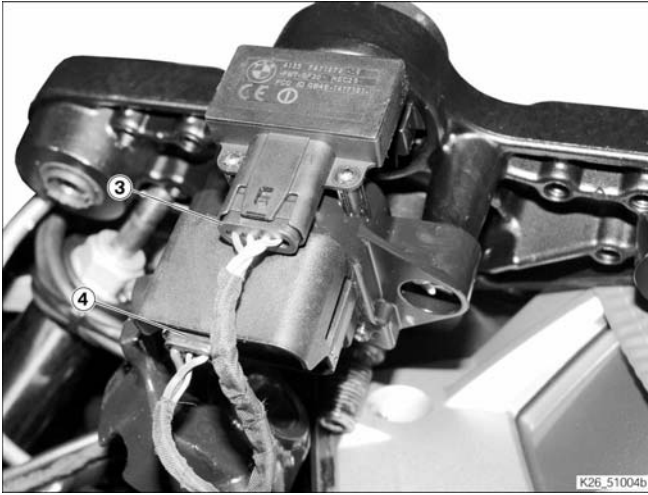
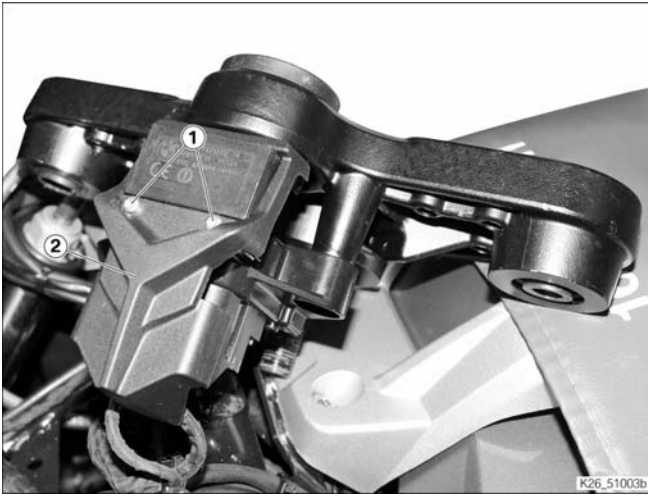
Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

- Turn the fork bridge all the way to the left and carefully remove the steering head bearing from the frame front section.
- Carefully lay the fork bridge back out of the way.

▷ **Disconnecting plug for ignition switch/ring aerial**

- Remove screws (1).
- Remove cover (2).



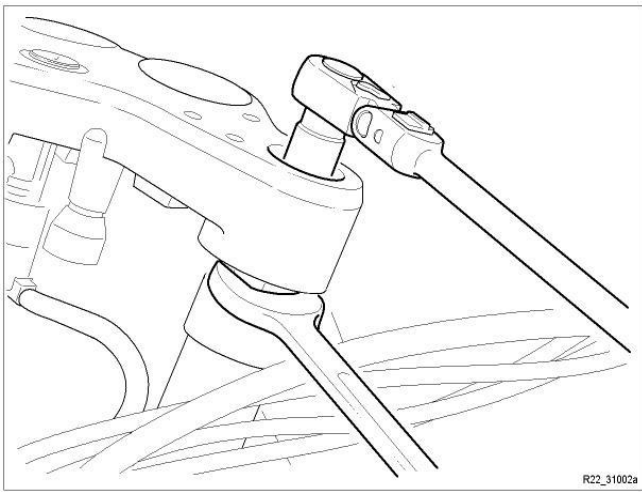
- Disconnect plugs (3) and (4).



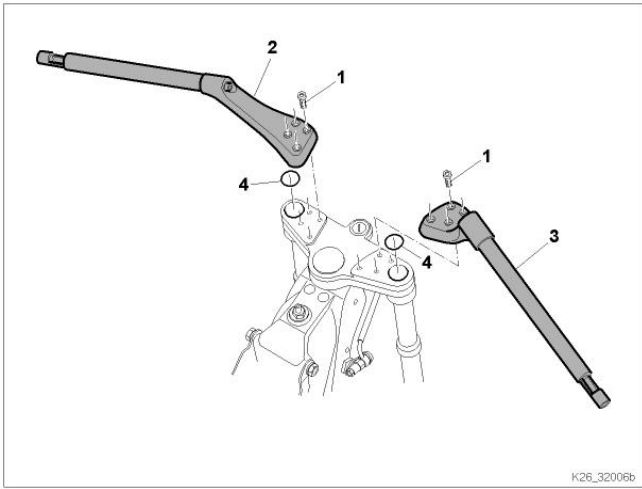
- Remove screw (1) from the oil-cooler return line.
- Align the front legs horizontally to the front.



- Working from below, introduce both fork legs into the top fork bridge.
- Provisionally secure the fork legs in the top fork bridge by tightening the nuts.

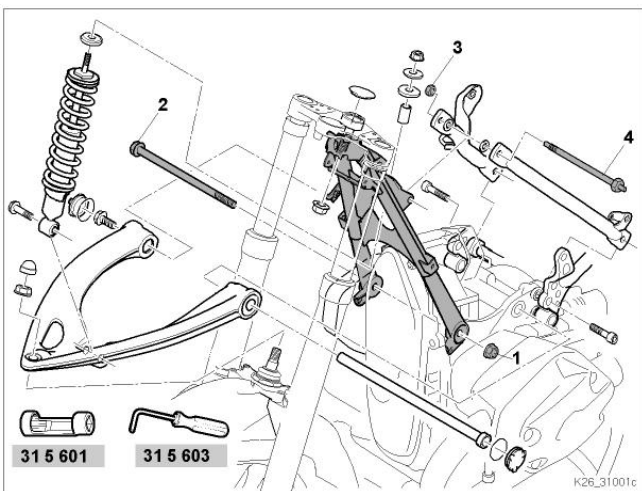


R22_31002a




K26_32006b

- Provisionally secure stub handlebars (2) and (3) to the top fork bridge with one screw per handlebar.



K26_31001c

- Use a strap to secure the top fork bridge to crane (No. 46 5 671), (No. 46 5 672), (No. 46 5 673), (No. 46 5 674).
- Crank the crane high enough to bring the front section of the motorcycle vertical.
- Heat nuts (1) and (3) and remove them.

 Technical data			
Release temperature, microencapsulated threaded fasteners		80 °C	

- Remove quick-release axle (2) and (4).

Attention

Nature: Bent or badly routed brake lines can chafe and leak.

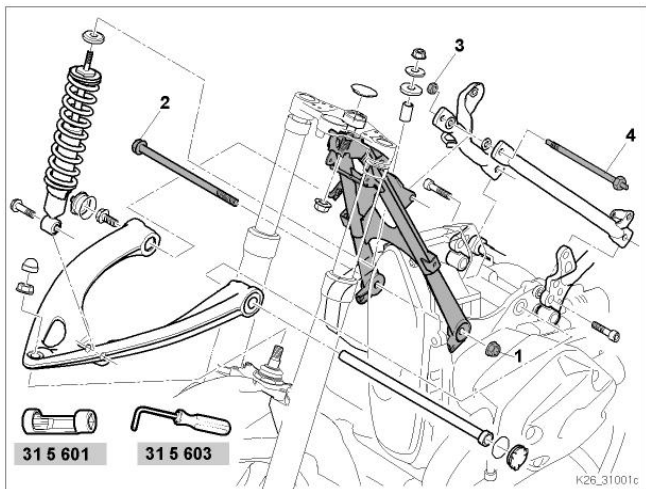
Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make

sure that all components have adequate clearance, even when the handlebars are turned to full lock.



- Remove the frame front section, noting the distributor.
- Secure clamping straps (arrows) for throttle cable and clutch line to the frame front section.
- Transfer the Vehicle Identification Number (VIN) from the old frame front section to the new frame, using number and letter punches, and spray the area with clear lacquer to seal it.
- Allow the clear lacquer to dry and apply adhesive film over the VIN.
- Dispose of the old frame front section in accordance with locally applicable legislation.



► **Installing front frame section**

- Clean threads of quick-release axles (2) and (4).

Attention

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Introduce the frame front section between the links and align it, noting the distributor.
- Grease quick-release axle (4) and insert it into the frame front section.




Consumables/lubricants


Optimoly TA	High-temperature assembly grease	18 21 9 062 599
-------------	----------------------------------	--------------------

- Install new nut (3) and tighten until hand-tight.
- Using a strap, pull the top and bottom fork bridges toward each other until the bottom fastener of the frame front section is easily accessible.


- Grease quick-release axle (2) and install it.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

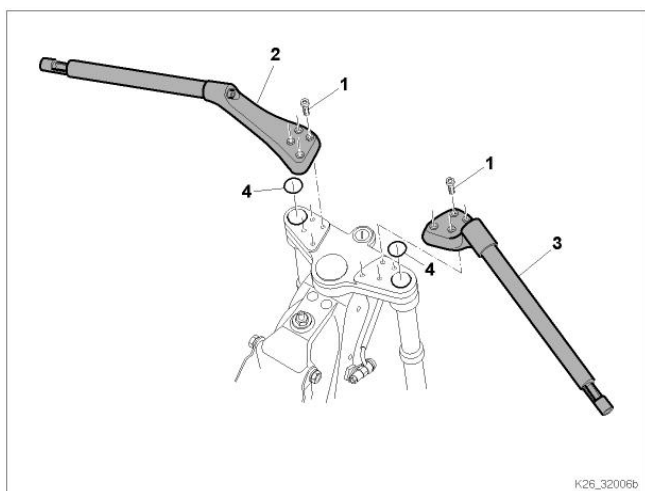
- Install new nut (1) and tighten.

 Tightening torques		
Front frame to engine, M12 x 210 - 10.9, Replace nuts Micro-encapsulated	130 Nm	

- Relieve the tension on the strap holding the fork bridges until they are more or less in the original positions.
- Tighten nut (3).

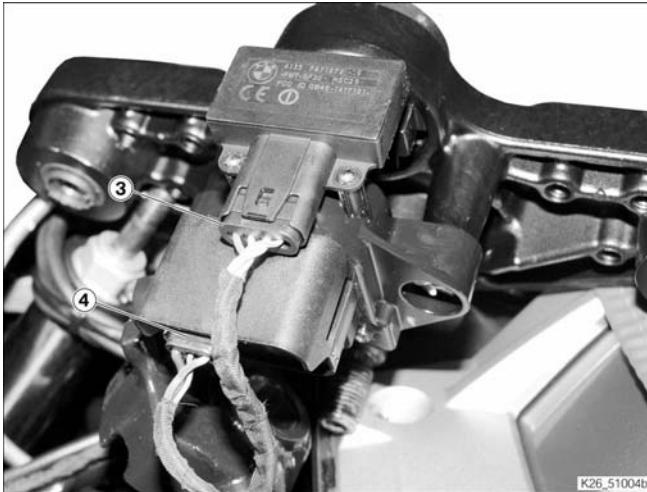
 Tightening torques		
Frame strut to front frame, M10 x 106 10.9, Replace nuts Micro-encapsulated	60 Nm	

- Lower crane (No. 46 5 671) ,. (No. 46 5 672) ,. (No. 46 5 673) ,. (No. 46 5 673) ,. (No. 46 5 674) until the straps can be removed from the front section of the motorcycle.
- Install the front wheel locating and locking element.
- Remove stub handlebars (2) and (3) from the top fork bridge.
- Release the fasteners securing the two fork legs in the top fork bridge.



▷ **Installing upper fork bridge**

- Clean the threads.

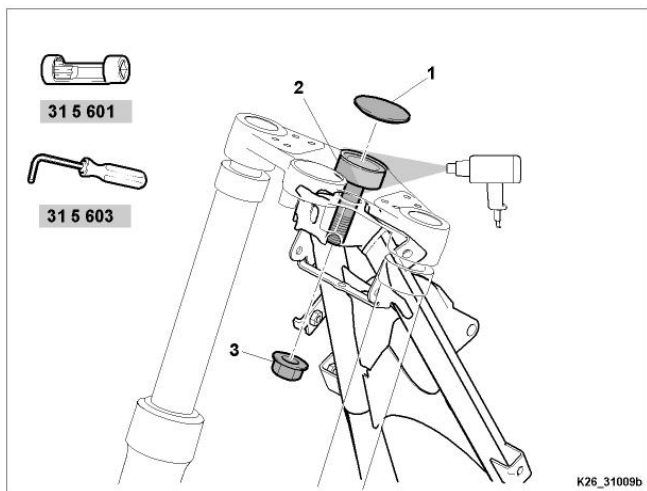


▷ **Connecting plug for ignition switch/ring aerial**

- Connect plugs (3) and (4).



- Install cover (2) and secure with screws (1).




⚠ Attention

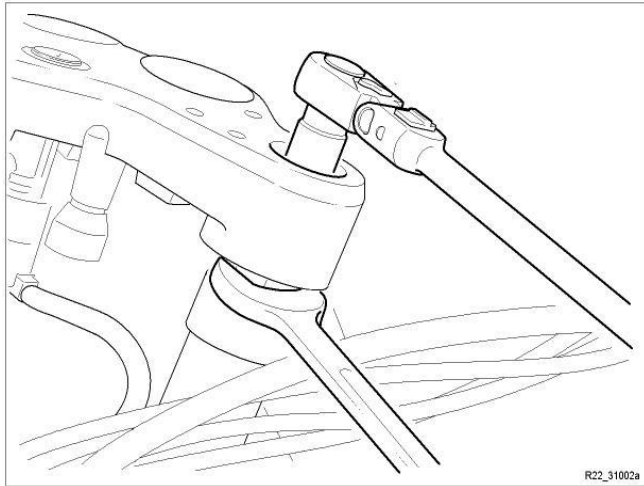
Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

- Turn the fork bridge all the way to the left and carefully introduce the steering head bearing into the frame front section.
- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, install new nut (3) with socket wrench insert (No. 31 5 601) .


 Tightening torques		
Fork bridge to front frame, M14 x 1.5, Replace nut Micro-encapsulated	130 Nm	

- Install cap (1).



▷ **Installing fixed fork tubes**

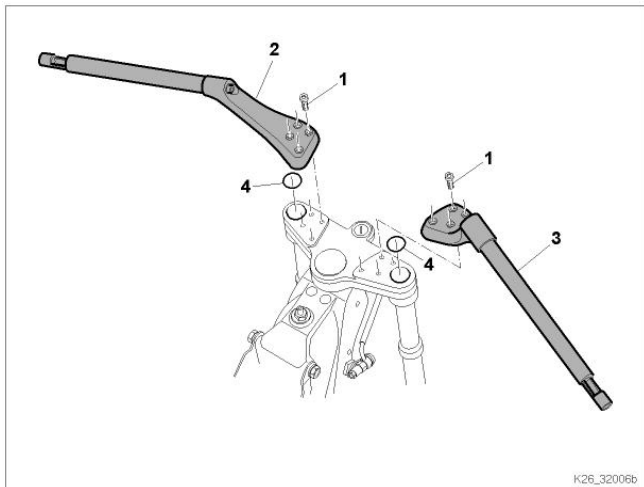
- Introduce the fixed fork tube into the fork bridge.
- Secure the fixed fork tube in the top fork bridge with a new nut, while holding the fixed fork tube at the hexagon underneath the fork bridge.


 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	



▷ **Securing stub handlebars**

- Position stub handlebars (2) on the top fork bridge, noting seals (4).
- Install screws (1).



 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	

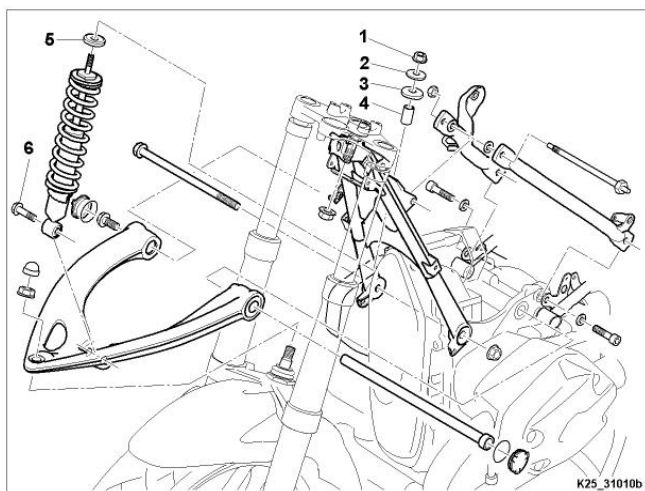


- Install screw (1) for the oil-cooler return line.
- Lower the engine until the spring strut can be aligned with the bore in the frame front section.




▷ **Installing spring strut**

- Clean the threads of the spring strut.
- Place rubber buffer (3), sleeve (4) and washer (2) in



position.

- Install nut (1) at top and tighten.

 Tightening torques		
Spring strut to front frame, Hex nut M10 x 1.25 Loctite 243	35 Nm	



▷ **Installing front distributor**


 **Attention**

Nature: Bent or badly routed brake lines can chafe and leak.

Avoidance: Take care not to bend, kink or trap the brake lines during removal and installation.

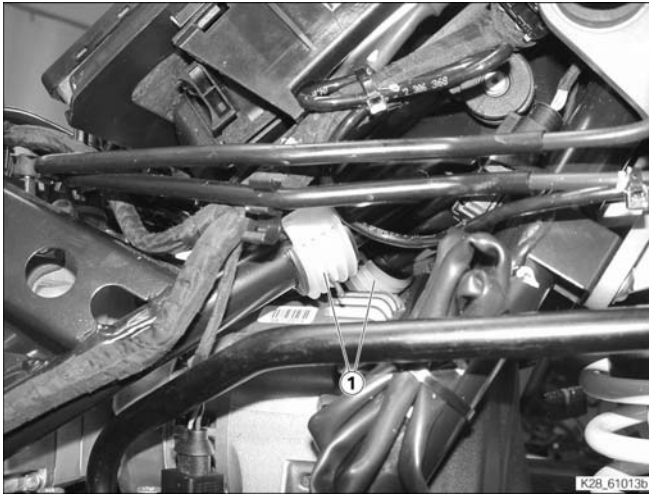
When installed, make sure that all lines are correctly routed and secured. Make sure that all components have adequate clearance, even when the handlebars are turned to full lock.

- Hold the distributor in position and secure it with screw (1).

 Tightening torques		
Distributor to front frame, M6 x 12	8 Nm	

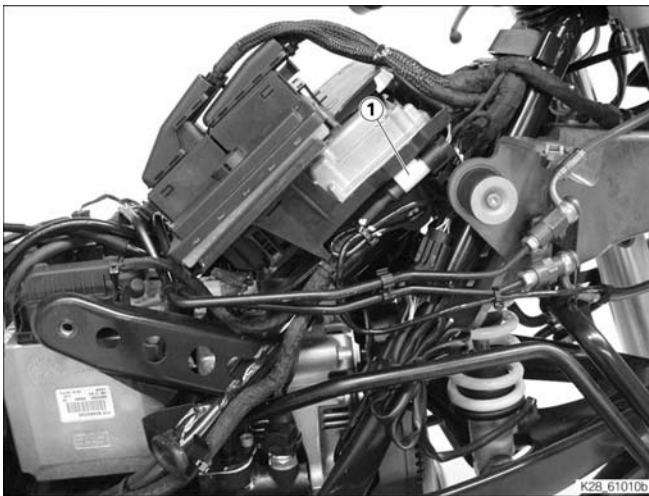
▷ **Installing control unit box**

- Hold the control unit box in position and secure it with clamps (1) on left and right.



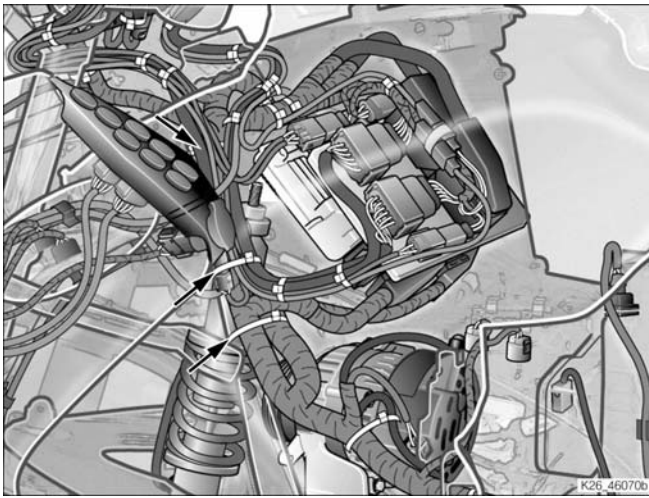
Variant, ESA

- Connect plug (7) of the spring strut.
- Secure the cable with cable tie (arrow).



- Connect plug for ABS sensor (1) to the control-unit box.

- Use cable ties (arrows) to secure the wiring harness to the left link.

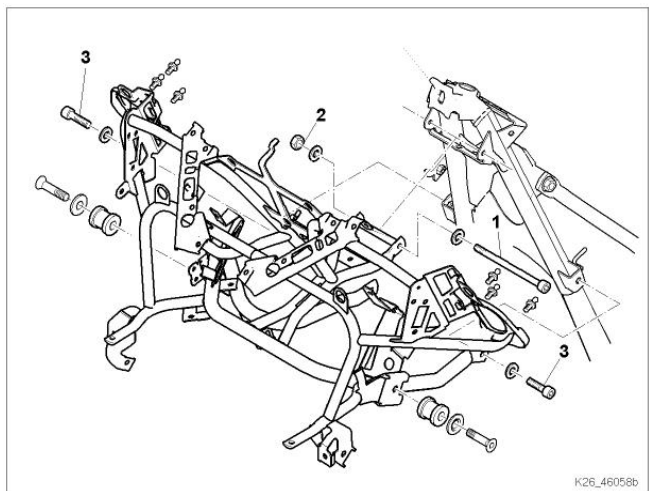



- Secure the wiring harness to the frame front section.



(-) Installing fairing bracket

- Place fairing bracket in position on frame.
- Install quick-release axle (1) with nut (2).



 Tightening torques		
Fairing bracket to front frame, M6 x 100, Replace nut	9 Nm	

- Install screws (3) on left and right.

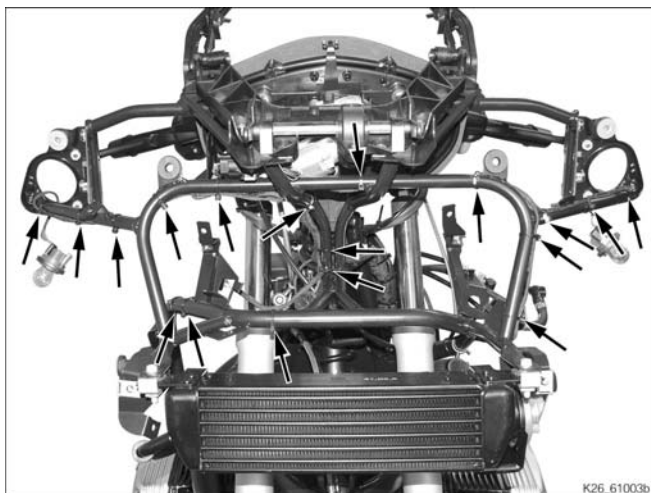
Variant, cruise control

► Installing control unit for cruise control

- Open the cable tie at the control unit.
- Connect plug (2).
- Install screws (1).



► Securing wiring harness at front



⚠ Attention

Nature: Incorrectly routed electrical cables can cause cable breaks/open circuits and chafing.

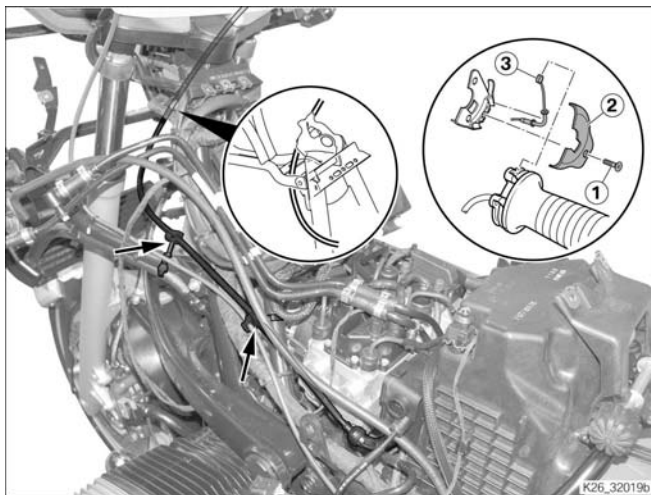
Avoidance: Always take care to route cables correctly.

Note the number of cable ties, and where the individual ties are installed.

- Thread the cable over the fairing bracket, making sure that cable routing is correct.
- Secure the wiring harness to the fairing bracket with cable ties (arrows).



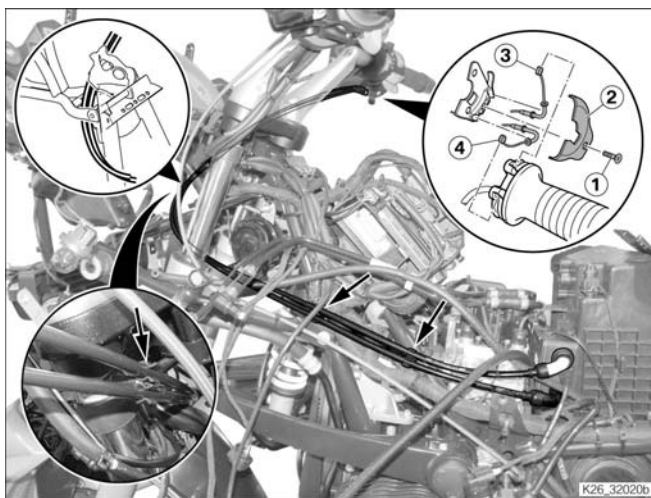
- ◀
- Secure cable tie (3).
- Secure retaining clip (2) on fairing bracket.
- Secure retaining clip (1) on left and right of fairing bracket.



- Clip Bowden cable (3) into retainers (arrows) on frame.
- Engage Bowden cable (3) on the throttle twistgrip.
- Fit cover (2) on throttle twistgrip and secure with screw (1).

Variant, cruise control

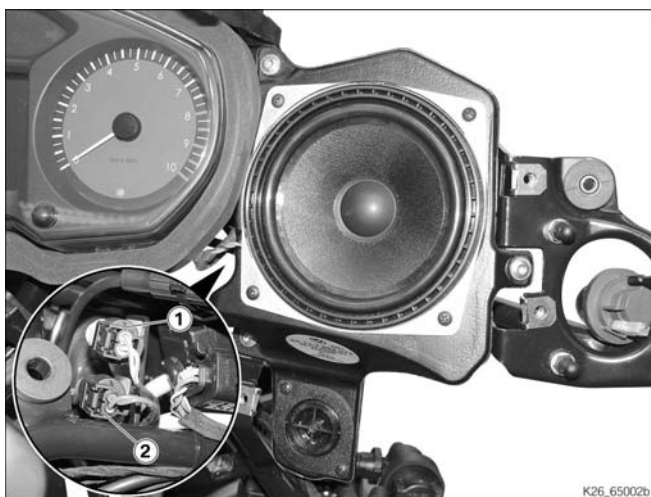
- Clip Bowden cables (3) and (4) into retainers on frame.
- Engage Bowden cables (3) and (4) on the throttle twistgrip.
- Fit cover (2) on throttle twistgrip and secure with screw (1).



Variant, Radio with CD player

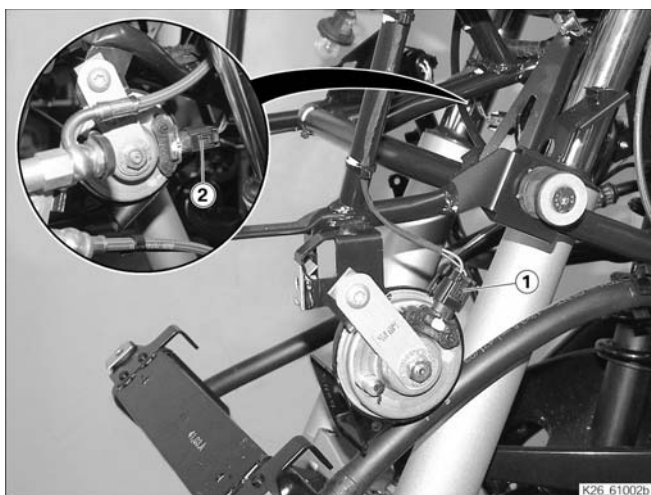
► **Securing left and right speakers**

- Secure plug (2).
- Secure plug (1).

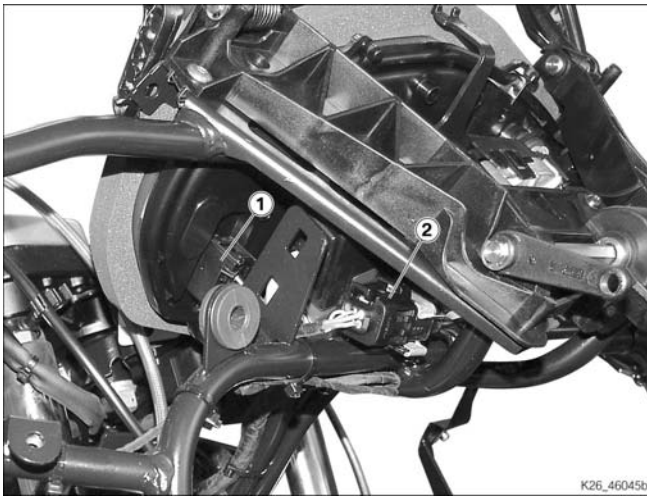


► **Securing horn**

- Secure plugs (1) and (2).




- Connect plugs (1) and (2).



(-) Installing oil cooler

- Hold oil cooler (2) in position at the fairing bracket.
- Install screws (1).



 Tightening torques		
Oil cooler to fairing bracket, M6 x 30	8 Nm	


(-) Installing entire top section of fairing

- Carefully place upper section of fairing in position.

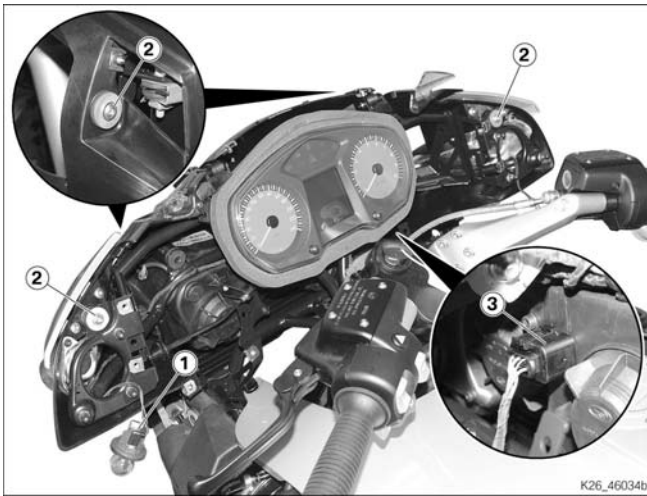
Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	

- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.

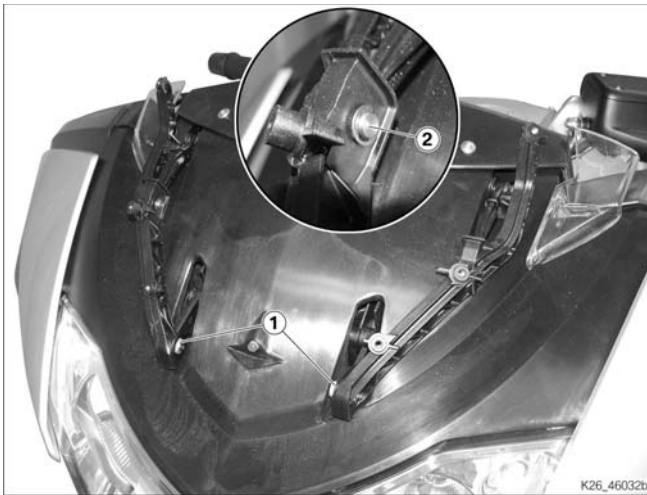


(-) Partially installing holder for windscreen

- Remove the strap and position holder (1) at the bottom.

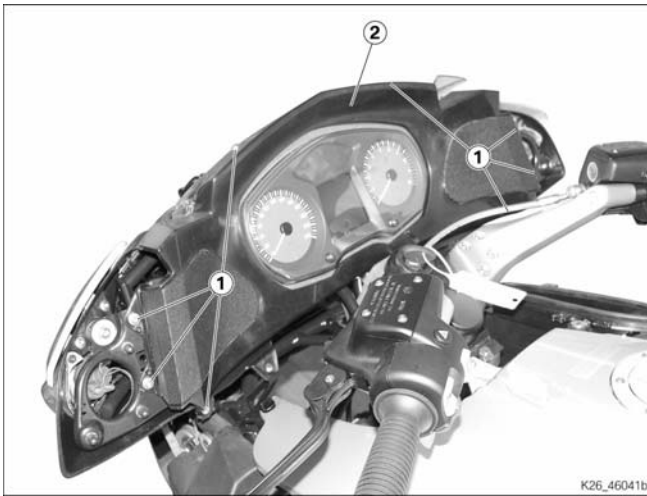


- Install pin (2).
- Install clips (1).



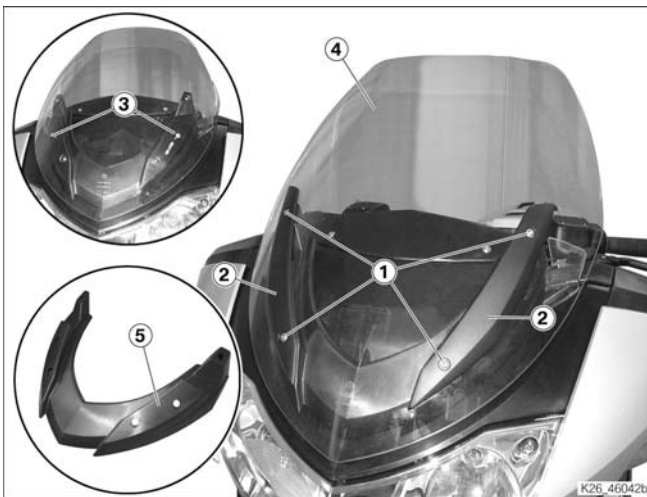
(-) Installing inner trim for instruments


- Place inner trim (2) in position.
- Install screws (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.



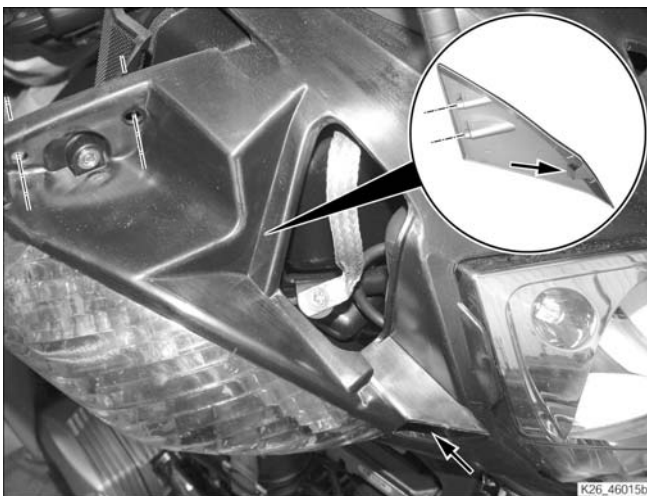
 Tightening torques		
Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	

- Fit left and right trim panels (2) and secure with screws (1).

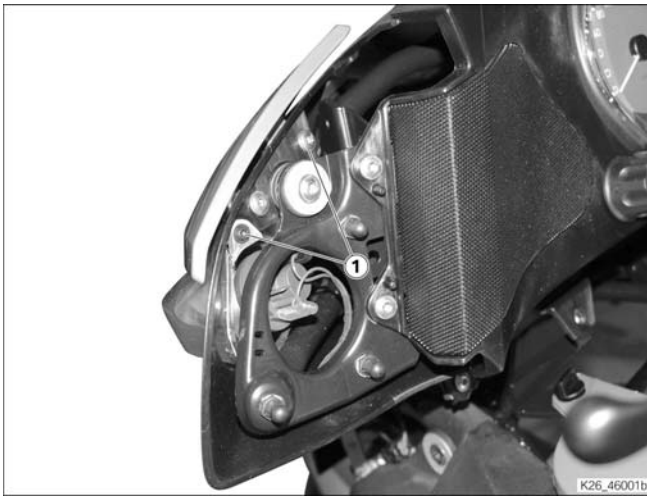
Variant, Radio with CD player

(-) Installing both left and right mirror trim panels

- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



- Install screws (1).



(-) Installing mirrors

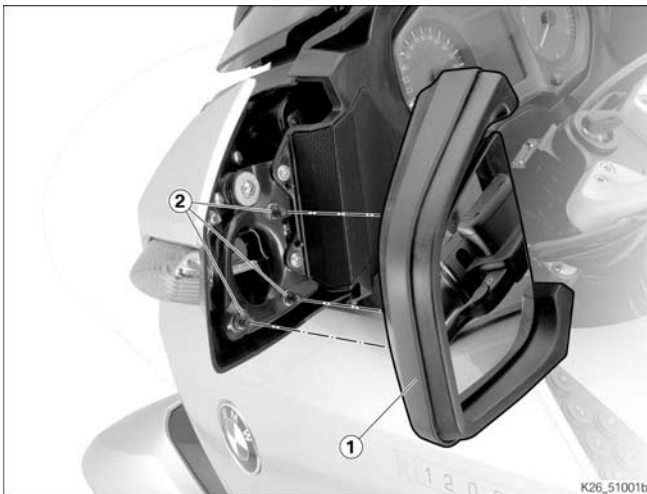


Attention

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

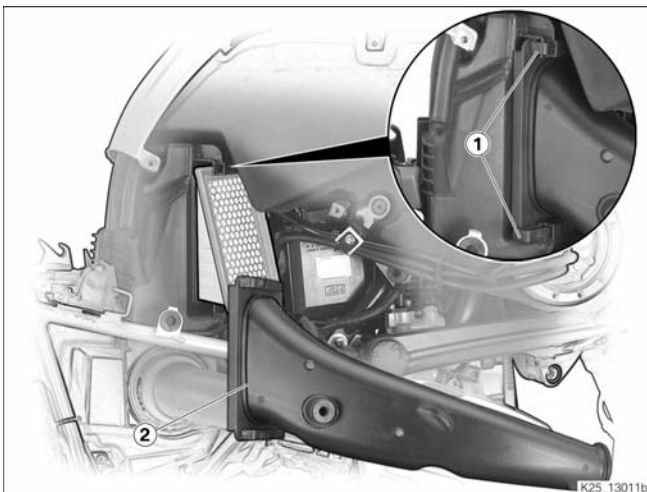
Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).

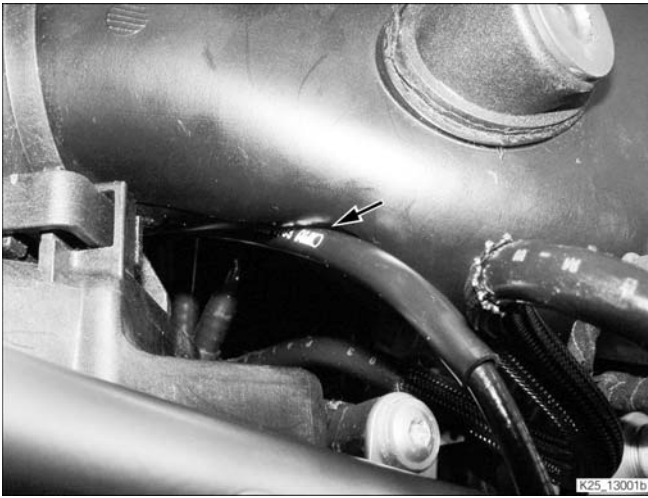


(-) Installing intake air pipe

- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

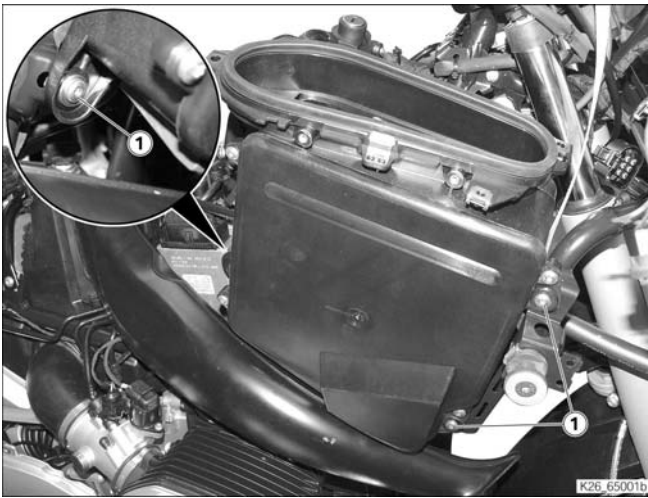


- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.



(-) Installing stowage compartment

- Place the stowage compartment in position and align it correctly.
- Install screws (1).



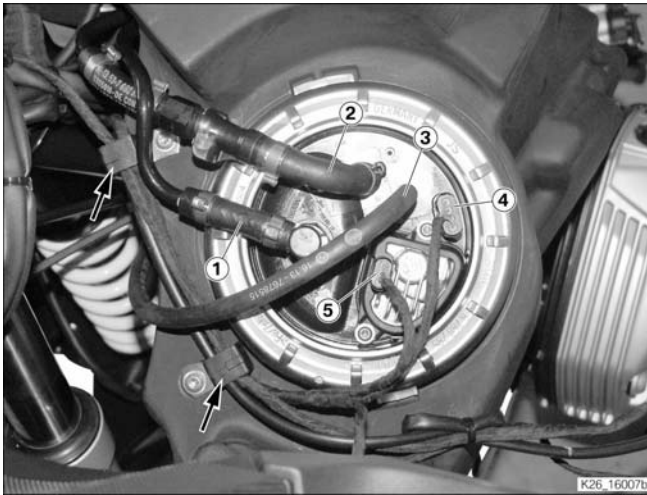
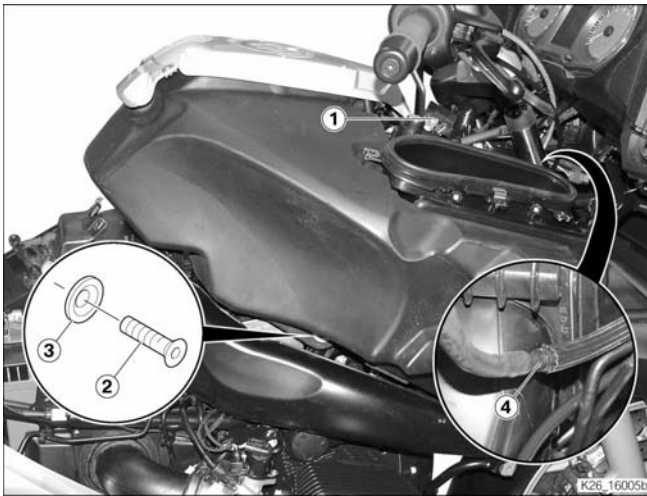
Variant, Radio with CD player

- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).




(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and



right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! **Attention**

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

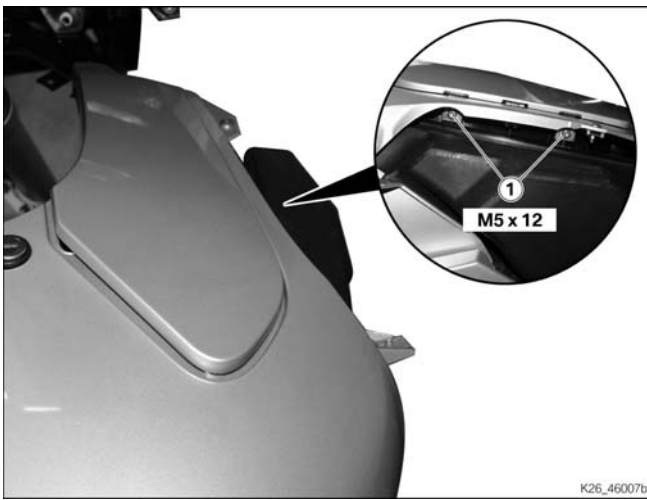
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



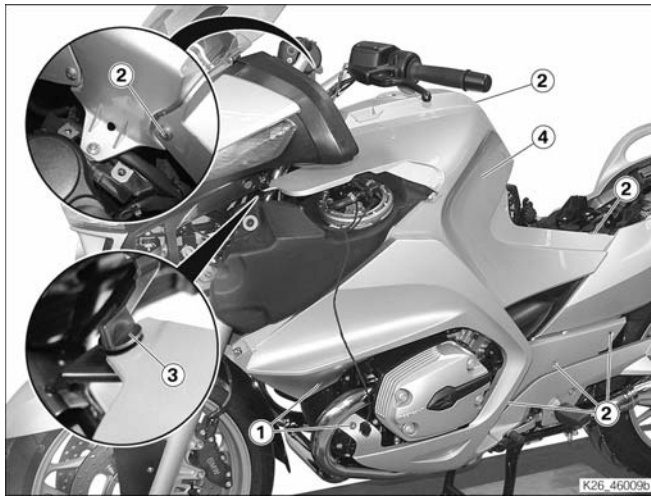
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



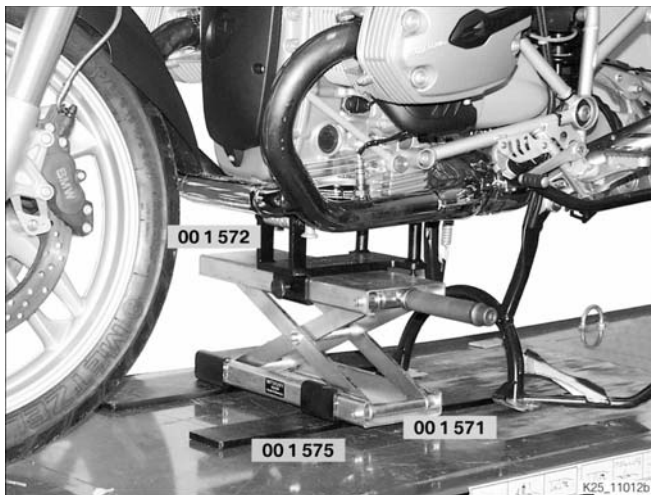
Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .

 **46 51 050 Replacing rear frame section**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

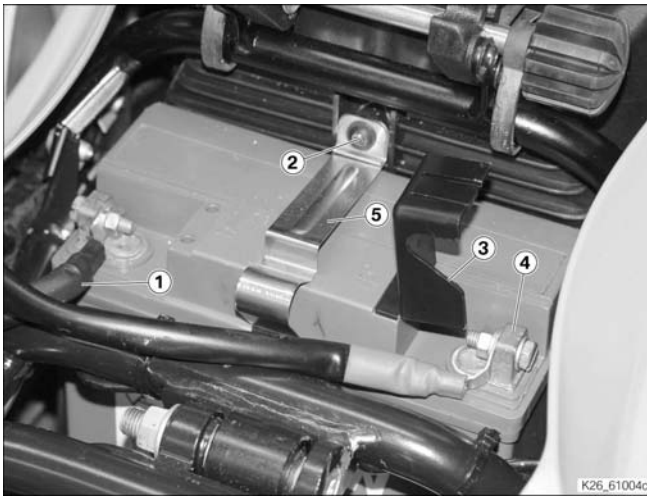
- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing the battery



Attention

Nature: Disconnection in the wrong sequence increases the risk of short-circuits.



Avoidance: Always proceed in the correct sequence.

- Release screw (2) and remove battery retainer (5).
- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (3).
- Disconnect the positive lead from the battery's positive terminal (4).
- Remove the battery from its holder.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

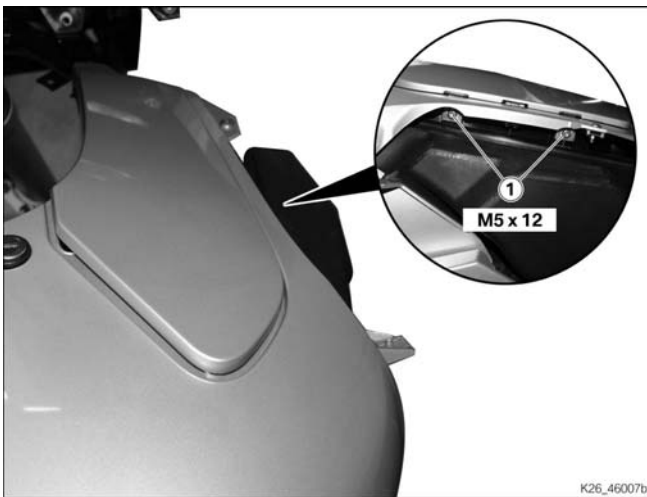
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



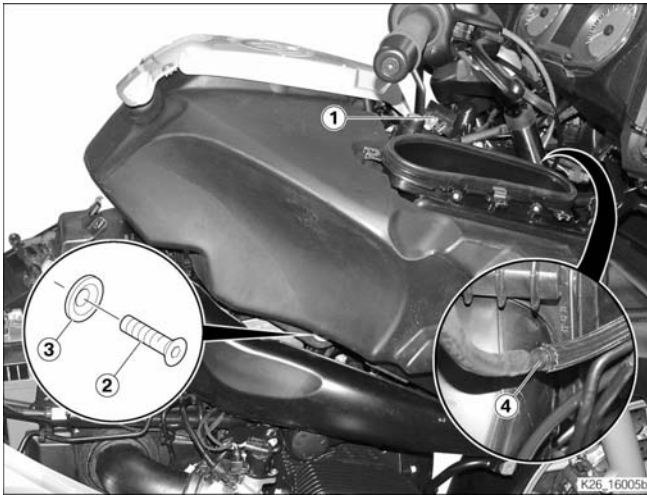
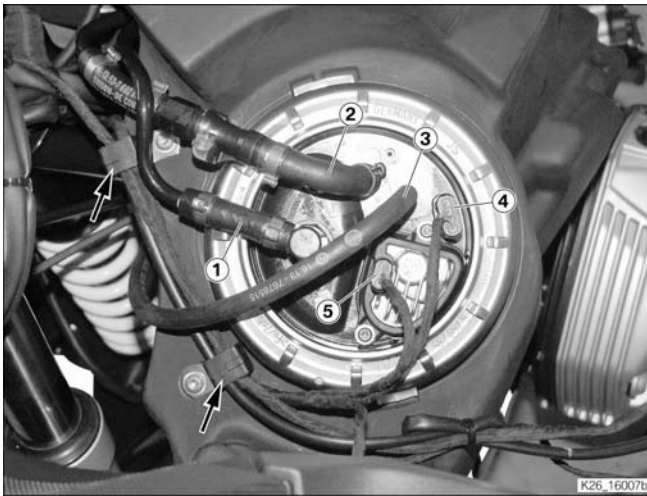
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



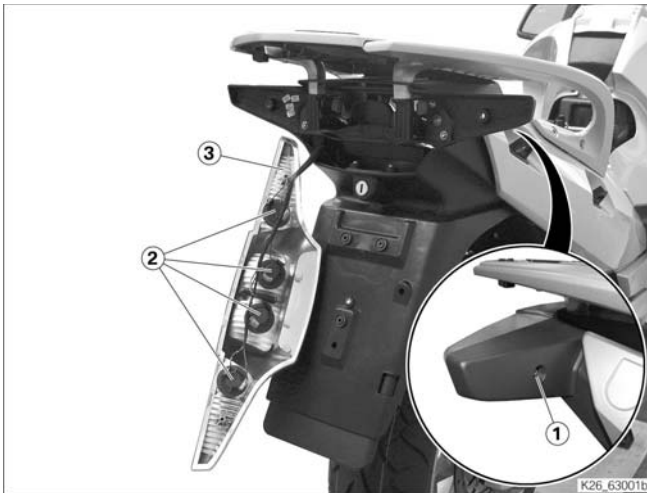
(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

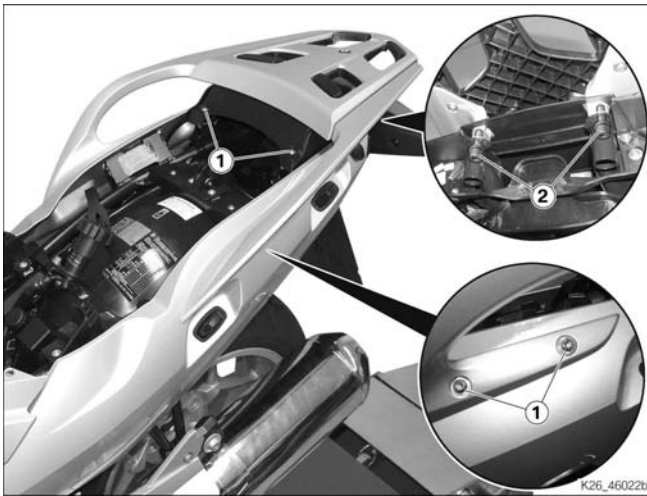
(-) Removing rear-light unit



- Remove screws (1).
- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).

(-) Removing luggage carrier

- Remove screws (1).
- Remove screws (2) on rear left and right.
- Remove the luggage carrier.



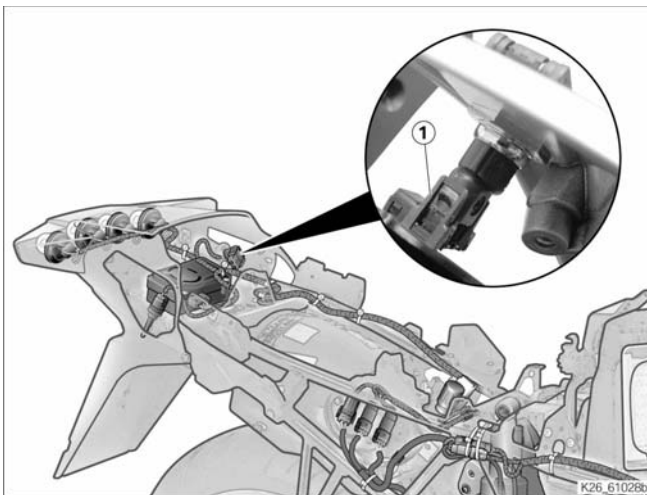
(-) Removing left rear trim panel

- Carefully bend back the bottom section of the fairing until screw (3) is accessible.
- Remove screw (3).
- Remove screws (1).
- Remove the tail finisher from the motorcycle, noting the flat nuts.



Variant, 2nd socket outlet

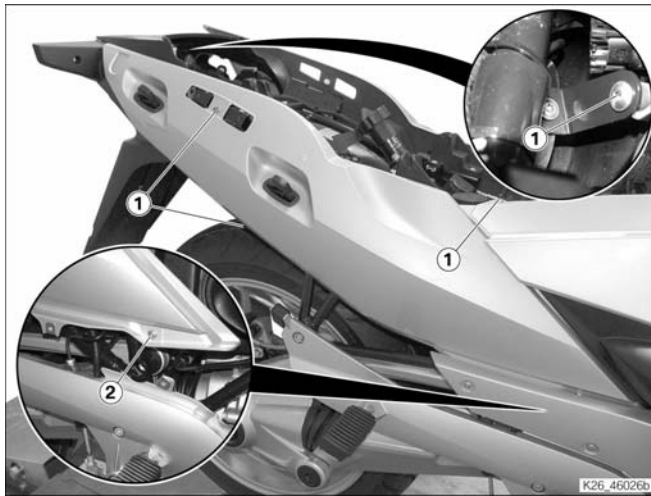
- Disconnect plug (1) from socket.



- Remove the tail trimmer from the motorcycle.

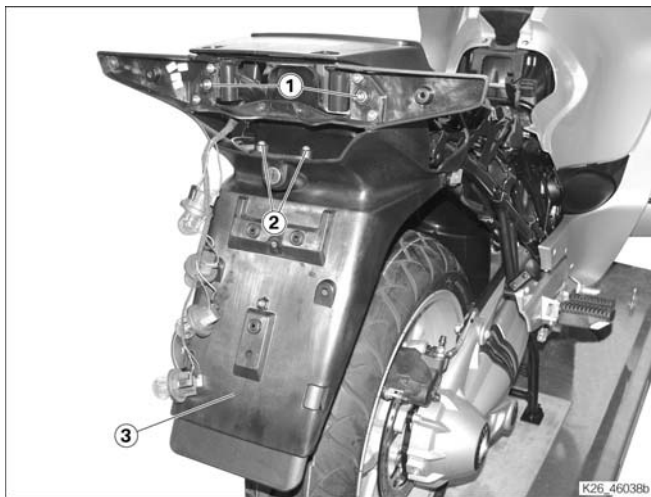
(-) Removing rear right trim panel

- Carefully bend back the bottom section of the fairing until screw (2) is accessible.
- Remove screw (2).
- Remove screws (1).
- Remove the tail trimmer from the motorcycle.



(-) Removing number-plate carrier

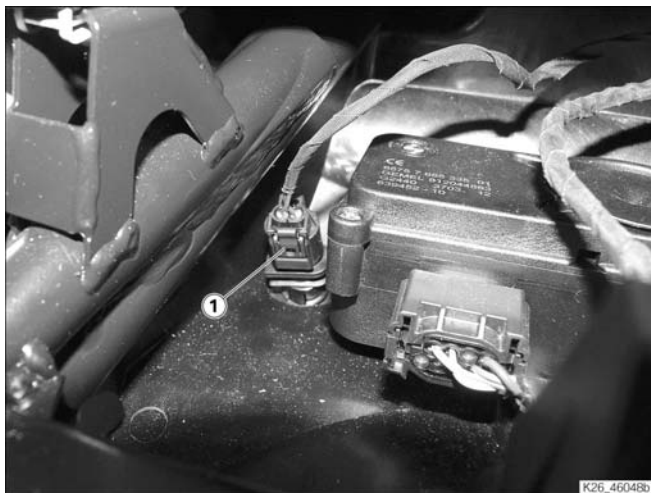
- Remove screws (1).
- Remove screws (2).
- Remove license-plate carrier (3).



(-) Disengaging wiring harness at rear

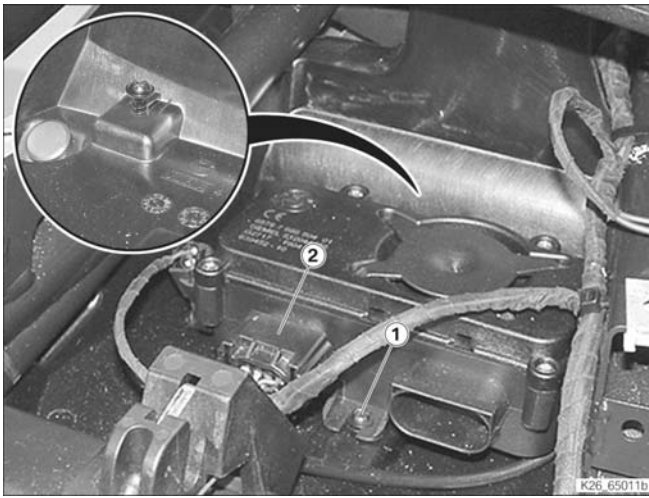
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



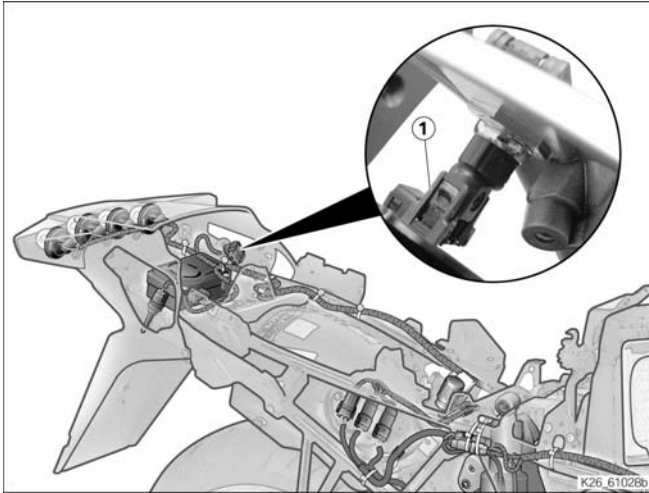
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

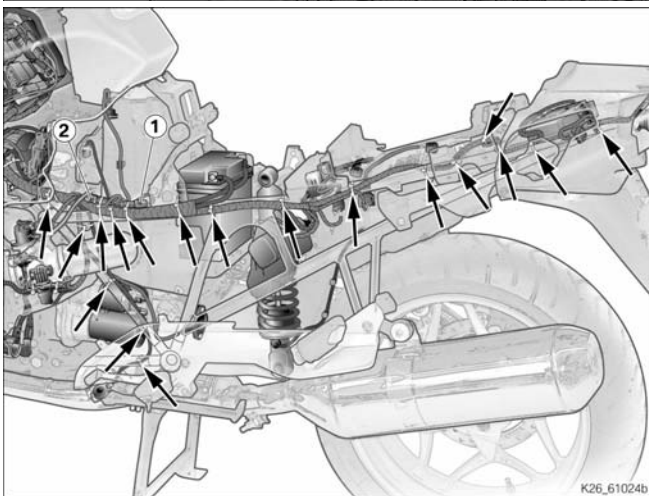


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.

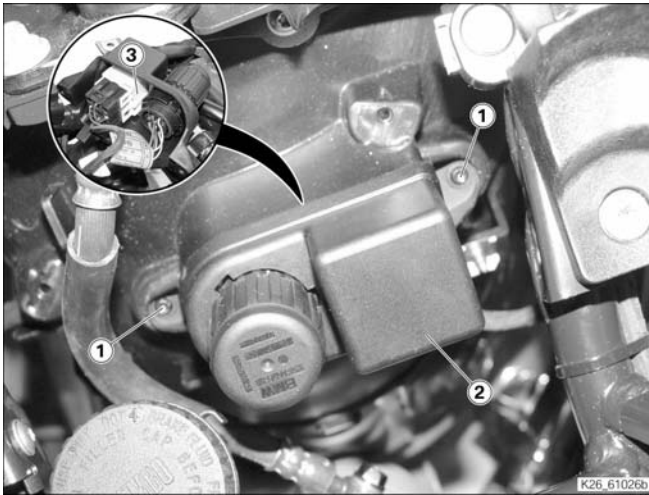
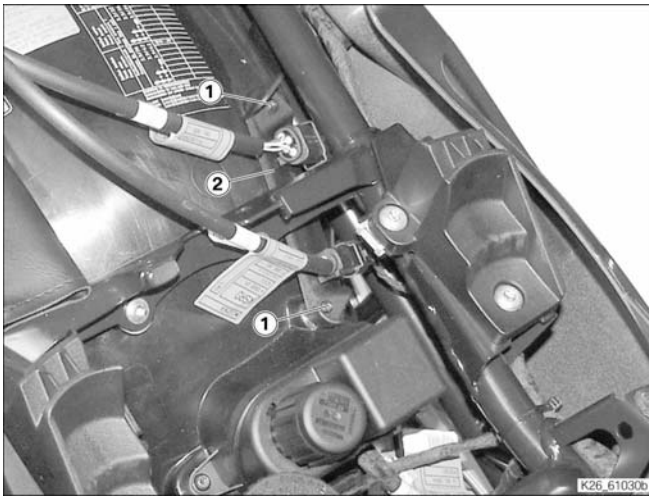


- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.

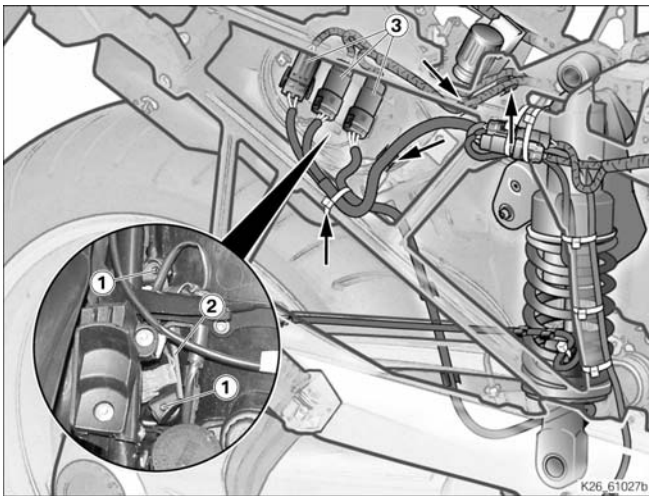


Variant, Seat heating

- Remove screws (1).
- Pass holder (2) forward with the cables.



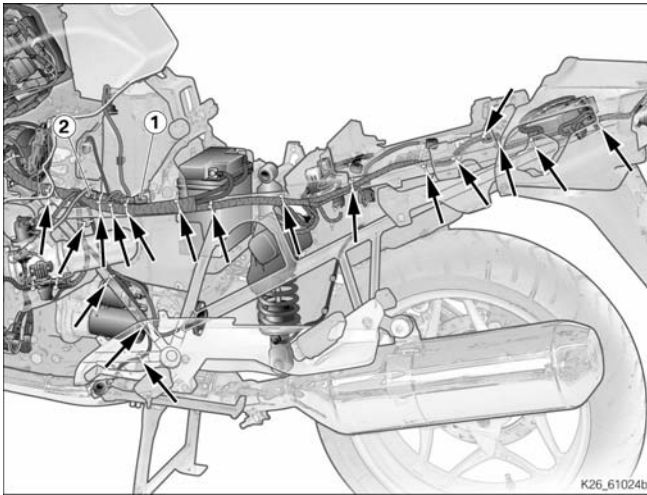
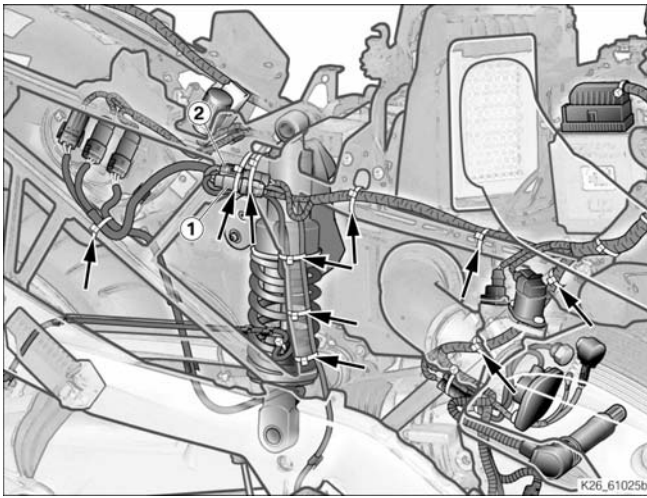
- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.



Variant, ESA

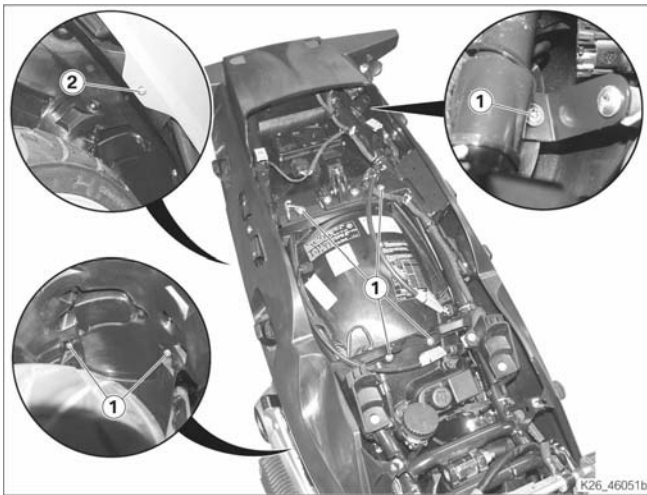
- Remove screws (1).
- Pass holder (2) forward with the cables.
- Disconnect plug (3) of the spring strut.

- Disconnect plug (1) of the speed sensor.



- Disconnect plug (1) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (2) of the side-stand switch.
- Thread the wiring harness forward and tie it up out of the way at the front.

(-) Removing rear mudguard



- Remove screws (1).
- Remove screws (2) on left and right.

Variant, On-board computer

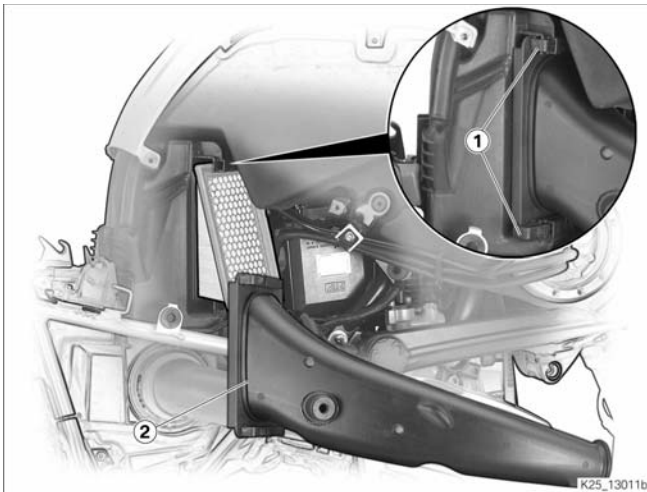
- Disconnect plug (1).



- Remove the rear mudguard.

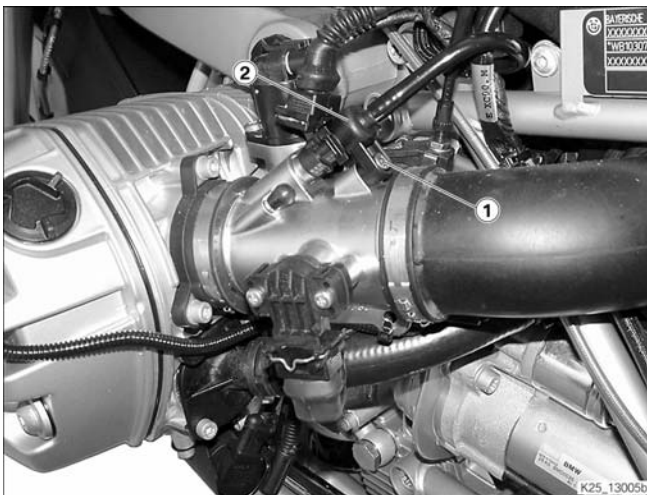
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



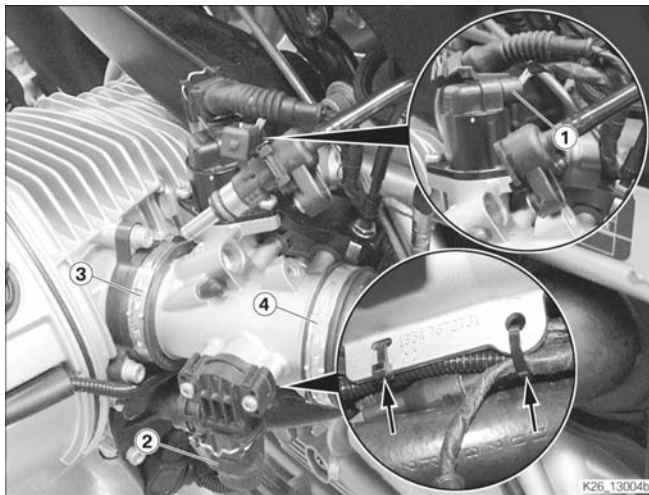
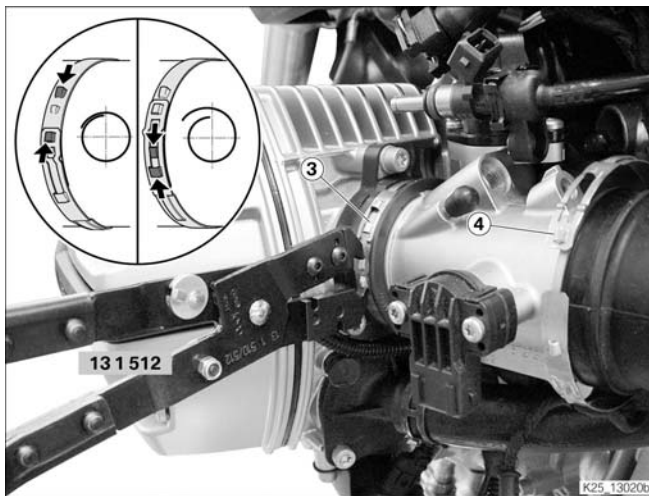
(-) Removing right and left injection valves

- Disconnect the plugs from the injection valves.
- Remove screws (1).
- Pull injection valves with holders (2) and cables out of the throttle-valve stubs, noting the O-rings.



(-) Disconnecting both throttle-valve stubs

- Open hose clamps (3) and (4) at left and right throttle-valve stubs with pliers (No. 13 1 512) .



- Cut through cable ties (arrows) on left and right.
- Disconnect plugs for idle actuators (1) on left and right.
- Disconnect plug of throttle-valve potentiometer (2).
- Pull off the right-hand throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.
- Push up the retainer on the intake air silencer.
- Pull the cable divider to the left to remove, carefully manoeuvring out the right throttle valve stub along with the cable divider.
- Pull off the left throttle-valve stub and, taking care not to pinch or bend the throttle cable, carefully lay it aside.
- Seal the intake duct at the engine to prevent parts and foreign matter from dropping into the engine.

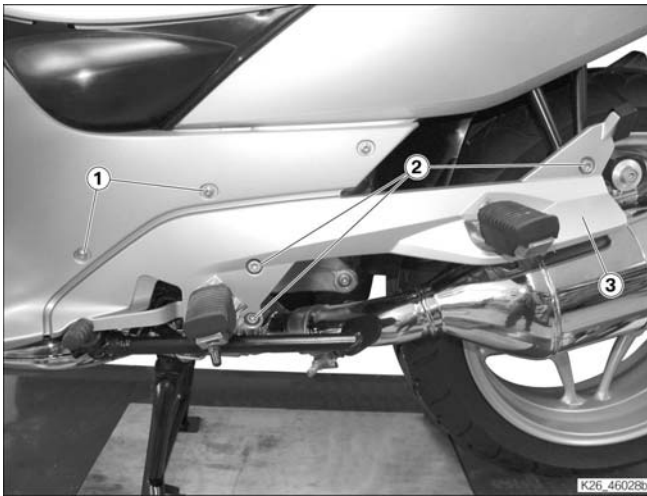
(-) Securing throttle valve stub with cable divider

- Tie up throttle valve stub and cable divider with cable tie (arrow).



(-) Removing left footrest plate

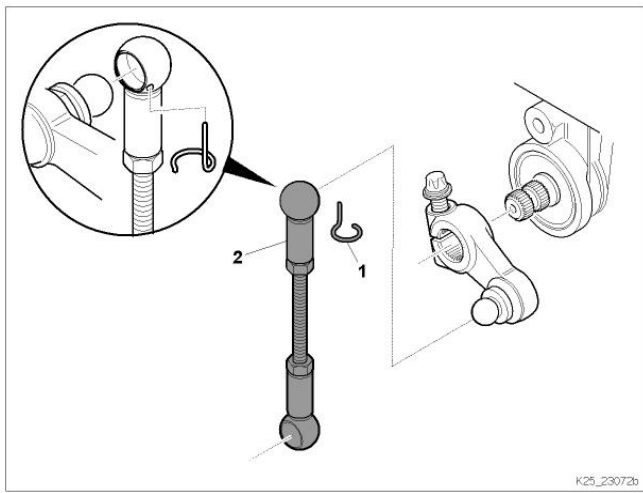
- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the



speed nuts on the footrest plate.

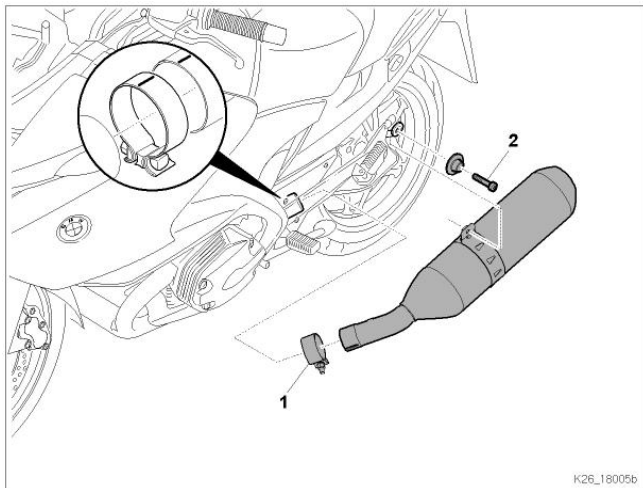
(-) Disengaging selector rod from shift lever

- Remove retaining clip (1).
- Pull selector rod (2) off the shift lever.



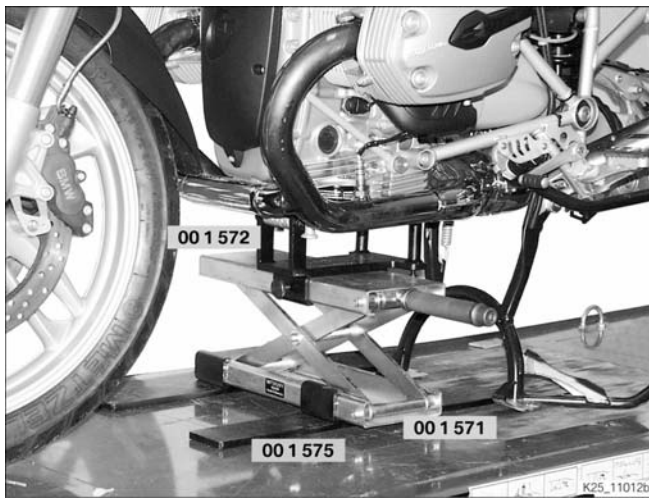
(-) Removing silencer

- Release Torca clamp (1).
- Hold the silencer and remove screw (2).
- Pull the silencer to the rear to remove.
- Remove the Torca clamp.



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

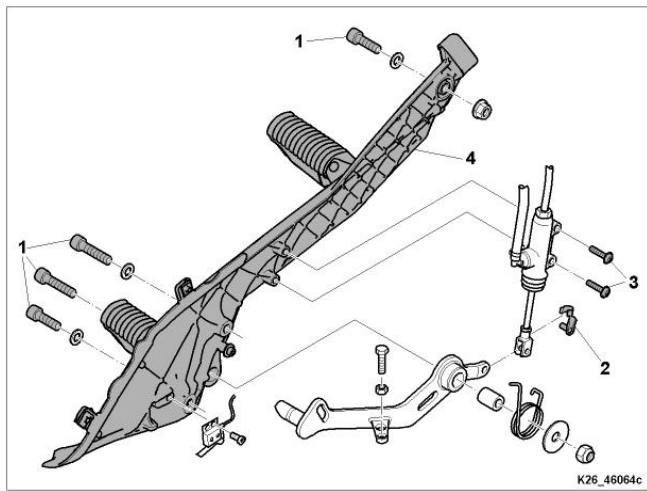



(-) Removing right footrest plate

- Undo screws (1) holding bottom section of fairing.

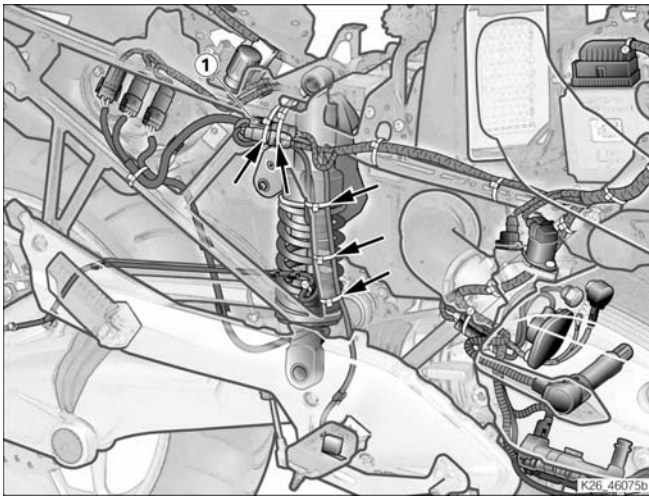


- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.



 Technical data			
Release temperature, screws for rear brake master cylinder		100 °C	

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.



(-) Removing brake calliper

- Remove screws (1).

Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake callipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake calliper removed.

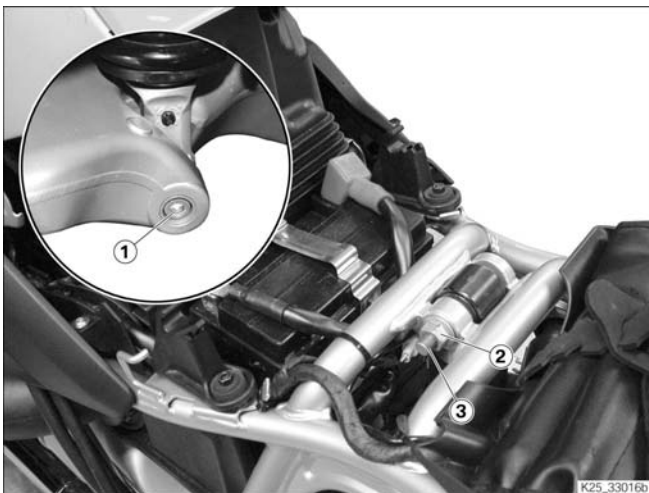
Install the brake calliper with brake pads or insert the piston resetting device.



- Remove the brake calliper.

(-) Releasing rear spring strut at top

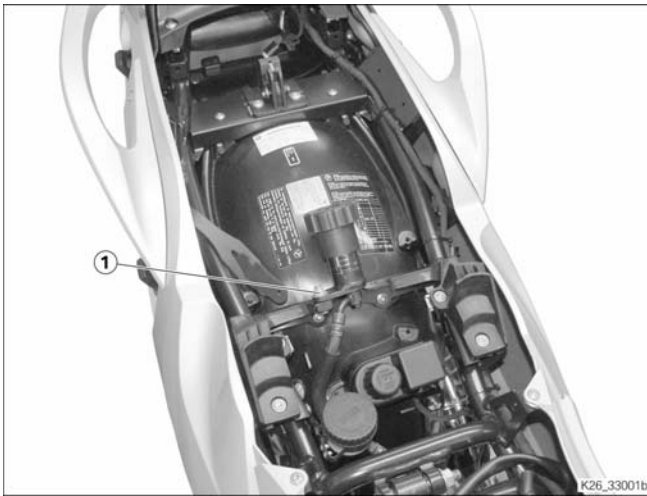
- Remove nut (2).
- Lift the spring strut and remove screw (3).



(-) Removing swinging arm with rear-wheel drive

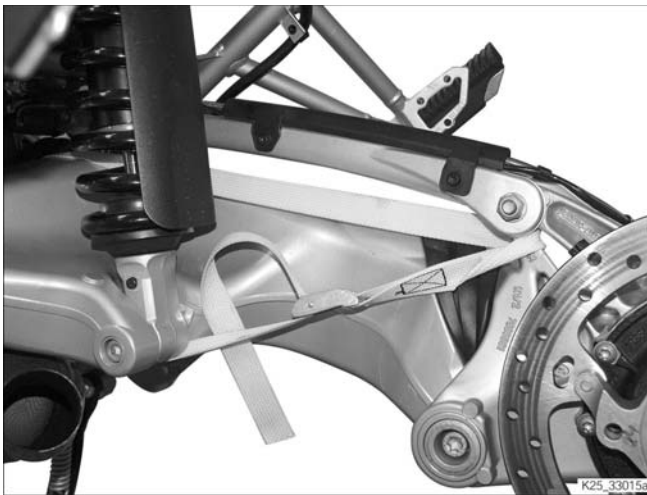
Variant, not for ESA

- Remove screw (1) and remove the spring-strut adjuster knob.

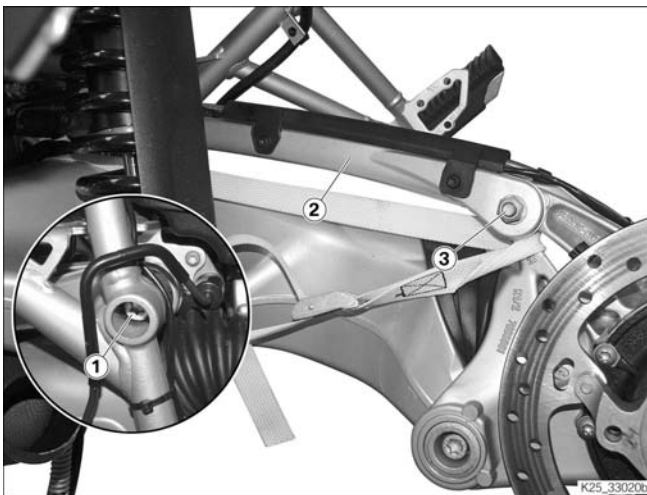


► **Releasing Paralever link at rear**

- Use a strap to secure the rear-wheel drive so that it cannot drop.

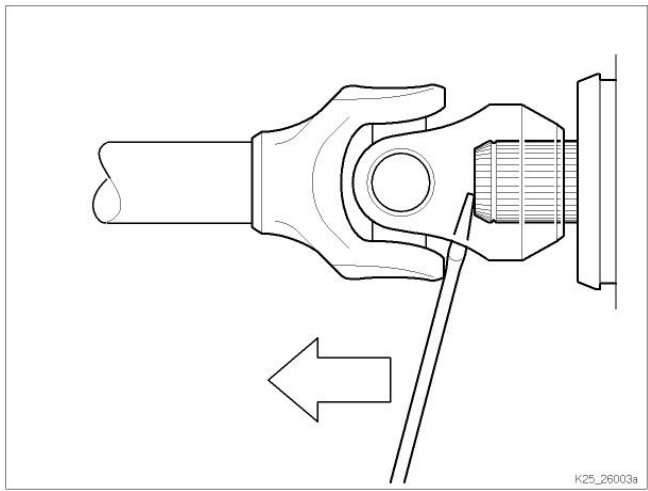
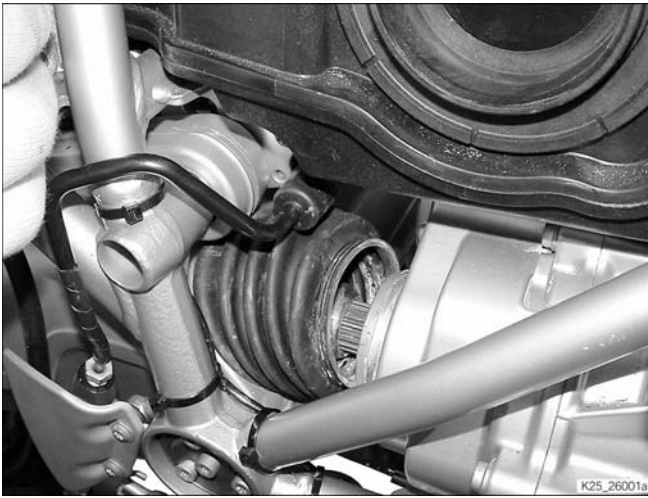


- Remove nut (3) with washer and bolt.
- Use a cable tie to hold the brake caliper up and let it dangle at the rear frame.



► **Pressing universal shaft off gearbox output shaft**

- Cut open the cable tie on the gearbox end of the flexible gaiter and pull the flexible gaiter off the gearbox housing.

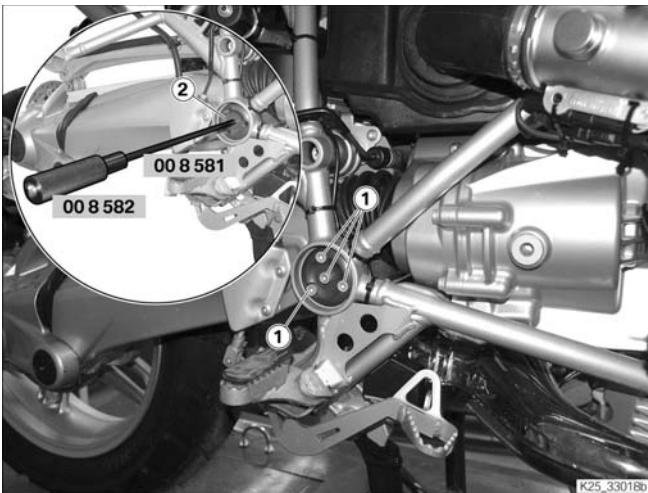


- Turn the universal shaft to a position for convenient access from outside and engage a gear to lock the shaft in this position.
- Using a suitable screwdriver, pry the universal shaft free of the gearbox output shaft.



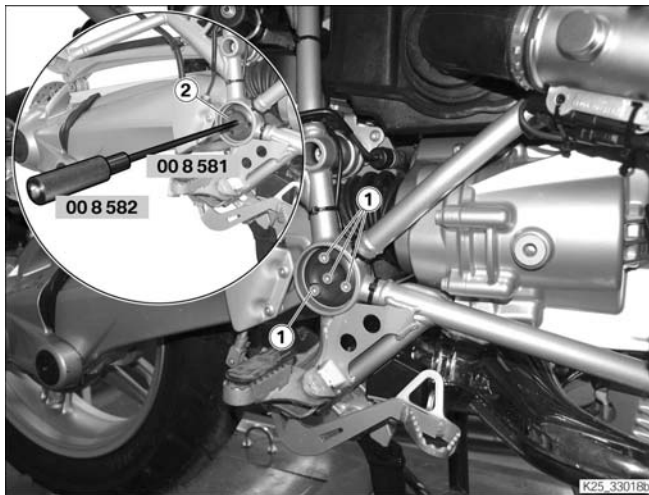
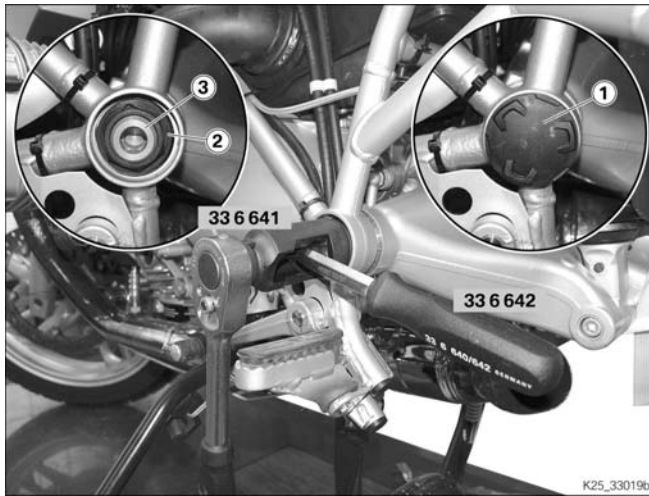
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.



- Remove screws (1).

- Remove cap (1).
- Slacken locknut (2) with Allen wrench (No. 33 6 642) and special socket wrench insert (No. 33 6 641).
- Remove bearing stud (3).

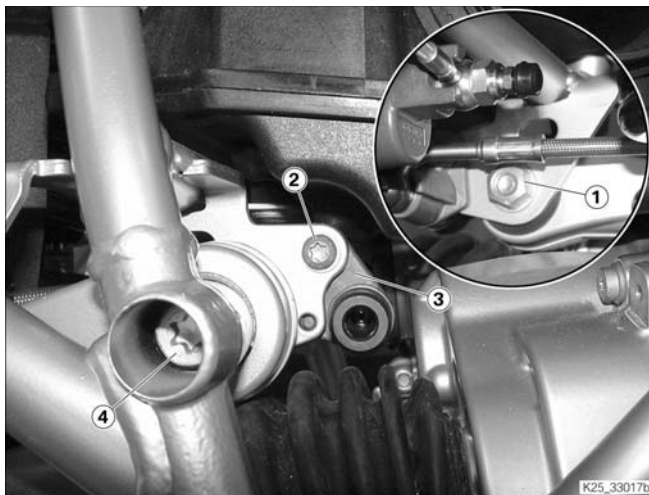


- Screw pull rod (No. 00 8 581) with impact weight (No. 00 8 582) into right bearing stud (2).
- Raise the swinging arm and remove the bearing stud.
- Carefully pull the swinging arm with universal shaft, spring strut and rear wheel to the rear, using a suitable tool to push the universal shaft completely out of the gearbox output shaft.



Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.

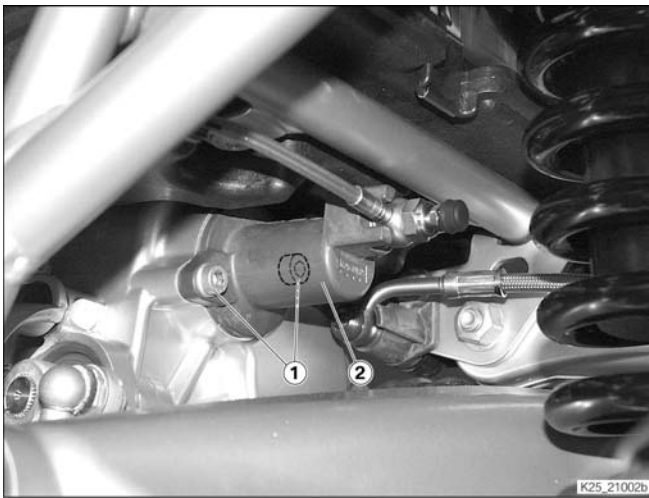


(-) Releasing Paralever link at front

- Remove screw (2) from connector (3).
- Remove screw (4), while holding nut (1).
- Lift the link with brake caliper up and let it dangle at the rear frame.

(-) Removing clutch slave cylinder from gearbox

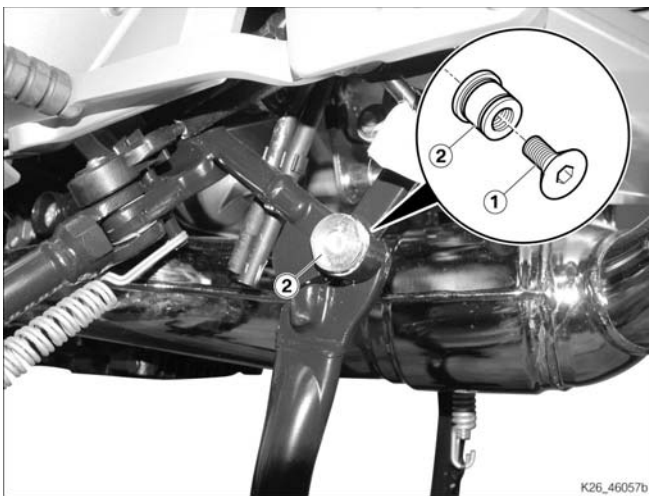
- Uniformly remove screws (1), making sure the clutch slave cylinder is not tilted (cylinder under spring pressure).
- Free the clutch line from the rear frame.
- Free clutch slave cylinder (2) from the gearbox and remove it from the rear frame.



(-) Removing rear frame

► Removing centre stand

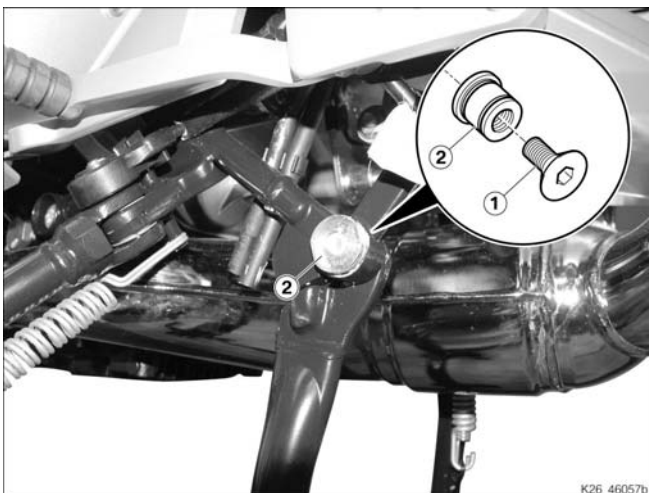
- Remove screws (1) on left and right, while holding against bearing pin (2).



- Remove the centre stand.
- Disengage springs.

► Installing centre stand


- Engage the centre stand springs.
- Lubricate the outside of both bearing pins.



Consumables/lubricants

Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992
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- Insert right bearing pin (2) into frame.
- Hold the centre stand in position, insert (1) on right and tighten the screw enough to hold the centre stand.
- Insert left bearing pin (2) into frame.
- Tighten screws (1) on left and right.

 Tightening torques		
Centre stand to main frame, M10 x 30, Replace screws Micro-encapsulated	42 Nm	



- ◀
- Using straps, secure the rear frame to workshop crane (No. 46 5 671) , (No. 46 5 672) , (No. 46 5 673) and (No. 46 5 674) .
- Crank the crane just high enough to tension the straps.

▶ **Releasing threaded fastener on rear frame**

- Remove screw (1) on left and right and install securing screw (No. 46 5 691) .
- Remove screws (2) on left and right.
- Remove screw (3) on the left-hand side.
- Remove screw (3) on the right-hand side complete with the bushing.

 **Attention**

Nature: The swinging arm can be damaged if the centre stand is retracted after the main-stand stop has been removed.

Avoidance: Do not retract the centre stand with the centre-stand stop or the end silencer removed.

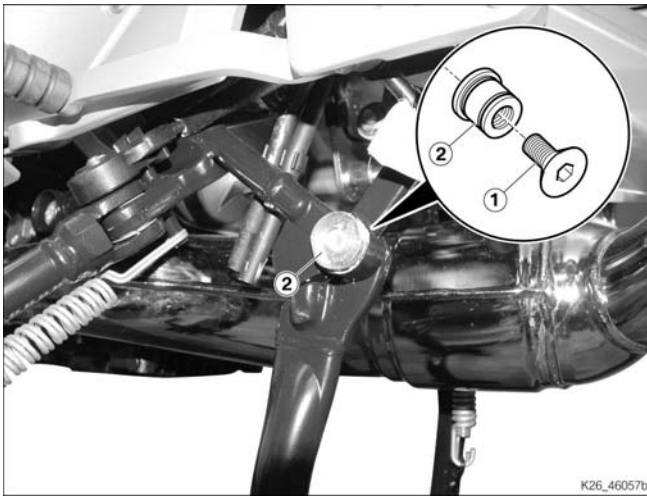
Apply masking tape to the part of the swinging arm that could be damaged.

- Remove screw (4).

- ◀
- Carefully raise the rear frame and pull it back and clear of the motorcycle.
- Manoeuvre the brake caliper and brake hose with speed sensor through the rear frame.
- Carefully set down the rear frame where it will not be damaged.

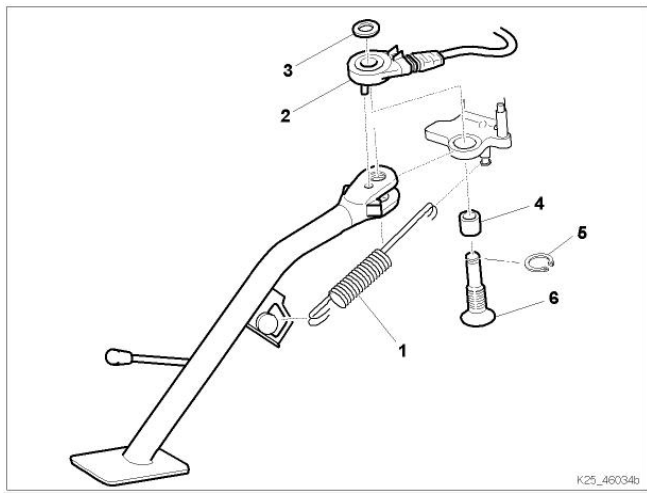
(-) Removing centre stand

- Remove screws (1) on left and right, while holding against bearing pin (2).



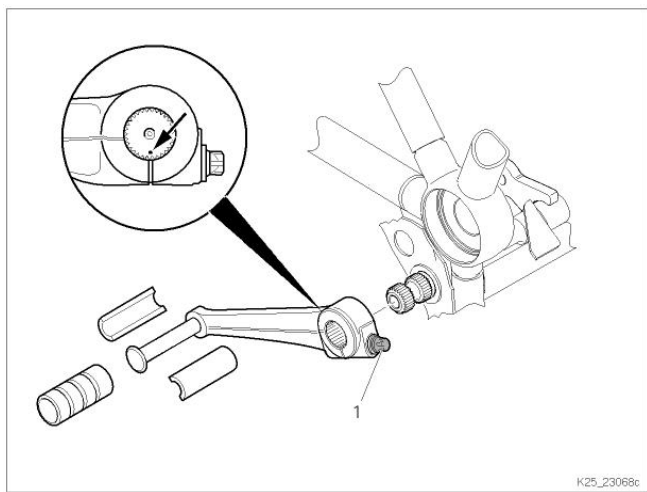
- Remove the centre stand.
- Disengage springs.

(-) Removing side stand



- Disengage springs (1) with assembly/disassembly tool (No. 46 5 721) .
- Remove circlip (5).
- Remove washer (3).
- Remove side-stand switch (2).
- Remove screw (6).
- Remove bushing (4).

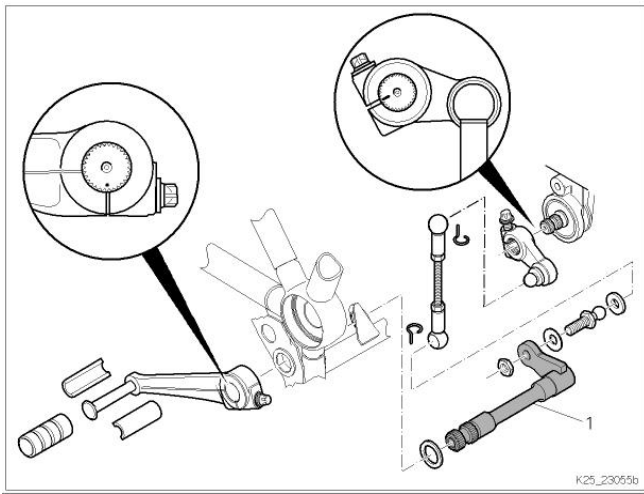
(-) Removing gearshift lever



- Remove screw (1) securing the gearshift lever.
- Remove the gearshift lever.

(-) Removing foot-operated selector shaft

- Remove foot-operated selector shaft (1).



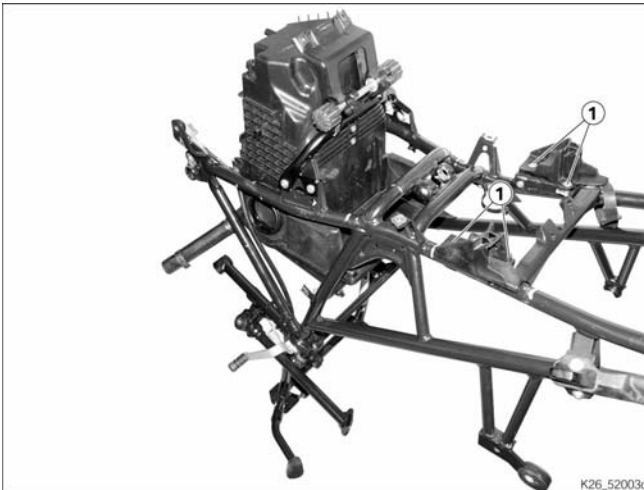
(-) Removing case carrier on left and right

- Remove screws (1).
- Remove screw (2).
- Carefully pull and remove case carrier.



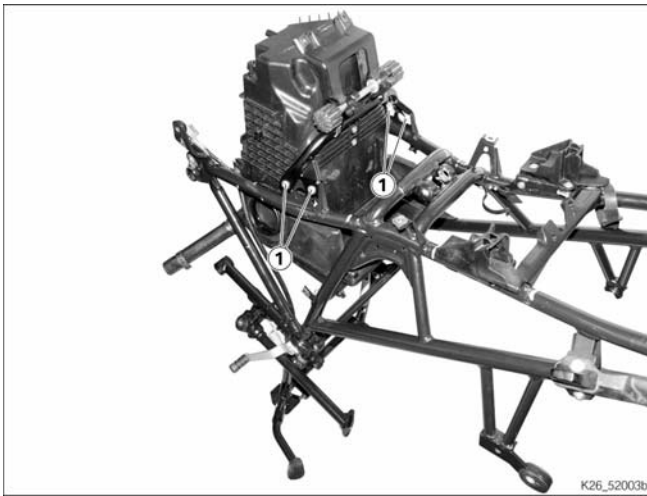
(-) Removing front seat bracket at rear

- Remove screws (1).
- Remove both rear front-seat brackets.



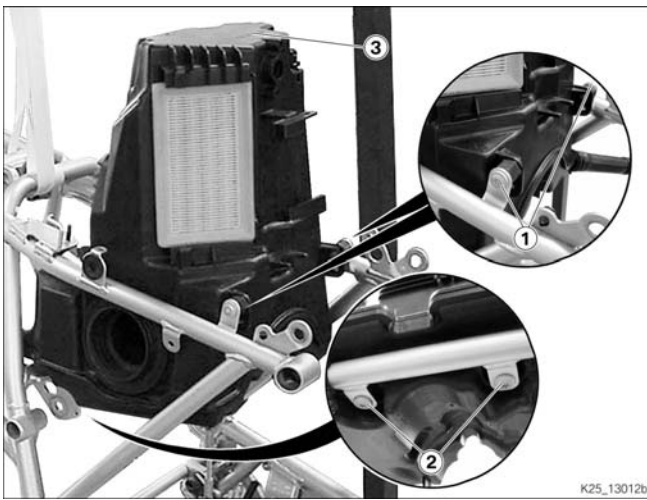
(-) Removing front seat bracket at front

- Remove screws (1).
- Remove front bracket for front seat.



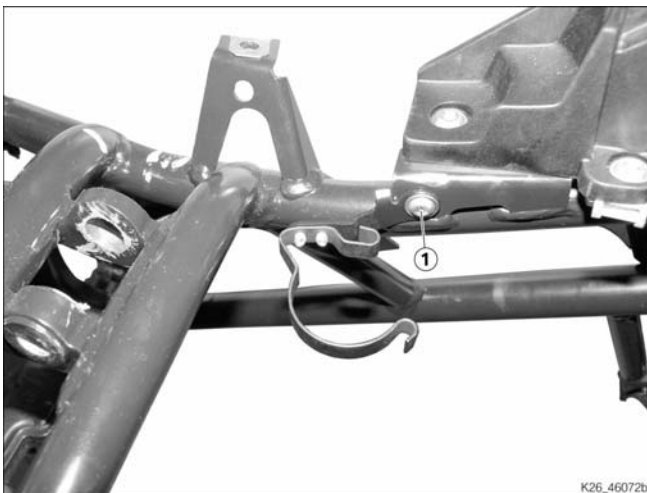
(-) Removing intake air silencer


- Remove screws (1).
- Remove screws (2).
- Pull intake air silencer (3) up and forward to remove.



(-) Replacing rear frame

- Remove screw (1).
- Remove the bracket for the brake-fluid reservoir and mount it on the new rear frame.
- Install screw (1).



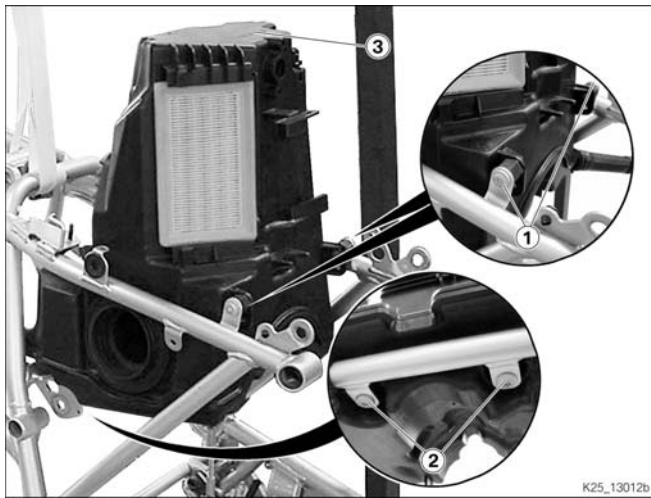
 Tightening torques		
Brake fluid reservoir with bracket to rear frame, M6 x 12	8 Nm	

- Remove rubber holder for the silencer and mount it on the new rear frame.
- Transfer the reusable small items from the old rear frame to the new frame.

(-) Installing intake air silencer


- Install intake air silencer (3).
- Install screws (2).

 Tightening torques		

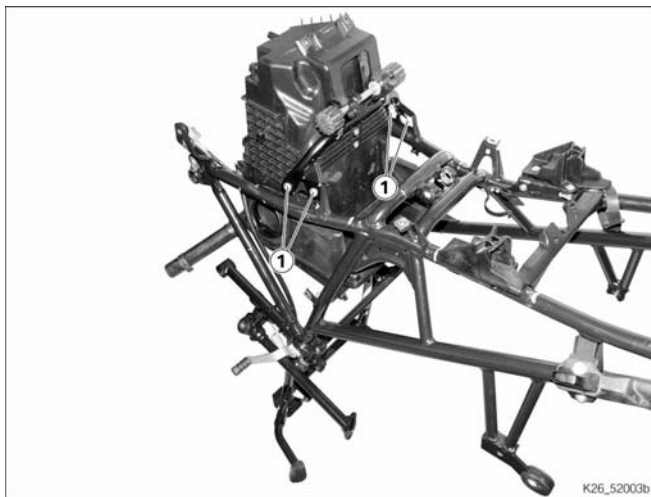


Airbox to rear frame, M6	8 Nm	
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- Install screws (1).

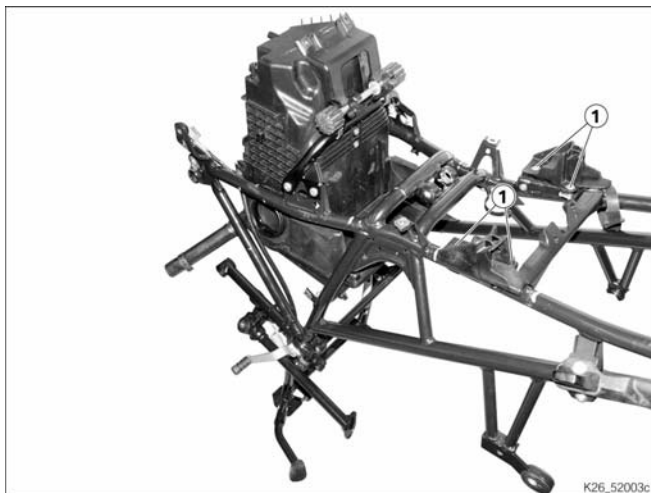
 Tightening torques		
Airbox to rear frame, M6	8 Nm	

(-) Installing front seat bracket at front



- Place front front seat bracket in position.
- Install screws (1).

(-) Installing front seat bracket at rear



- Place both front seat brackets at rear in position.
- Install screws (1).

(-) Installing case bracket on left and right

- Place case bracket in position on rear of motorcycle and install.
- Install new screws (1).

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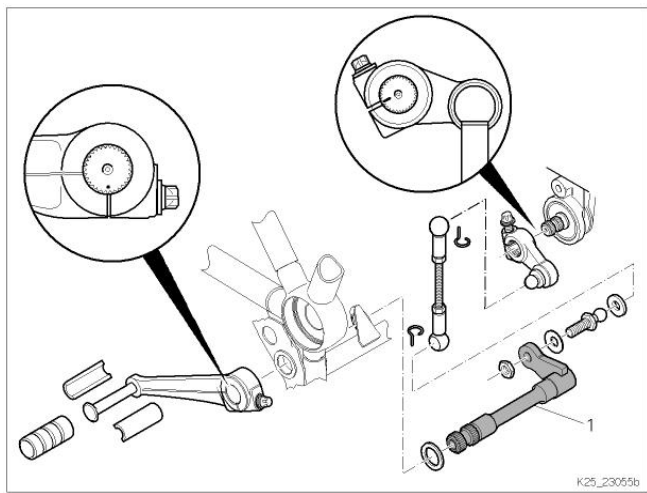


Tightening torques

Case bracket to rear section of frame, M6 x 14, Replace screws Micro-encapsulated	8 Nm	
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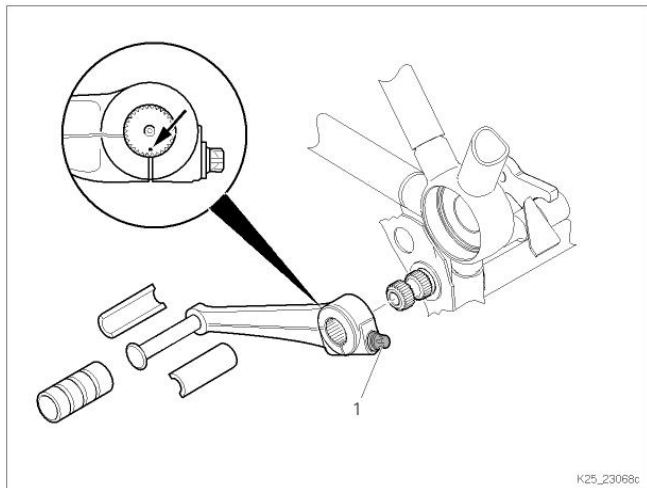
- Install screw (2).

(-) Installing foot-operated selector shaft



- Install foot-operated selector shaft (1).

(-) Installing gearshift lever



Attention

Nature: If the shift lever is not positioned correctly it can obstruct the side stand.

Avoidance: Use the marks to install the shift lever in the correct position.

When all work on the shift linkage has been completed, check that the side stand is not obstructed.

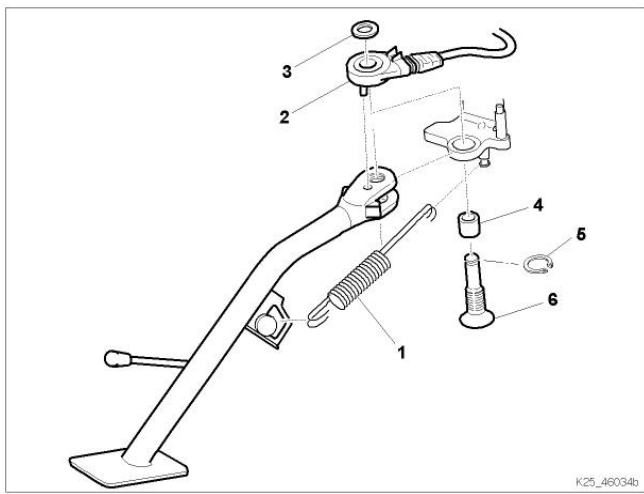
- Position the gearshift lever on the selector rod.
- The punch mark (arrow) must be aligned with the gap in the gearshift lever.
- Tighten screw (1) to secure the gearshift lever.




Tightening torques

Foot-operated shift lever to selector shaft, M6 x 25	8 Nm	
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(-) Installing side stand

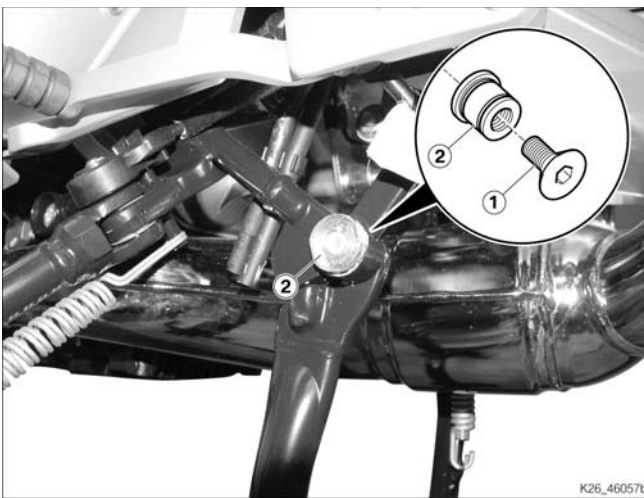


- Clean the tapped hole in the side stand.
- Fit pin for side stand switch (2) in hole in side stand.
- Hold the side stand in position.
- Install new screw (6) and tighten.


 Tightening torques		
Side stand to pivot mount, M10 x 1-10.9 Micro-encapsulated	42 Nm	

- Place washer (3) in position and install circlip (5).
- Engage springs (1) with hook (No. 46 5 721) .


(-) Installing centre stand



- Engage the centre stand springs.
- Lubricate the outside of both bearing pins.

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

- Insert right bearing pin (2) into frame.
- Hold the centre stand in position, insert (1) on right and tighten the screw enough to hold the centre stand.
- Insert left bearing pin (2) into frame.
- Tighten screws (1) on left and right.

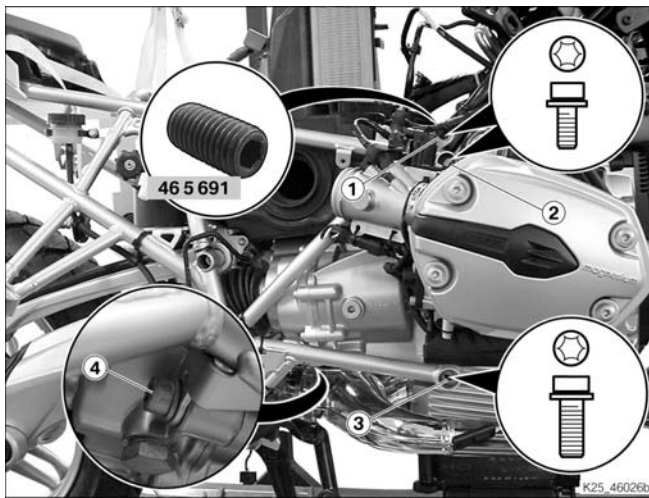
 Tightening torques		
Centre stand to main frame, M10 x 30, Replace screws Micro-encapsulated	42 Nm	

(-) Installing rear frame

- Carefully manoeuvre the rear section of the motorcycle into position from behind.
- Manoeuvre the brake caliper and brake hose with speed sensor through the rear frame.
- Carefully continue moving the rear section forward until the mounting points of the rear frame are in line.


► Securing rear frame to motorcycle

- Install screw (4), **but do not tighten it at this point.**
- Insert screws (2) on left and right.
- Insert screw (3) on left.
- Insert screw (3) on right, complete with bushing.
- Remove retaining screw (No. 46 5 691) and insert



screws (1) on left and right.

- Tighten screw (4).
- Tighten screws (1), (2) and (3).

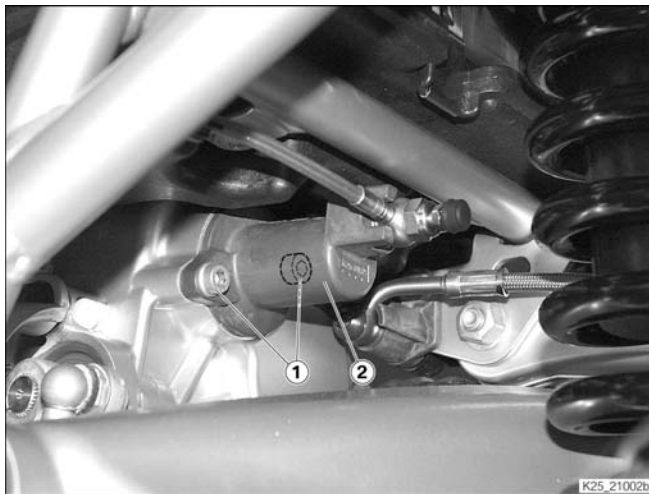
 Tightening torques		
Rear frame to gearbox, M8 x 55-10.9, 1. Hand-tighten all screws; 2. Tighten gearbox screw first; 3. Tighten remaining screws	28 Nm	
Rear frame to engine, bottom, M12 x 50	55 Nm	
Rear frame to engine, top, M10 x 40	38 Nm	




- Take the strain off the straps and remove, complete with workshop crane.

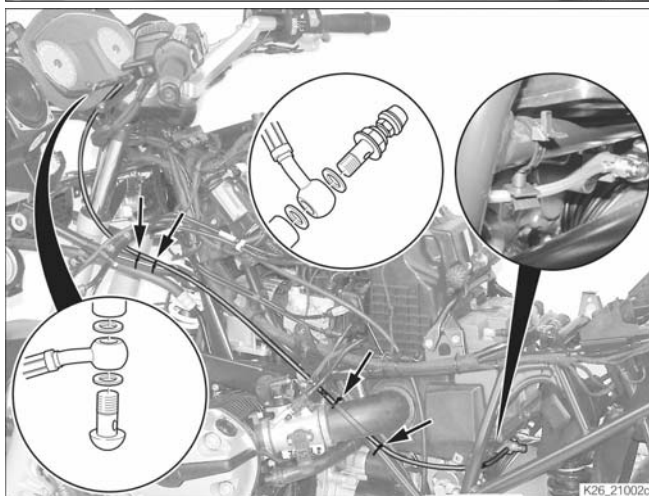
(-) Installing clutch slave cylinder

- Thread the clutch line with clutch slave cylinder (2) into the rear frame and position the cylinder in the gearbox.
- Uniformly tighten screws (1) making sure the cylinder does not tilt.



 Tightening torques		
Clutch slave cylinder to gearbox, M6 x 18	8 Nm	

- Install the clutch line and use cable ties (arrows) to secure it to the rear frame.



(-) Installing swinging arm with rear-wheel drive

-

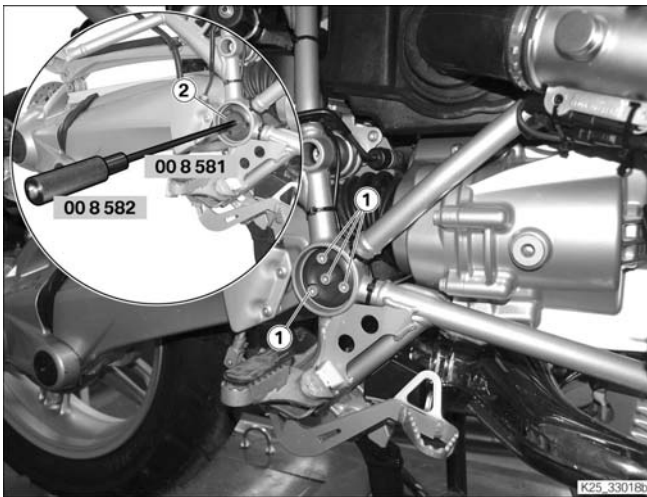
Carefully manoeuvre the swinging arm with universal shaft, spring strut and rear wheel into position from the rear and slide the universal shaft onto the gearbox output shaft.



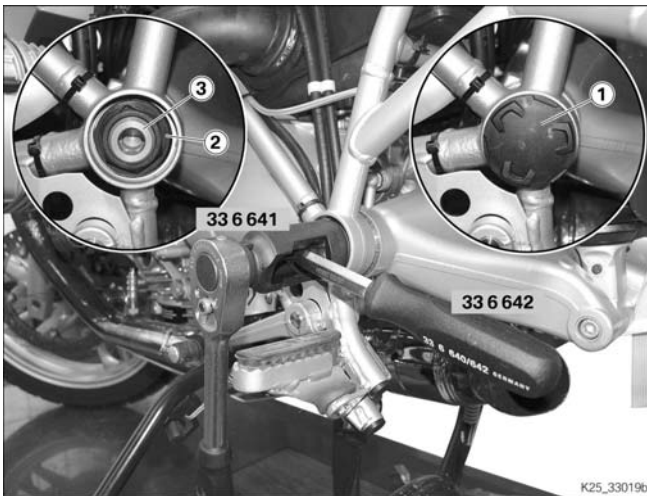
Note

If the universal shaft is pulled too far out of the cardan tunnel, it will slip off the splines of the rear-wheel drive input shaft. If this happens the rear-wheel drive will have to be disassembled in order to permit reinstallation of the universal shaft.


- Slide the link into the mount on the frame, noting the thrust washers on left and right on the pivot bearing.
- Lift the swinging arm and install bearing stud (2).

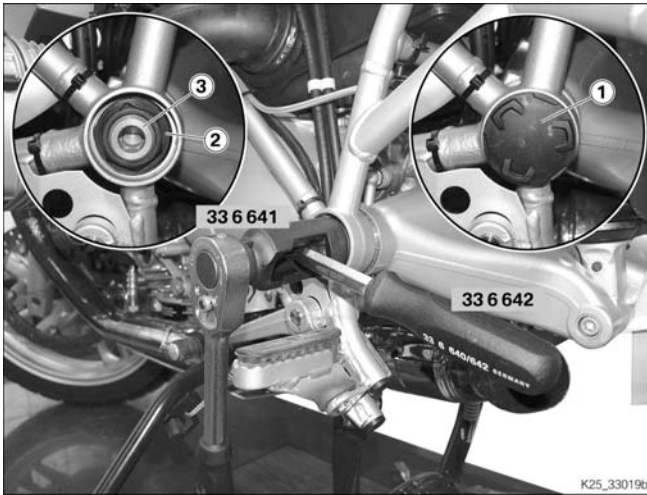
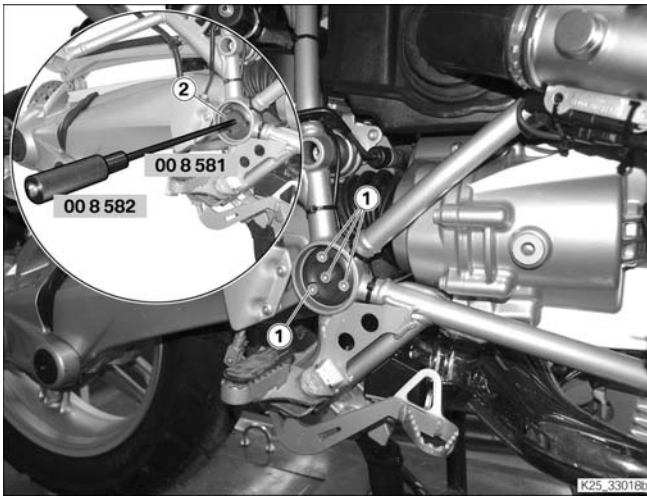


- Align the swinging arm and install bearing stud (3).




- Install screws (1).


 Tightening torques		
Swinging arm to main frame, right, M6	9 Nm	



- Tighten bearing stud (3).

 Tightening torques		
Bearing stud, swinging arm to main frame, left, M24 x 1.25	7 Nm	

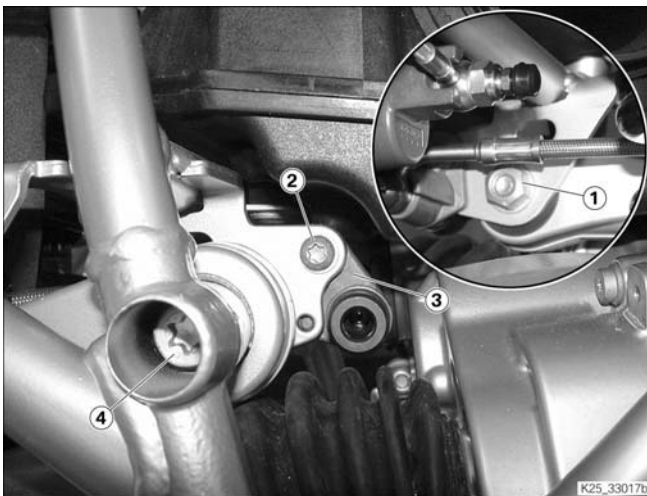
- Tighten locknut (2) with Allen wrench (No. 33 6 642) and special socket wrench insert (No. 33 6 641).


 Tightening torques		
Lock nut, swinging arm to main frame, left, M24 x 1.25	145 Nm	

- Install cap (1).


► Installing Paralever link at front

- Introduce the link into the rear frame and align it.
- Install screw (4) in the frame.
- Install nut (1).

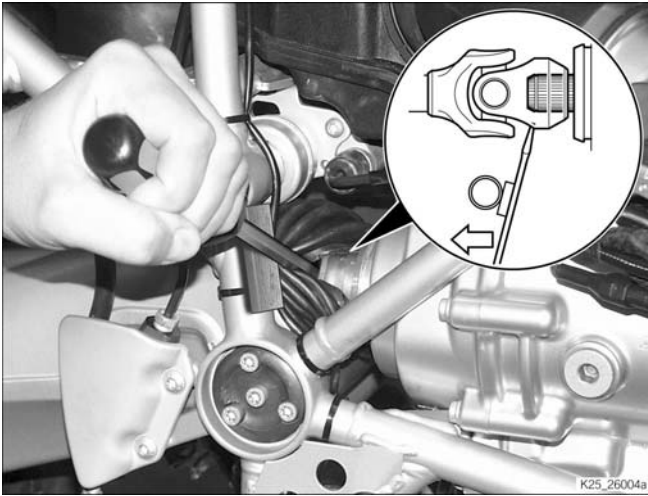


 Tightening torques		
Reaction link to frame, M10 x 55-10.9, Replace nut	42 Nm	

- Hold connector (3) in position and secure it with screw (2).

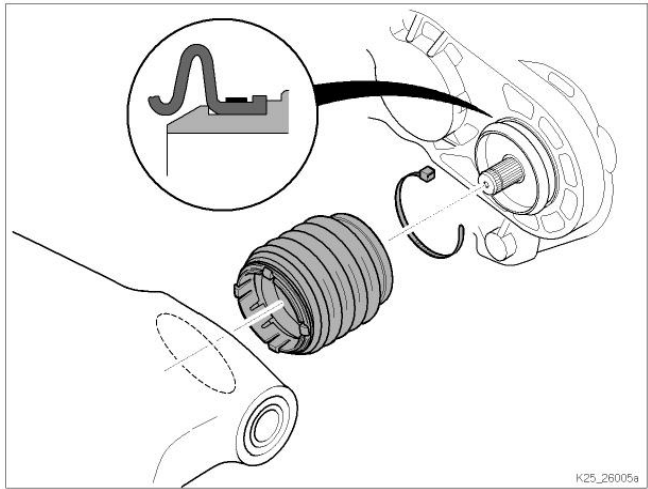
 Tightening torques		
Connecting piece to rear frame, M6 x 16	8 Nm	






► **Pressing universal shaft onto gearbox output shaft**

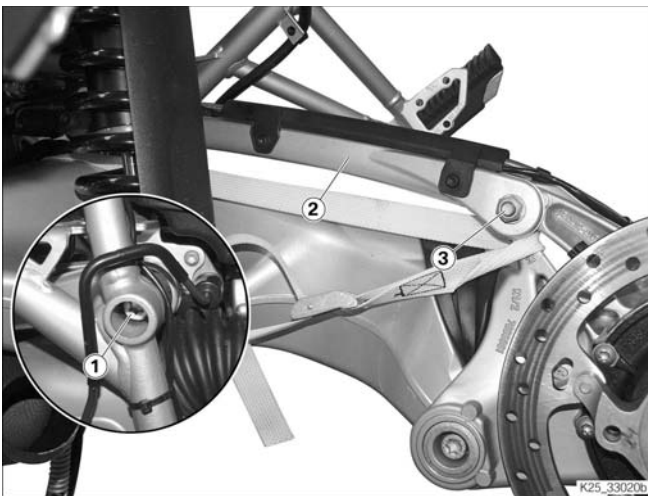
- Use a suitable screwdriver to press the universal shaft onto the gearbox output shaft until you clearly feel it engage.



- Grease the flexible gaiter at the seats for the gearbox and swinging arm, slip it onto the gearbox, and secure it with a new strap.


 Consumables/lubricants		
Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174

- Check that the flexible gaiter is correctly seated on the gearbox and in the swinging arm.



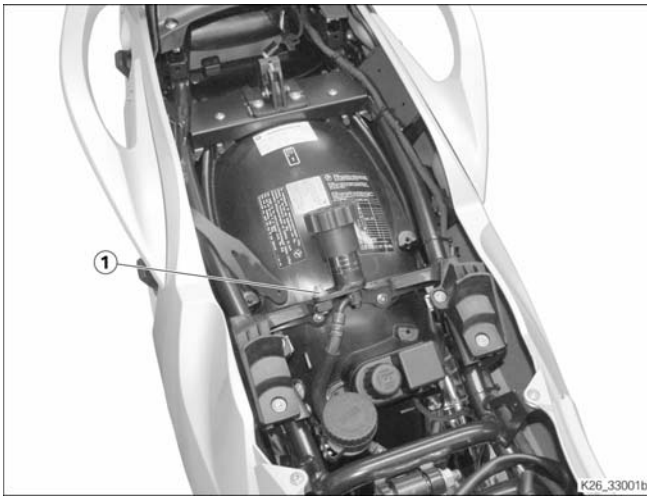
► **Installing Paralever link at rear**

- Release the brake caliper from the rear frame.
- Introduce link (2) into the rear-wheel drive and align it.
- Push the stud through toward the motorcycle side and tighten nut (3).

 Tightening torques		
Link to final drive housing, M10 x 55, Replace nut	43 Nm	

◄ **Variant, not for ESA**

- Secure the adjuster knob to the holder with screw (1).




K26_33001b

(-) Installing rear brake caliper

- Hold the brake caliper in position and secure with screws (1).



K25_34034b

 Tightening torques		
Brake calliper, rear, to cover of final drive housing, M8 x 25	24 Nm	



Warning

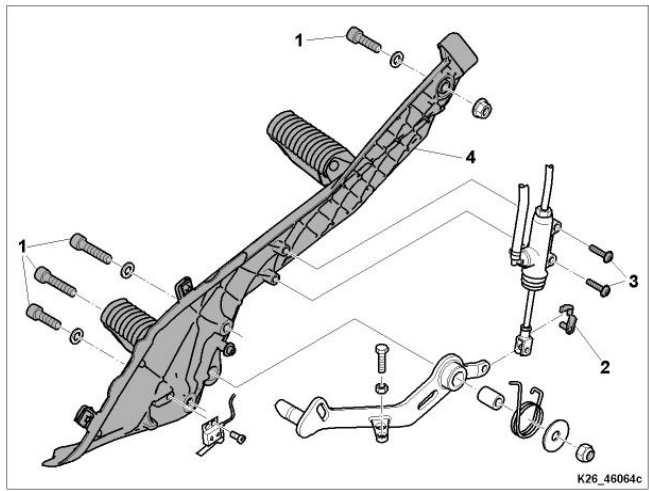
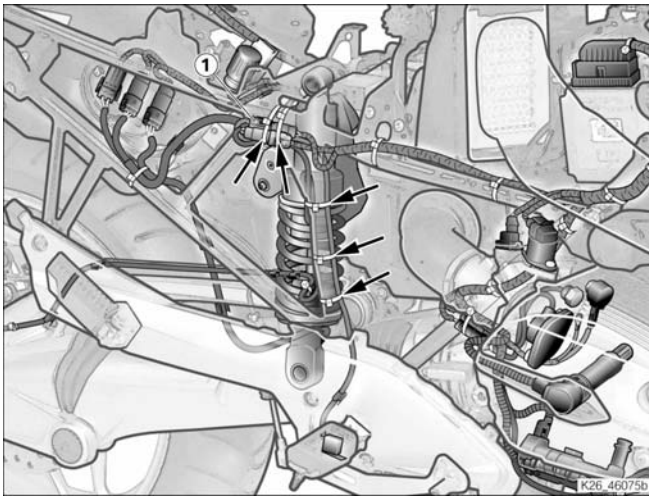
Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.


- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Installing right footrest plate


- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

- Install pin (2).
- Install screws (1).

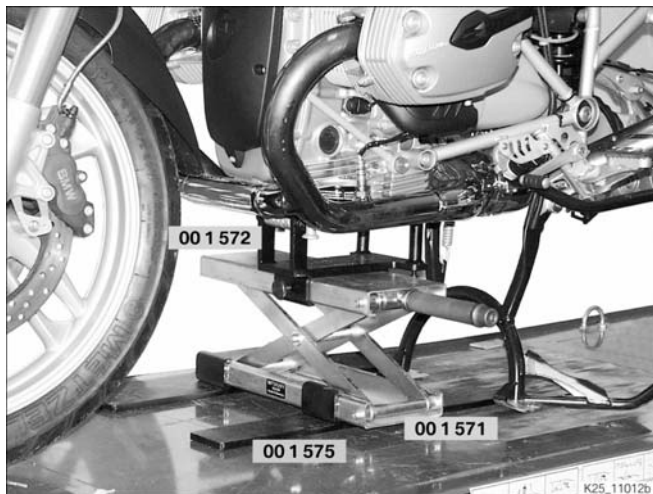
 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	



- Install screws (1) holding bottom section of fairing.

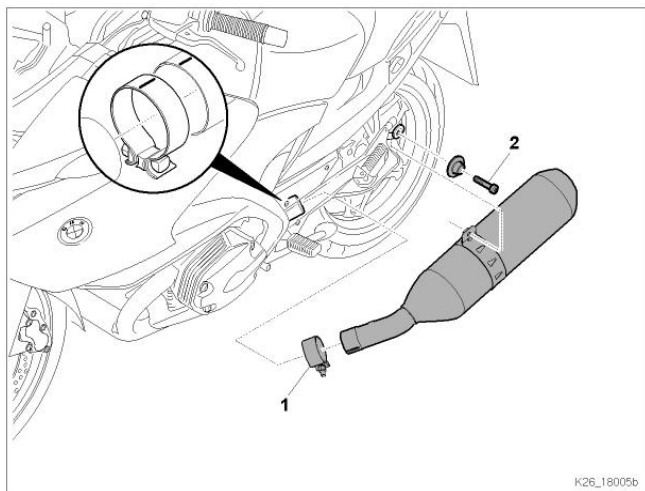
(-) Removing engine stand


- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .




(-) Installing silencer

- Grease the inner face of Torca clamp (1).




 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

- Slip the Torca clamp onto the silencer.
- Slide on the silencer as far as it will go up to the manifold and fit screw (2) in position.
- Tighten screw (2).

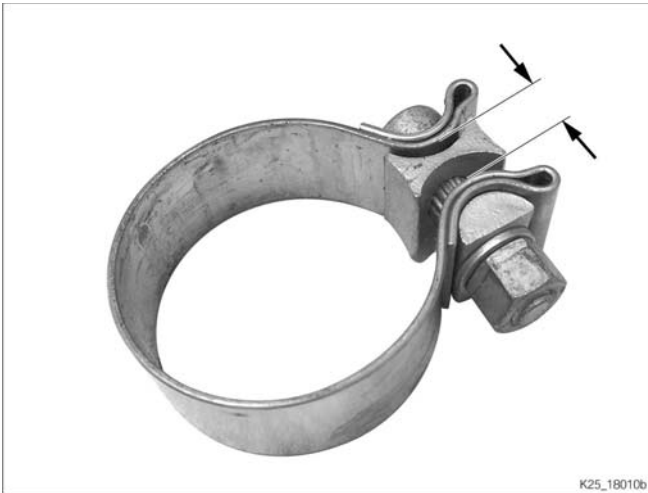
 Tightening torques		
End silencer to footrest support, M8	19 Nm	

- Align Torca clamp to marks (1) and secure hand-tight.



 Tightening torques		
Torca clamp to silencer and elbow, M8	55 Nm	
Optimoly TA		


► Checking Torca clamp on silencer



- Tighten the Torca clamp.

Test

- Check that a gap is visible at the clamp seat before final torque is applied.

 Tightening torques		
Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	

Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.




▶ Checking distance between silencer and rear wheel

Test

- Check distance (*arrows*) between silencer and rear wheel.



 Technical data			
Minimum distance between silencer and rear wheel		min. 15 mm	

Result: Distance between silencer and rear wheel is less than specified.

Measure:

▷ Adjusting silencer

- Undo Torca clamp.
- Remove screws (1).

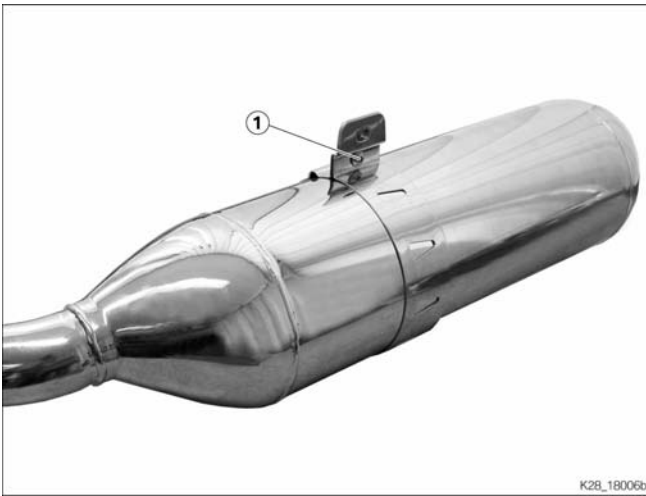


Attention

Nature: The outer pipe can be scraped when the clamp on the end silencer is moved.

Avoidance: Do not move the clamp on the end silencer unless absolutely necessary for the purposes of adjustment.

Open the clamp far enough and grease it lightly.



- Bend open the clamp far enough to prevent damage to the surface of the silencer.
- Turn silencer up to min. clearance.



Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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- Apply a thin coat of grease to the inner face of the clamp, install screws (1) and tighten.



Consumables/lubricants

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten Torca clamp.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
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Checking Torca clamp on silencer

- Tighten the Torca clamp.

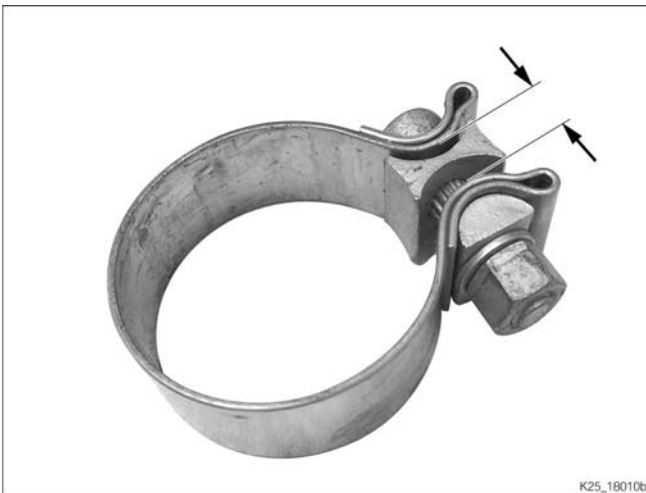
Test

- Check that a gap is visible at the clamp seat before final torque is applied.



Tightening torques

Torca clamp to silencer and elbow, M8 <i>Optimoly TA</i>	55 Nm	
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Result: No gap is visible at the clamp seat when final torque is applied.

Measure:

- Replace the Torca clamp.



- Once again check distance (arrows) between silencer and rear wheel.



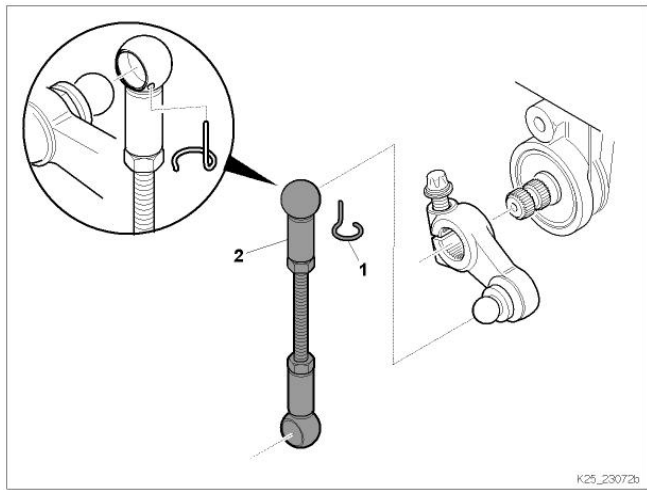
Technical data

Minimum distance between silencer and rear wheel		min. 15 mm	
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(-) Securing selector rod to shift lever

- Grease the ball head of the shift lever and the ball socket of selector rod (2).



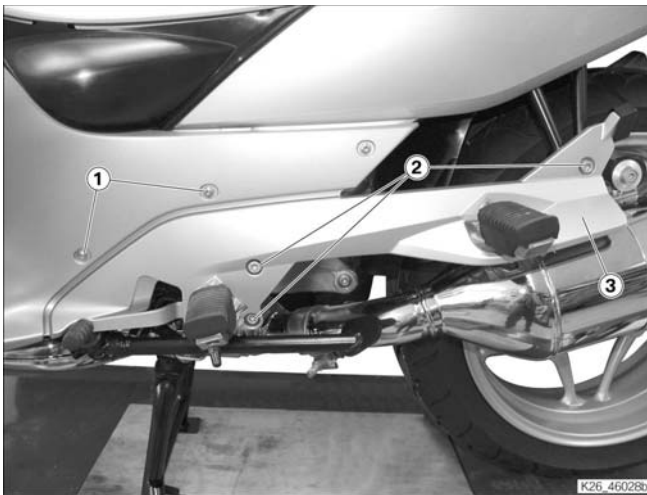
Consumables/lubricants

Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992
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- Press the ball socket of selector rod (2) onto the ball head of the shift lever.
- Install retaining clip (1).

(-) Installing left footrest plate

- Install footrest plate (3).
- Install screws (2).



Tightening torques

Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

- Install screws (1).

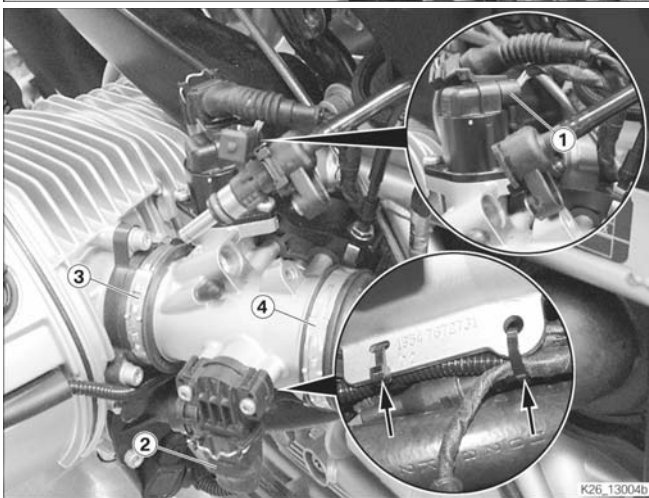
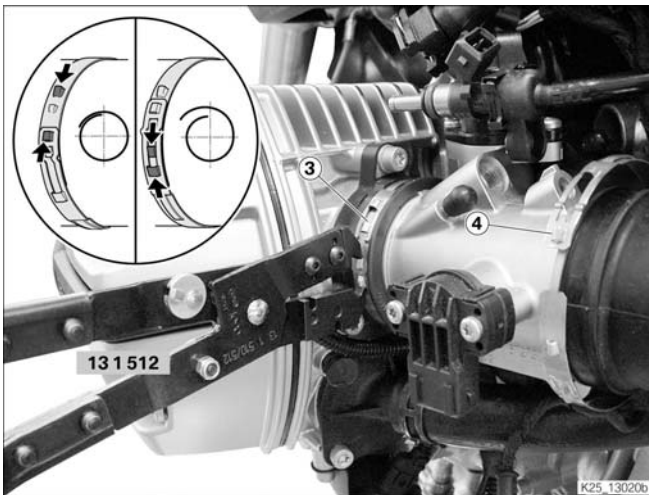
(-) Releasing throttle valve stub with cable divider

- Open cable tie (arrow) and pull down throttle valve stub together with throttle cable divider to remove.



(-) Installing throttle-valve stub

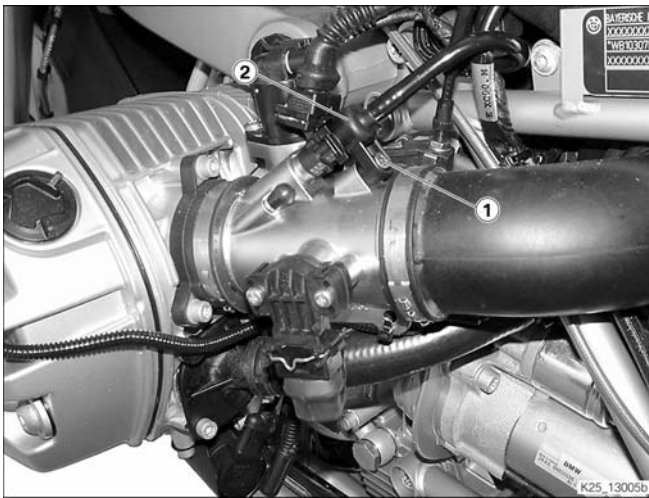
- Clip the cable divider into the holder on the intake air silencer, carefully manoeuvring the right throttle valve into position at the same time.
- Remove the covers from the intakes.
- Introduce the left and right throttle-valve stubs into the air intakes and position them correctly.
- Align hose clips (3) and (4) and close them with pliers (No. 13 1 512) .




- Connect plugs for idle actuators (1) on left and right.
- Connect plug for throttle-valve potentiometer (2).
- Use cable ties (arrows) to secure the electric cables to the throttle-valve stubs on left and right.
- Check that the throttle cables are correctly routed and secure at the throttle-valve stubs and at the throttle-cable divider and correct if necessary.

(-) Installing right and left injection valves

- Check the sealing rings of the injection valves for damage. Replace the sealing rings if swollen or damaged.
- Insert the injection valves with holders (2) and secure

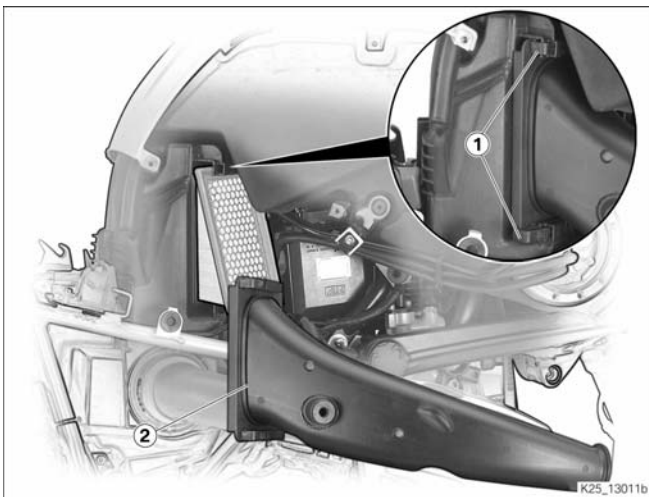


with screws (2).

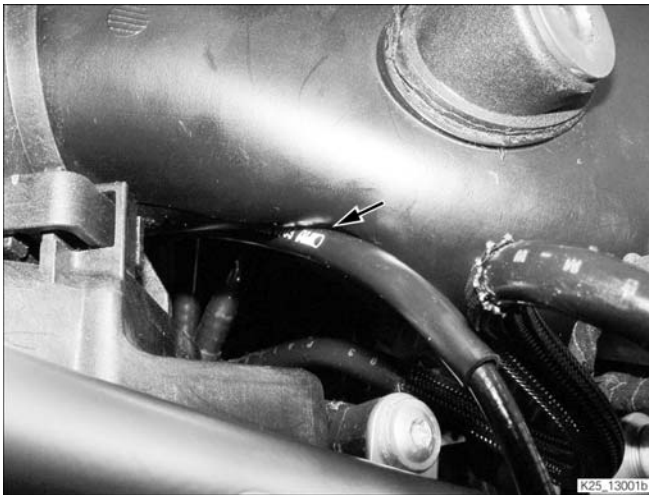
 Tightening torques		
Holder for injection nozzle to throttle-valve stub, M5 x 16	5 Nm	

- Connect plugs (1) to the injection valves.

(-) Installing intake air pipe



- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



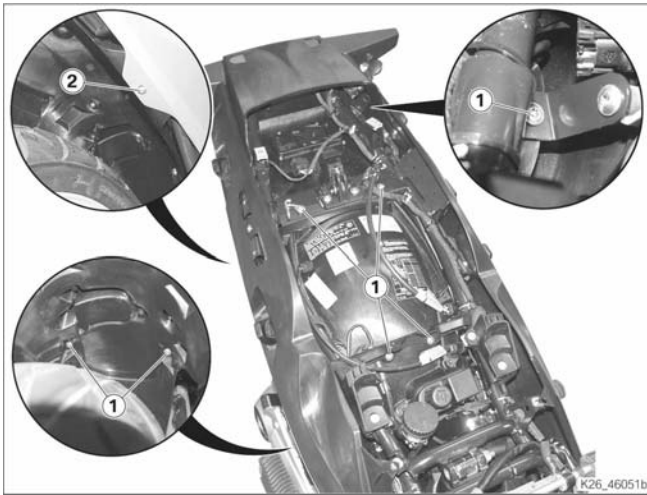
- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

(-) Installing rear mudguard

- Install the rear mudguard.

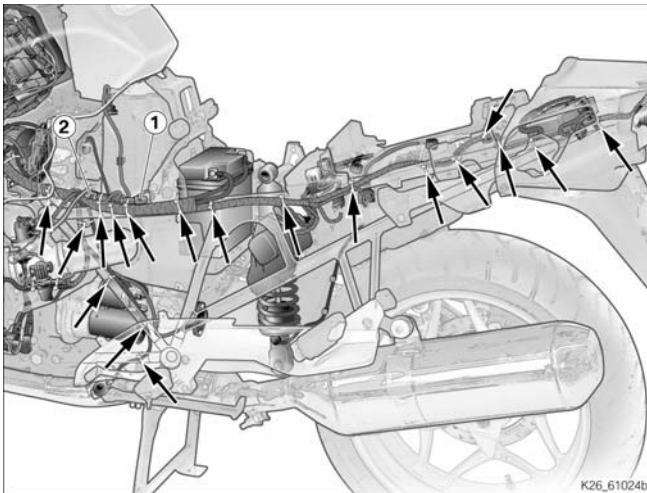
Variant, On-board computer

- Connect plug (1).



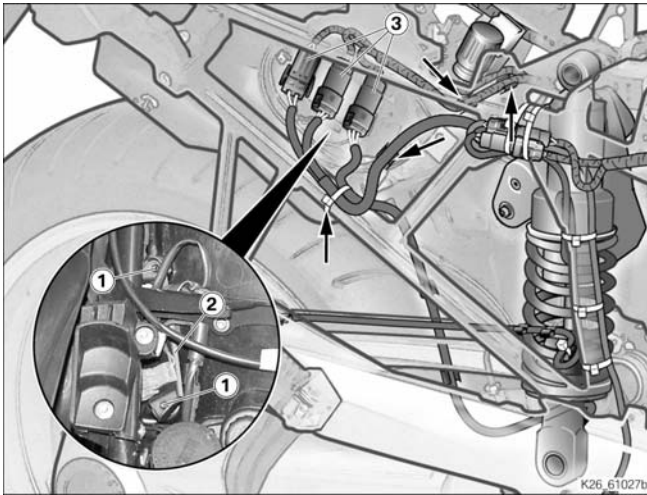
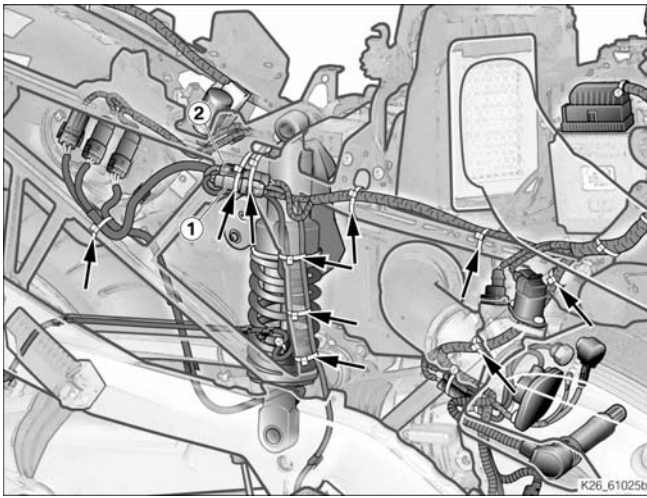
- Install screws (2) on left and right.
- Install screws (1).

(-) Securing wiring harness at rear



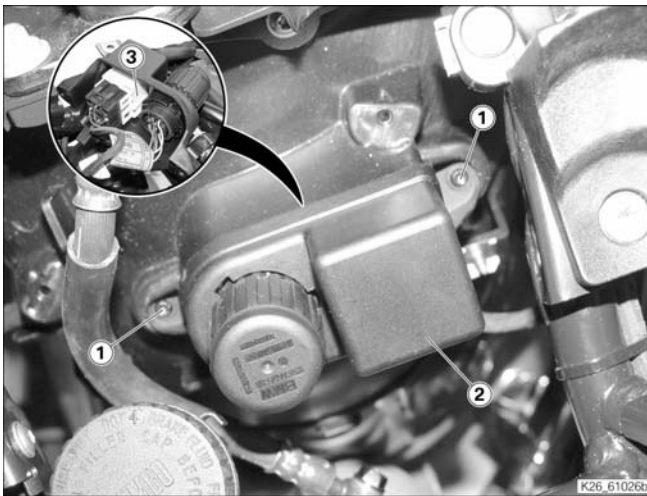
- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.
- Connect plug (1) of the intake-air temperature sensor and secure the cable to the intake air silencer.

- Connect plug (1) of the speed sensor.



Variant, ESA

- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Secure holder (2) with screws (1).



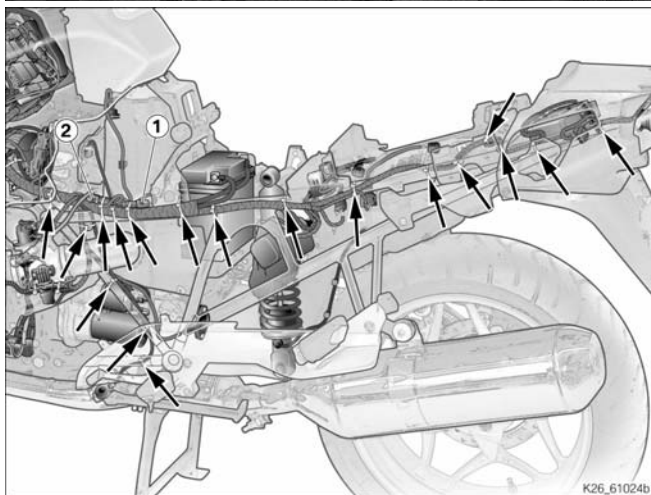
- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).

Variant, Seat heating

- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

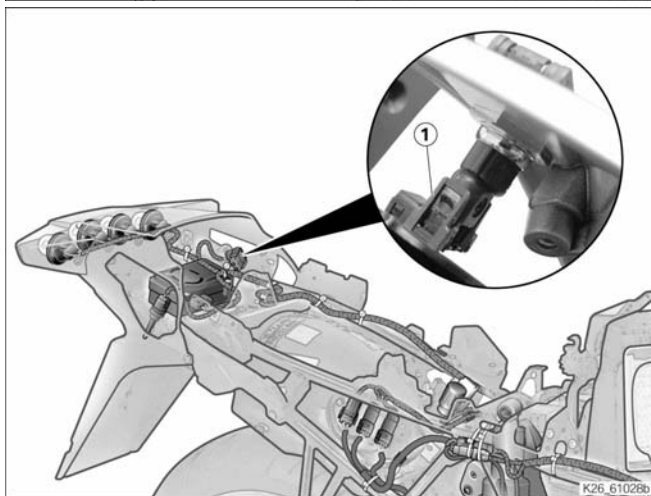


- Secure the wiring harness to the rear frame with cable ties (arrows).



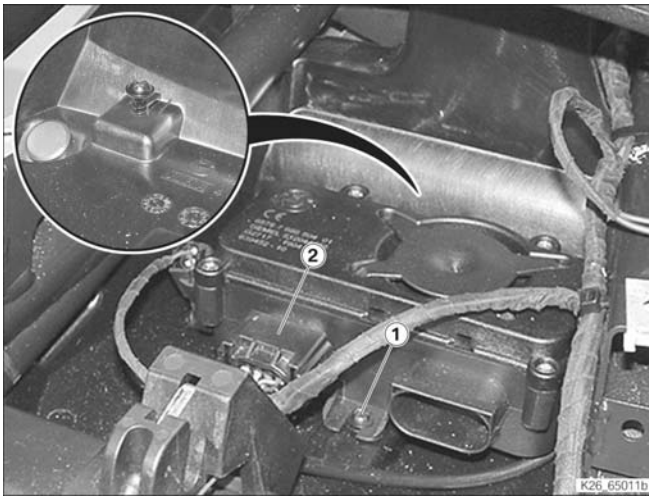
Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



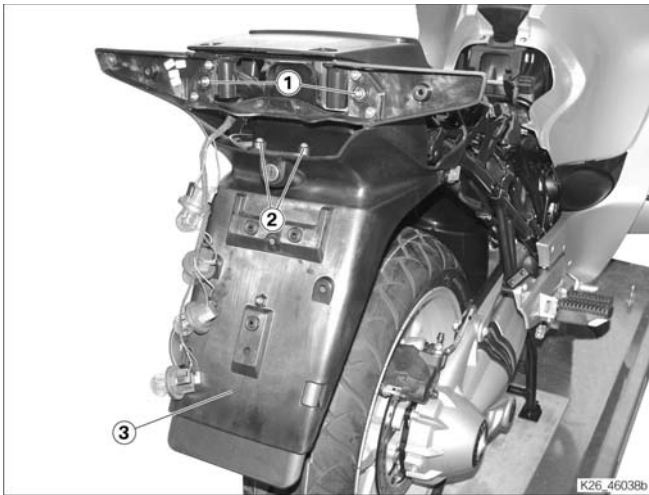
Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.




Variant, On-board computer

- Connect plug (1) of the temperature sensor.




(-) Installing number-plate carrier

- Hold license-plate holder (3) in position at the rear of the motorcycle.
- Install screws (1).

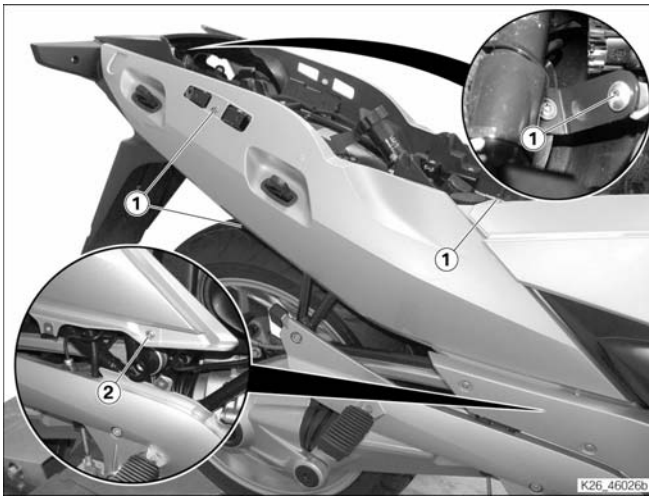
 Tightening torques		
Licence plate carrier to rear frame, M6 x 25	6 Nm	

- Install screws (2).

 Tightening torques		
Pillion catch to rear frame, M6 x 16	6 Nm	

(-) Installing rear trim panel on right

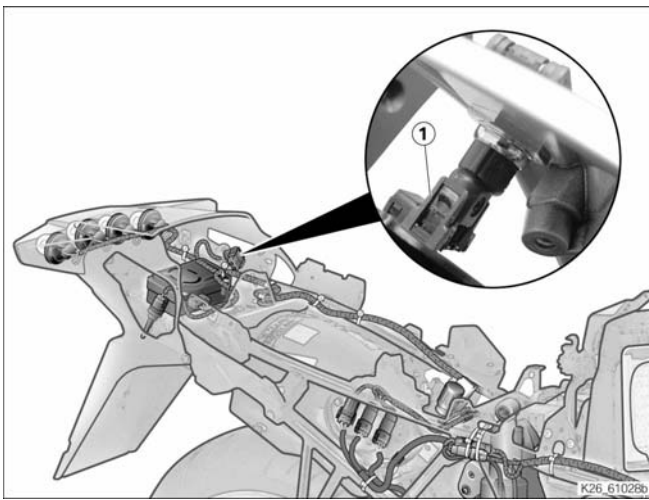
- Carefully bend back the bottom section of the fairing, just far enough to allow screw (2) to be installed.
- Install screw (2).
- Install screws (1).



(-) Installing rear trim panel on left

Variant, 2nd socket outlet


- Connect plug (1) to the socket.

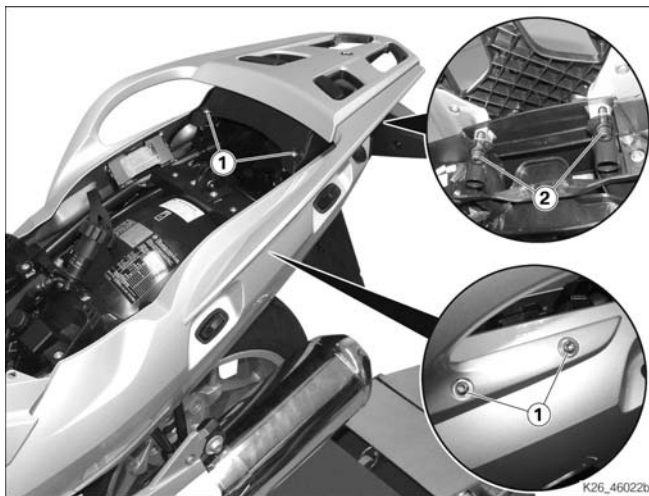


- Seat the rear trim panel on the motorcycle.
- Carefully bend back the bottom section of the fairing, just far enough to allow screw (3) to be installed.
- Install screw (3).
- Install screws (1).

(-) Installing luggage carrier


- Place luggage rack in position.
- Install new screws (1).

 Tightening torques		
Luggage rack, centre to	8 Nm	

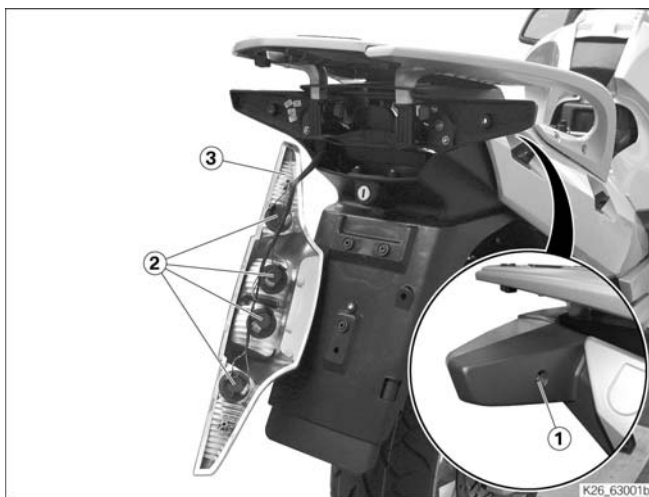


rear section of frame, M6 x 35, Replace screws Micro-encapsulated		
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- Install new screws (2) at rear left and right.

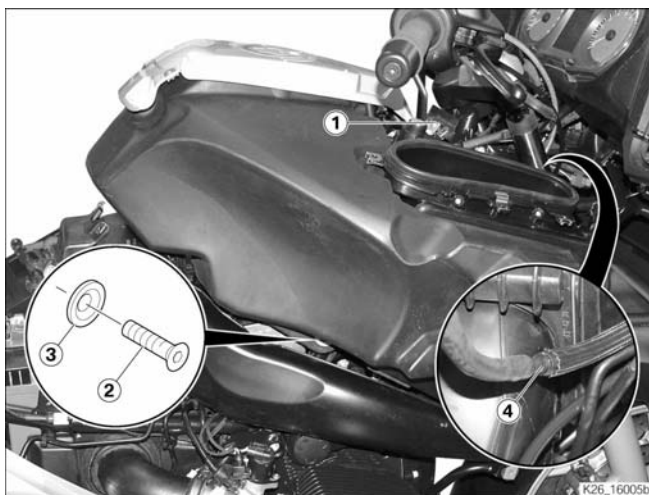
 Tightening torques		
Luggage rack from below to rear section of frame, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

(-) Installing rear-light unit




- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).

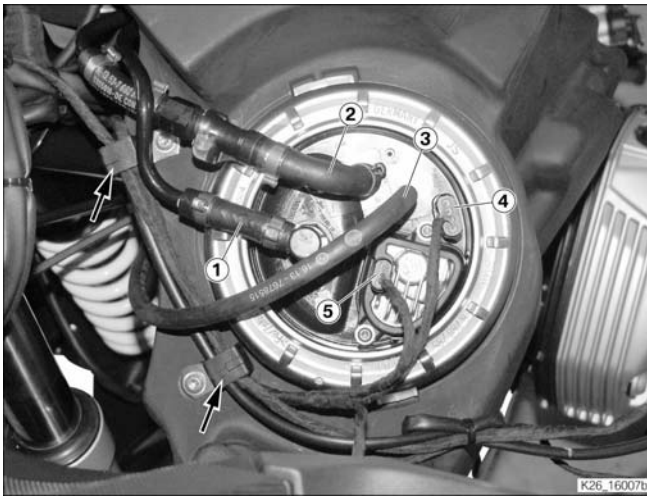
(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).



- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

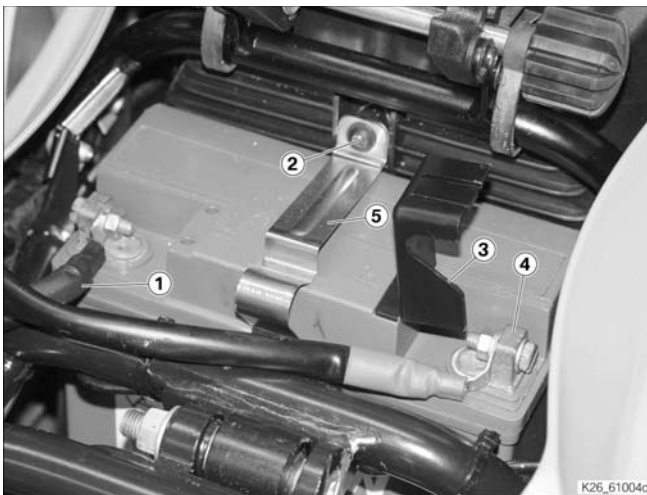
Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing the battery

- Place the battery in the battery holder and secure with battery retainer (5) and screw (2).



⚠ Tightening torques		
Battery retaining clip to airbox, M5 x 16	5 Nm	

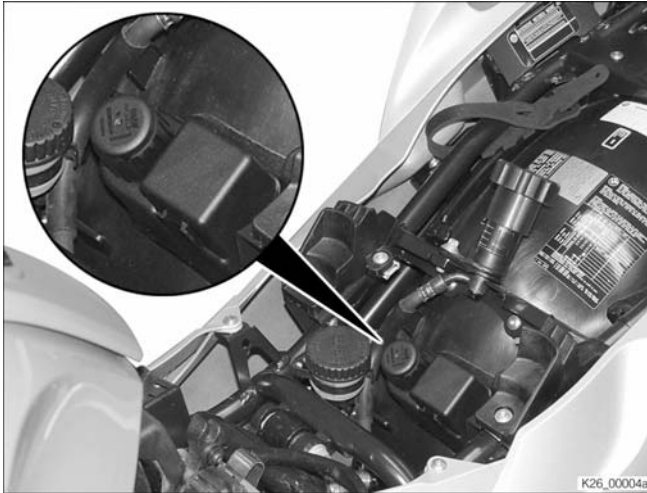
⚠ Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.

- Connect the positive lead to the battery's positive terminal (4).
- Install protective cap (3).
- Connect the negative lead to the battery's negative terminal (1), making sure that the connecting cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Connecting BMW Motorrad diagnostic system to motorcycle

**Note**

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Reading fault-code memories with the BMW Motorrad diagnostic system

- Read all fault memories.

**Note**

When working with the BMW Motorrad diagnostic system, always follow the instructions it issues.

- Perform all requisite repair work.

(-) Checking synchronisation

Precondition

- Action of throttle cables is smooth, throttle cables not chafing or kinked and correctly routed.

**Note**

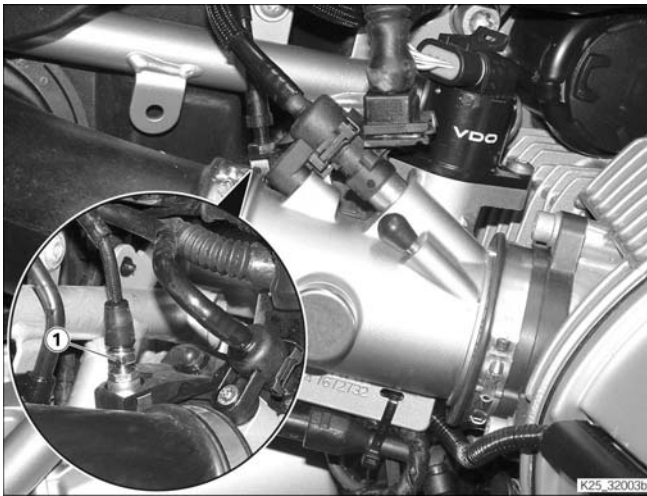
Note that synchronisation does not affect cylinder balance and engine rpm at idle speed.

In order to ensure that the engine operates as smoothly as possible after synchronisation, the BMW Motorrad diagnostic system deletes the adaptation values from the control unit's memory before the throttle valves are synchronised.


In order to ensure that they do not affect synchronisation with the throttle valves slightly open, the idle actuators are held in position by the BMW Motorrad diagnostic system.

Test

- Check that when the throttle grip is released, both



- throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.
- » Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

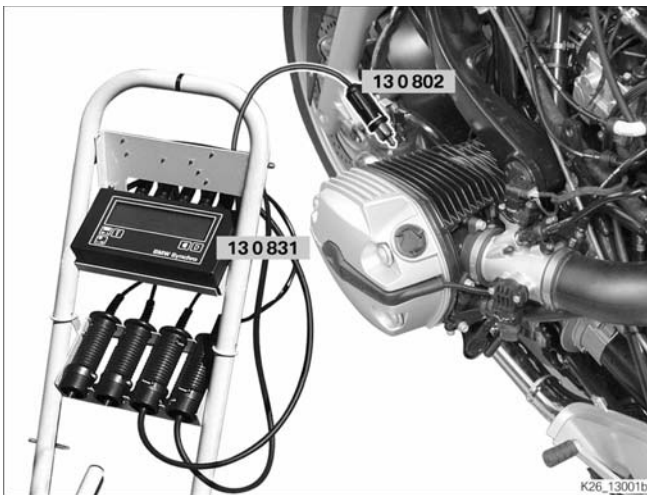
Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- Turn adjusting screw (1) of the appropriate throttle cable clockwise to adjust play.
- Be sure to match the play of the throttle cables of the throttle valves, so as to synchronise lift of the throttle valves.

► **Connecting BMW Synchro tester to the motorcycle**

- Connect BMW Synchro (No. 13 0 831) , (No. 13 0 802) to the motorcycle's on-board socket.

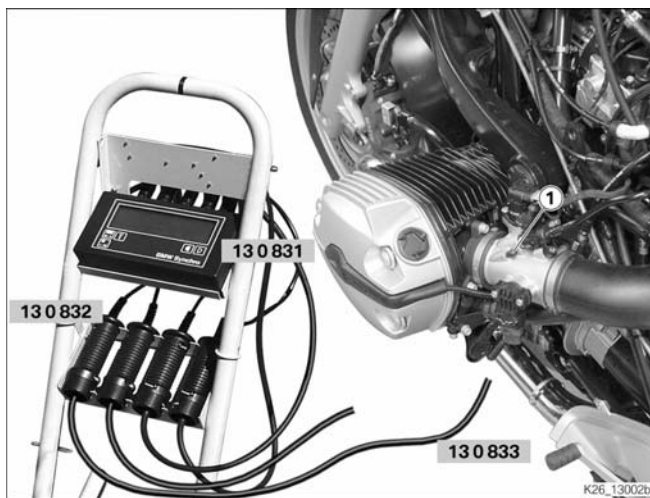


Note

Do not connect the hoses of the pressure sensors to the motorcycle until after the sensors have been calibrated. The BMW Synchro tester cannot calibrate the sensors if vacuum is applied to the pressure sensors.

- » The pressure sensors are calibrated.

- Detach caps (1) from throttle valve stub and connect hose (No. 13 0 833) of first sensor (No. 13 0 832) on the left and of another sensor on the right.



Attention

Nature: If ambient temperatures are high, there is a risk of the engine overheating in the absence of a cooling slipstream.

Avoidance: Do not allow the engine to idle unnecessarily for a prolonged period of time.

- Start the engine and follow the instructions issued by the BMW Motorrad diagnostic system as it warms up.
- Use the BMW Motorrad diagnostic system to set the engine management system's idle actuators to synchronisation mode. To do so, follow the instructions issued by the BMW Motorrad diagnostic system.

► 1. Checking idle

Test



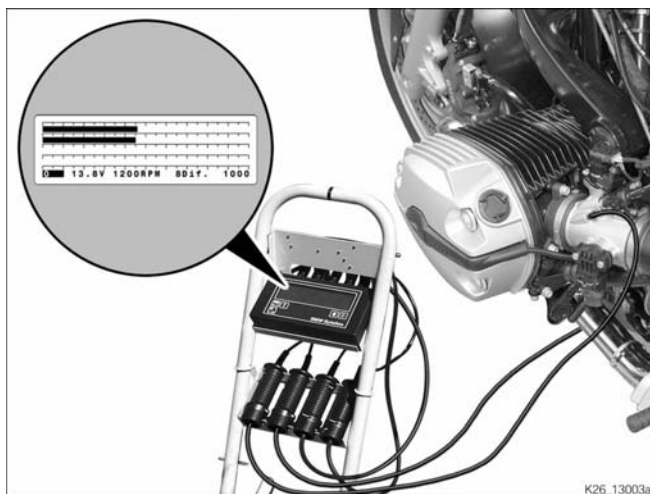
Attention

Nature: Any change to the ex-works basic setting of the throttle-valve stops will render the system impossible to adjust.

Avoidance: Do not tamper with the basic setting of the throttle-valve stops.

The sealing lacquer of the throttle-valve stop screws must remain untouched.

If the throttle-valve stub settings are changed the assembly has to be returned to the manufacturer for readjustment.



- Using BMW Synchro (No. 13 0 831) , (No. 13 0 832) , (No. 13 0 833) , (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves closed**.



Technical data

Pressure differential between intakes, engine idling	with throttle valves closed	max. 25 mbar	
--	-----------------------------	--------------	--

Result: Difference in pressure between the air intakes with throttle valves closed is excessive.

Measure:

- Check mechanical components of the engine:
 - » Air intake ducts
 - » Engine compression
 - » Valve clearances
- Recheck engine idle when the defects have been rectified.



► 2. Synchronising throttle-valve lift

Precondition

- Engine idle has been tested and is OK.



Test

- Start the engine and allow it to idle.
- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) check that the bar graphs for the average values (AVG) change **simultaneously** as you slowly operate the throttle.
- » Throttle valves lift off the idle stops.



Result: Bar graphs for average values (AVG) do not change simultaneously.


Measure:

- Turn the adjusting screw of the throttle cable for the **right** throttle valve (1) until the bar graphs for the average values (AVG) change **simultaneously**.
- » The throttle valves lift off the idle stops simultaneously.

Test

- Check that after adjustment has been completed, when the throttle grip is released, both throttle valves are fully closed irrespective of the position of the handlebars.
- » Both throttle valves reach the idle stops.

» Slight play is perceptible at the throttle cables of the throttle valves.

 Technical data			
Setting for throttle cable, throttle cable divider / throttle-valve stubs		0.5 - 1 mm	

Result: One or both throttle valves do not reach the idle stops and / or no play is perceptible at the throttle cable.

Measure:

- You must repeat the adjustment procedure.



► 3. Checking synchronisation of throttle-valve cables

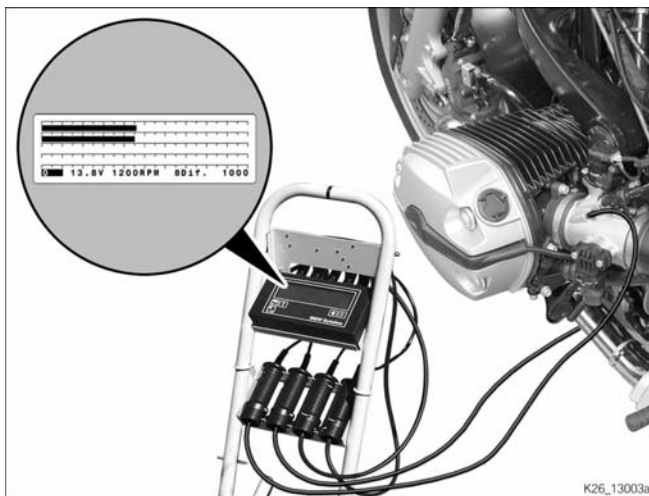
Precondition


- Engine idle has been tested and is OK.
- The throttle valves lift clear of the idle stops in synchronisation.



Test

- Using BMW Synchro (No. 13 0 831), (No. 13 0 832), (No. 13 0 833), (No. 13 0 802) measure the difference of the average values (AVG) of the partial vacuum in the air intakes **with the throttle valves slightly open**.



 Technical data			
Pressure differential between intakes	with throttle valves slightly open 1400 - 1800 min ⁻¹	max. 15 mbar	

Result: Difference in pressure between the air intakes with throttle valves slightly open is excessive.

Measure:

- Repeat the procedure for synchronising the action of the throttle valves.

» If there is a residual difference in pressure with the throttle valves slightly open, the air intake with the lower partial vacuum must be the same one in which partial vacuum is lower with the engine idling (throttle valves against their stops).



► **Disconnecting BMW Synchro tester from the motorcycle**

- Disconnect the BMW Synchro from the motorcycle's on-board socket.
- Disconnect the hoses of the pressure sensors.



Attention

Nature: A sealing cap that does not form a tight seal can allow unmetered air to be inducted into the system; this can cause the engine management system to malfunction.

Avoidance: Do not fit leaky or porous sealing caps.

- Refit the caps to the vacuum ports.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

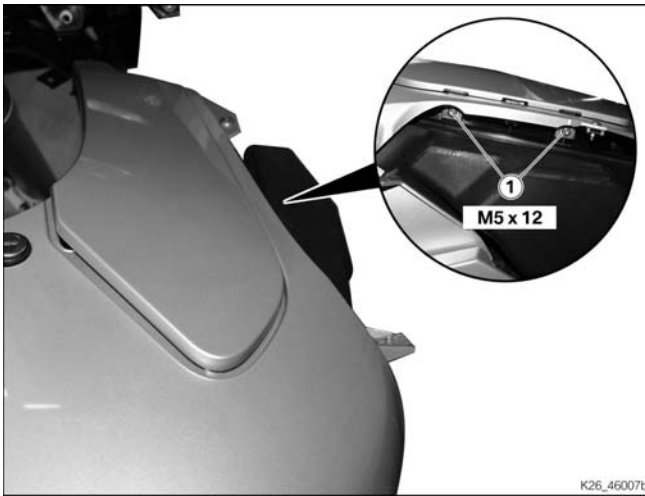
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



K26_65007b

- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **46 51 102 Replacing struts, front frame section**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

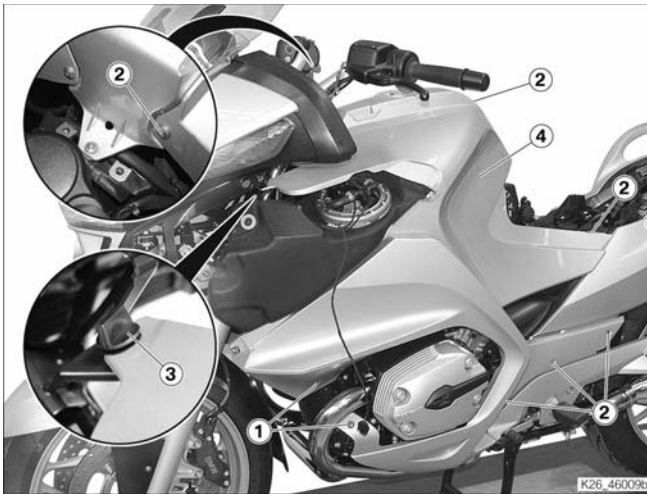


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

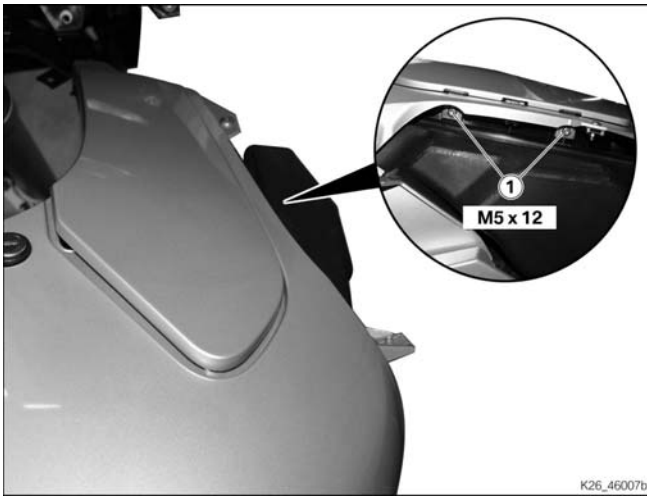
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



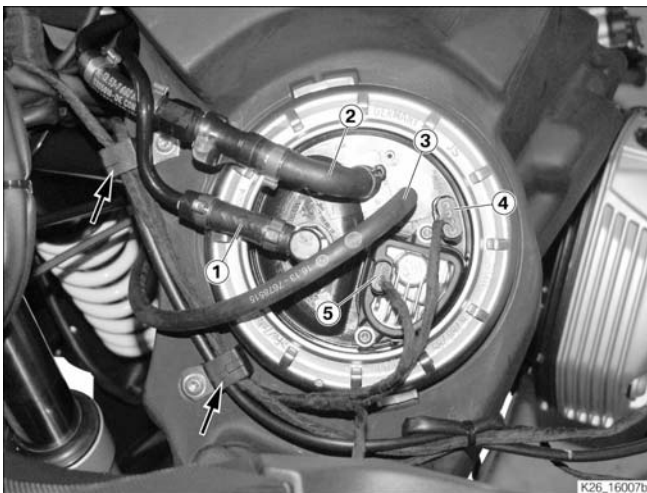
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

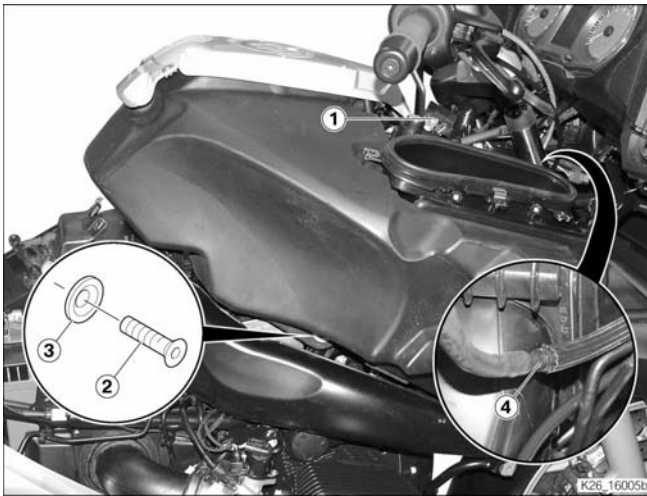


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

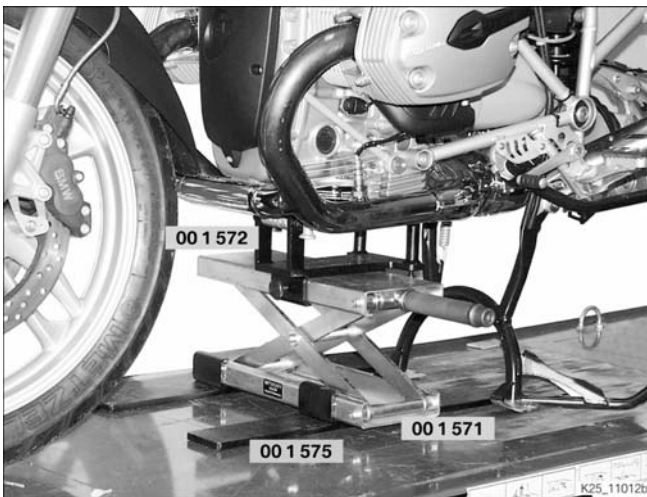


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



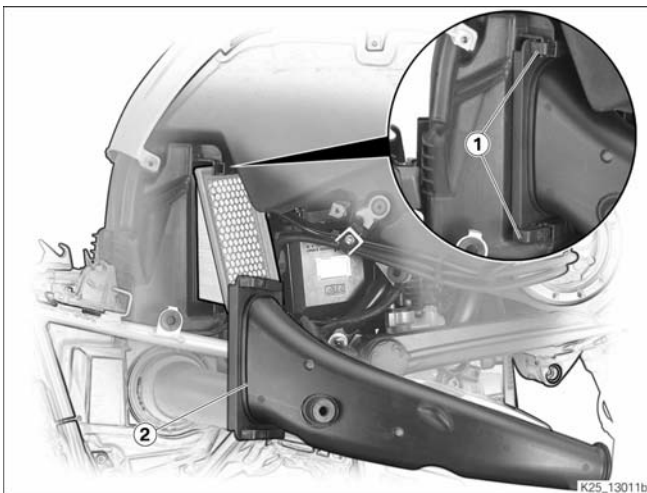
(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



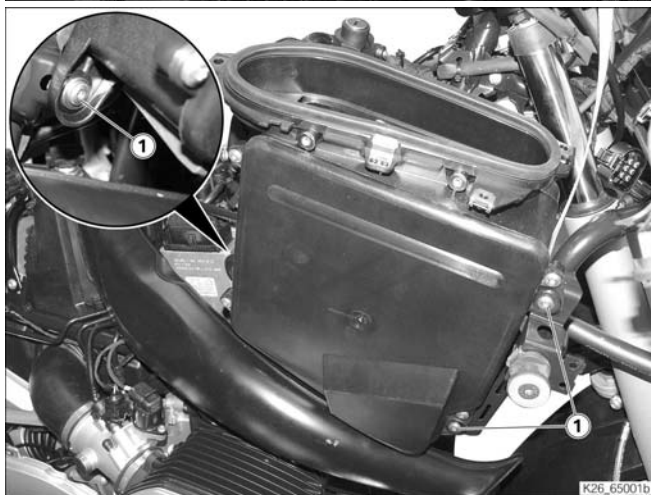
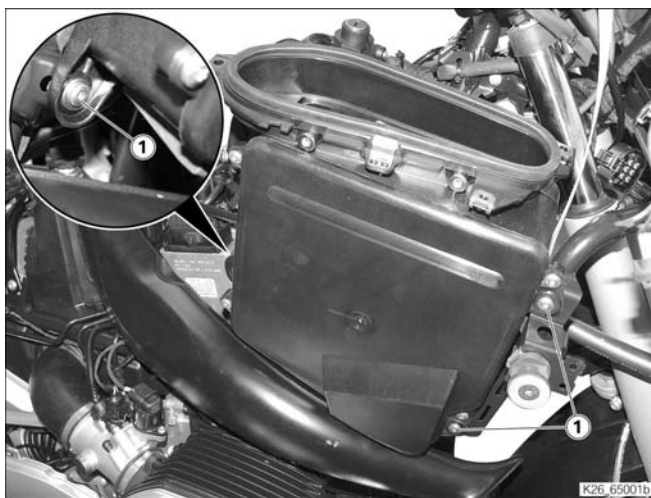
(-) Removing intake air pipe

- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.



(-) Removing stowage compartment

- Remove screws (1).
- Remove the stowage compartment.



Variant, Radio with CD player

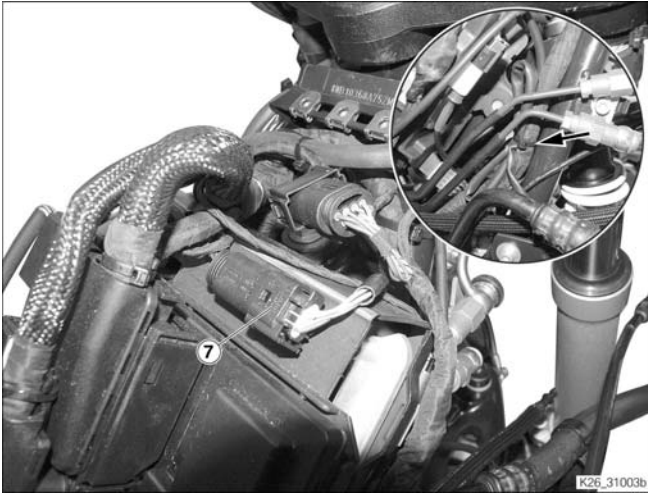
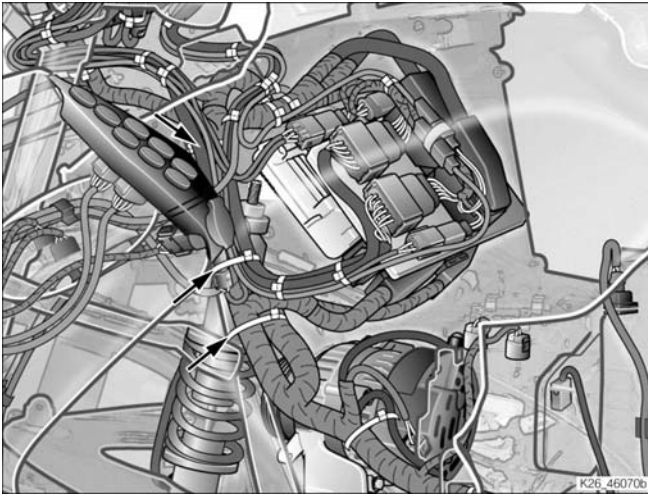
- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



(-) Removing control unit box

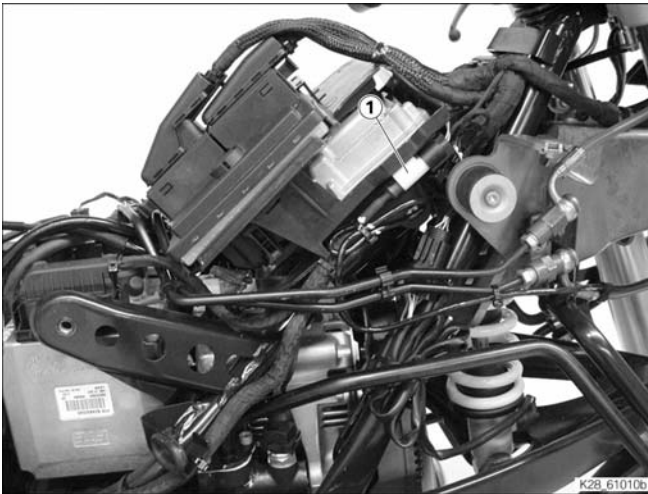
- Open latches of control unit box (1) on left and right.

- Open cable ties (arrows) on the left link.



Variant, ESA

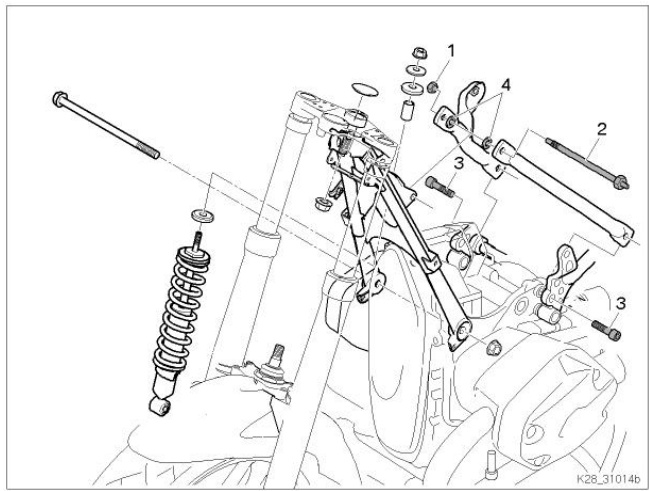
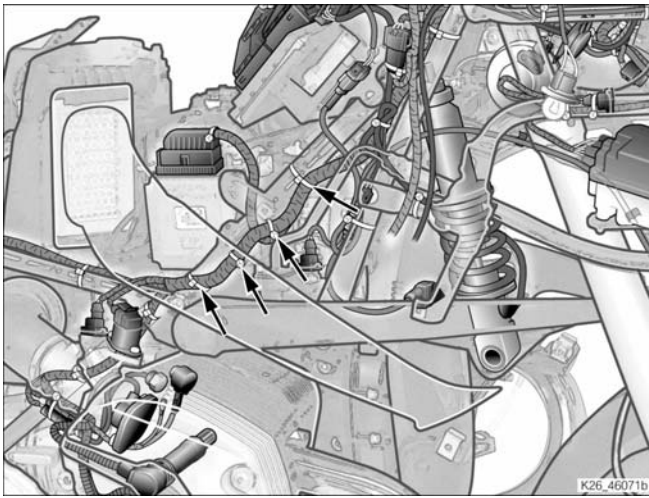
- Cut through the cable tie (arrow) on the link.
- Disconnect plug (7) of the spring strut.



- Disconnect plug for ABS sensor (1) and remove it from the control unit box.
- Release the control unit box from the link and remove it.

(-) Removing both links from frame front section

- Crank up the engine stand until the front wheel is just touching the ground.
- Open cable ties (arrows) on the right link.



! Attention

Nature: Heat can damage plastic components and paint.

Avoidance: Do not overheat plastic parts and paint.

- Heat nut (1) and remove.

Technical data			
Release temperature, microencapsulated threaded fasteners		80 °C	

- Remove quick-release axle (2).

! Attention

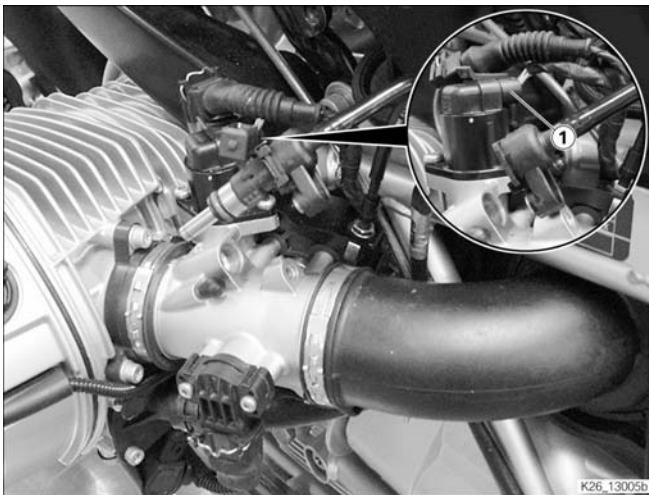
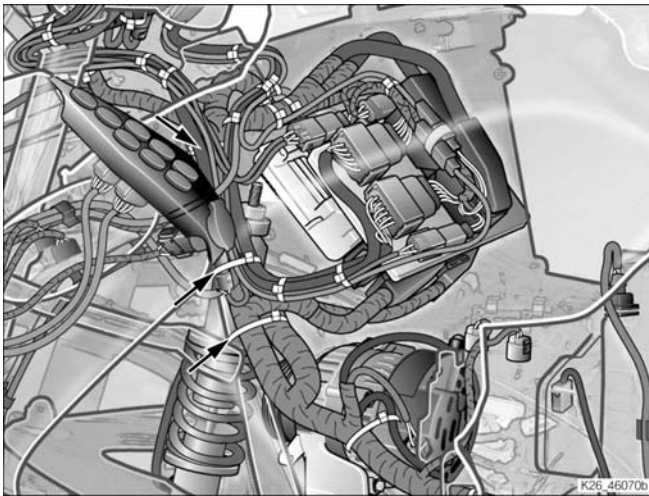
Nature: Heat can damage plastic components and paint.

Avoidance: Do not overheat plastic parts and paint.

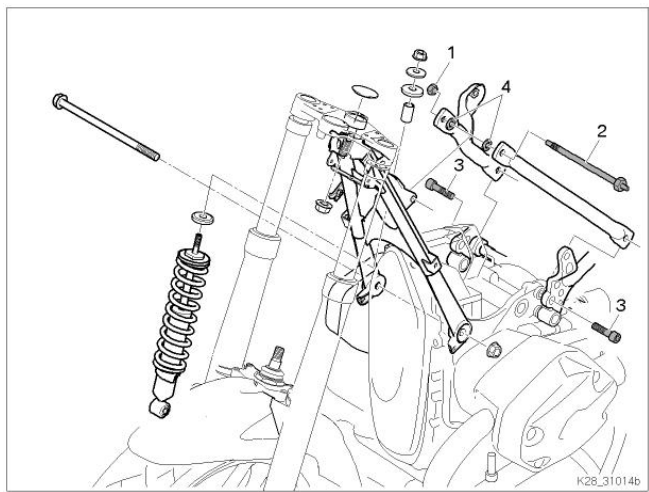
- Heat screw (3) on the right link.

Technical data			
Release temperature, microencapsulated threaded fasteners		80 °C	

- Remove screw (3).
- Remove the link.
- Open cable ties (arrows) on the left link.



- Disconnect plug (1) from the left idle actuator.




⚠ Attention

Nature: Heat can damage plastic components and paint.

Avoidance: Do not overheat plastic parts and paint.

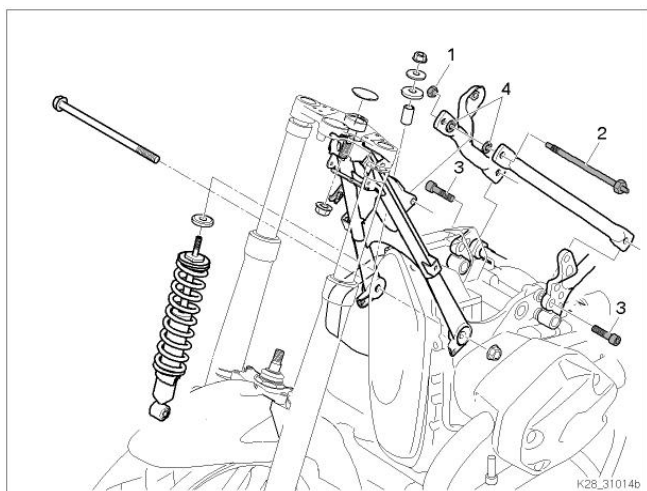
- Heat screw (3) on the left link.

 Technical data			
Release temperature, microencapsulated threaded fasteners		80 °C	

- Remove screw (3).
- Remove the link.


(-) Installing both links of frame front section

- Clean the threads of quick-release axle (2).
- Clean the tapped bores for screws (3).
- Install the left link between rear frame and engine block.
- Install the link with new screw (3) and tighten the




screw until hand-tight.


- Install the right link between rear frame and engine block.
- Install the link with new screw (3) and tighten the screw until hand-tight.
- Align the links with the main frame.
- Install washers (4) on left and right between the link and the frame.
- Grease quick-release axle (2) and insert it into the frame front section.

 Consumables/lubricants		
Optimoly TA	High-temperature assembly grease	18 21 9 062 599

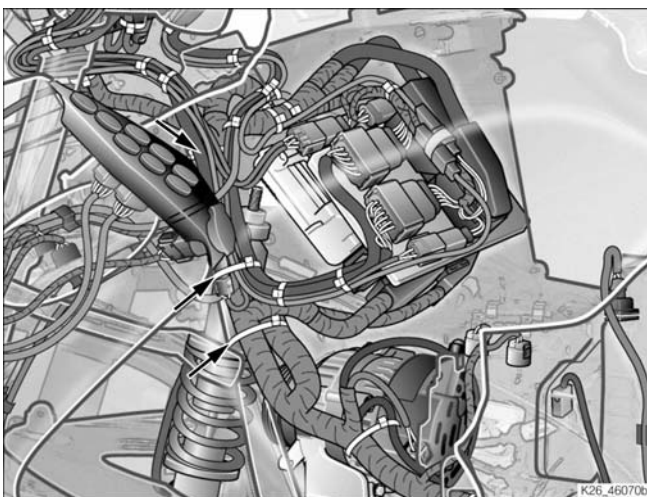
- Install new nut (1) and tighten.

 Tightening torques		
Frame strut to front frame, M10 x 106 10.9, Replace nuts Micro-encapsulated	60 Nm	

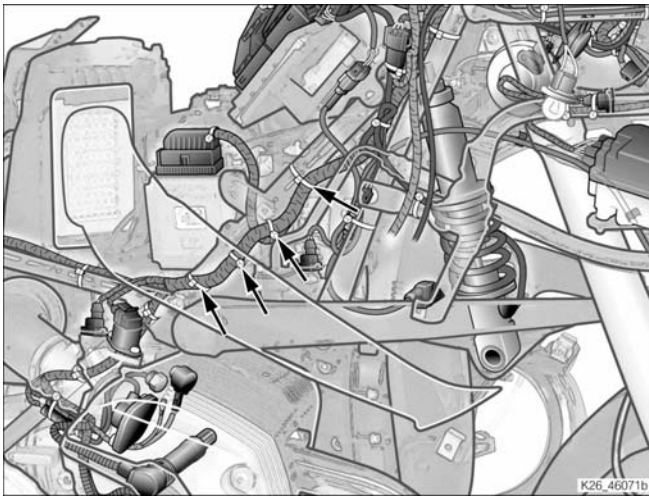
- Tighten screws (3).

 Tightening torques		
Frame strut to engine, M10 x 40, Replace screws Micro-encapsulated	38 Nm	

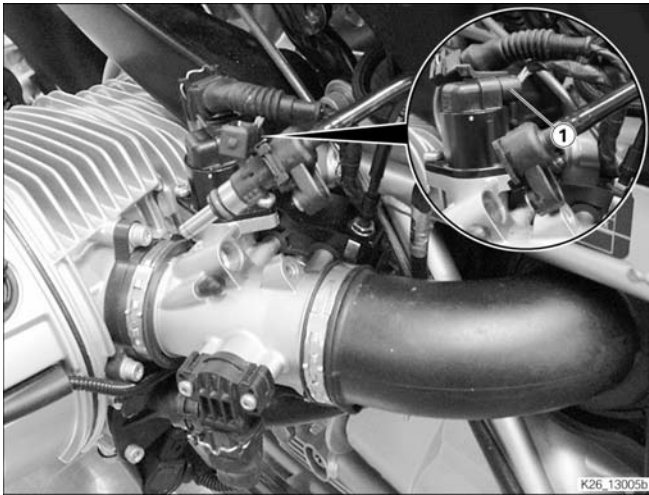
- Use cable ties (arrows) to secure the wiring harness to the left link.



- Use cable ties (arrows) to secure the wiring harness to the right link.



- Secure plug (1) to the left idle actuator.



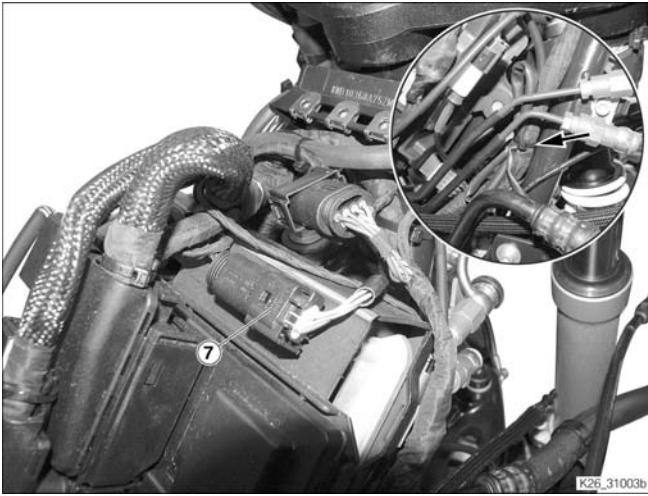
(-) Installing control unit box

- Hold the control unit box in position and secure it with clamps (1) on left and right.

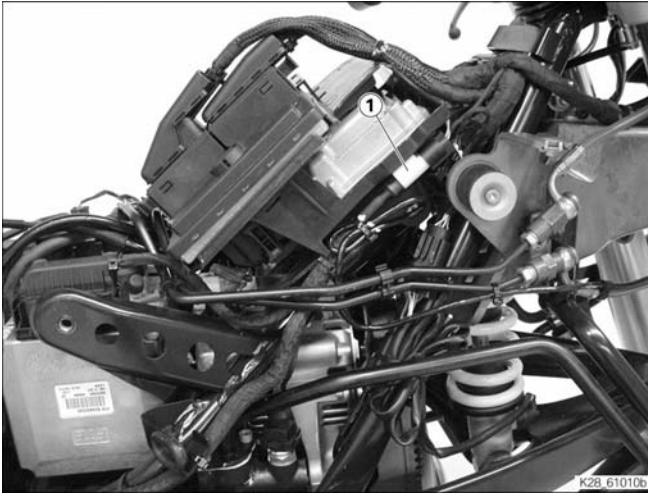


Variant, ESA

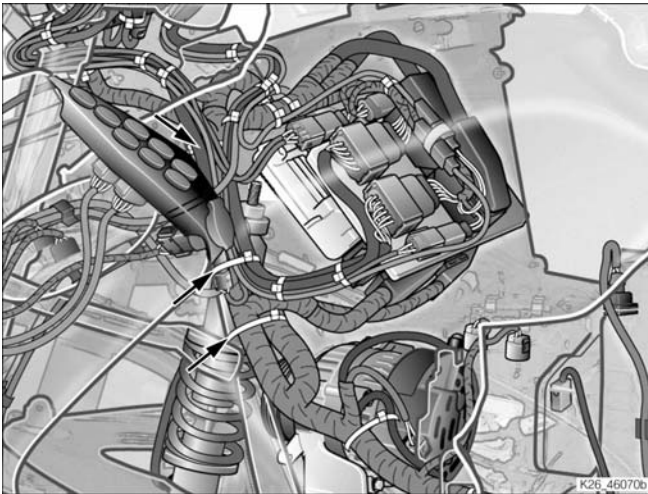
- Connect plug (7) of the spring strut.
- Secure the cable with cable tie (arrow).



- Connect plug for ABS sensor (1) to the control-unit box.

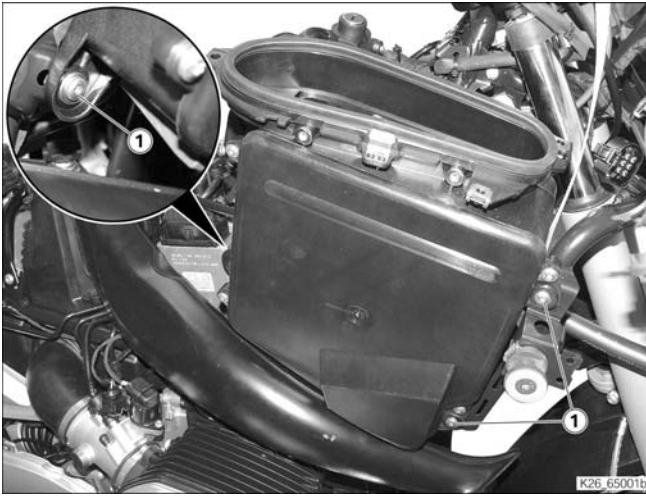


- Use cable ties (arrows) to secure the wiring harness to the left link.



(-) Installing stowage compartment

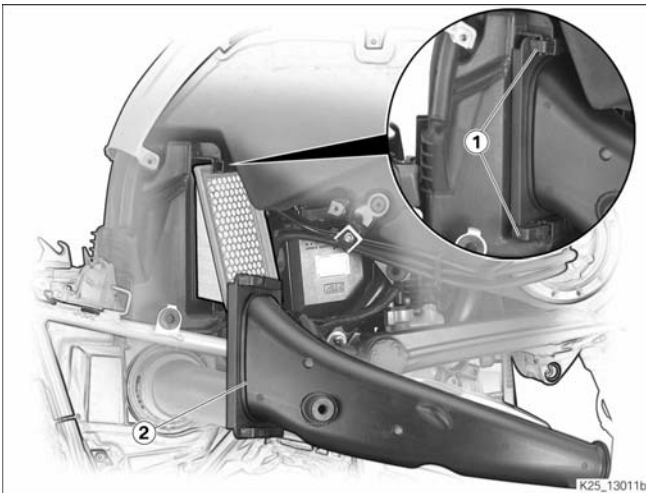
- Place the stowage compartment in position and align it correctly.
- Install screws (1).



Variant, Radio with CD player

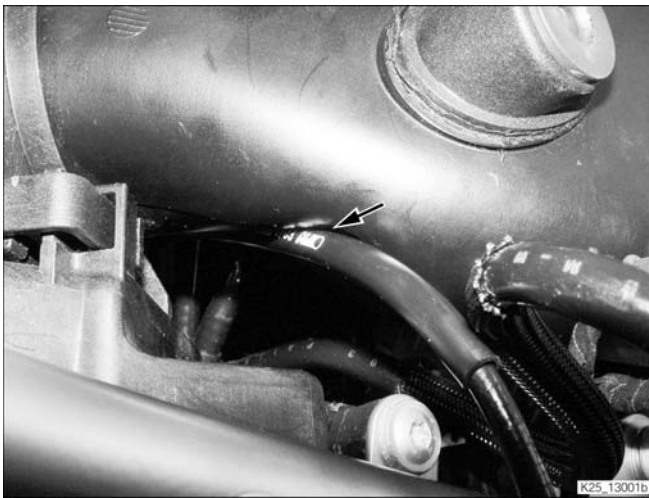
- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).

(-) Installing intake air pipe



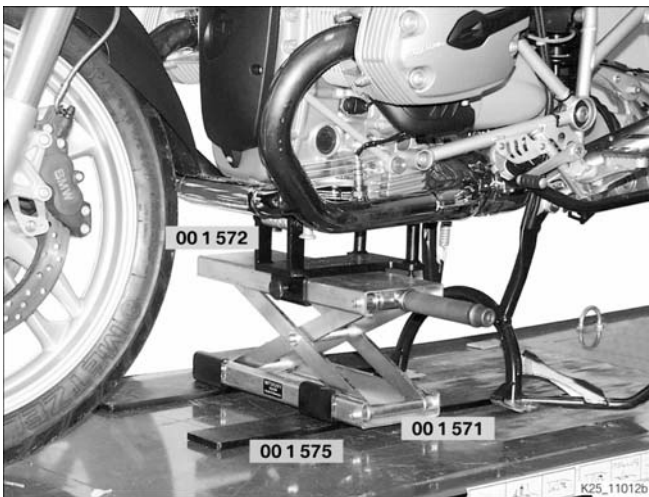
- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.

- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.



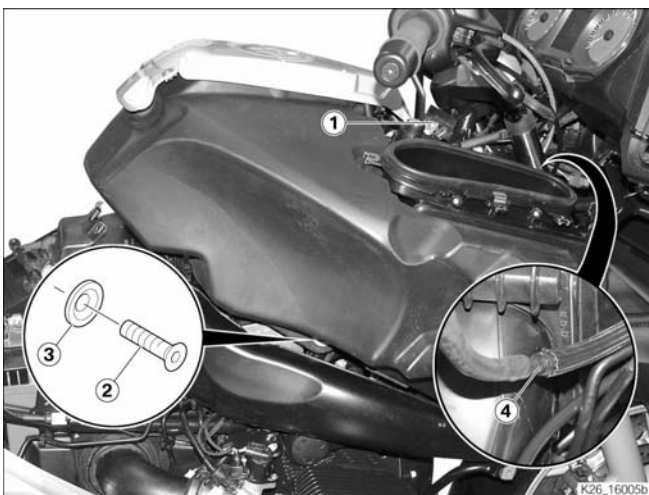
(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



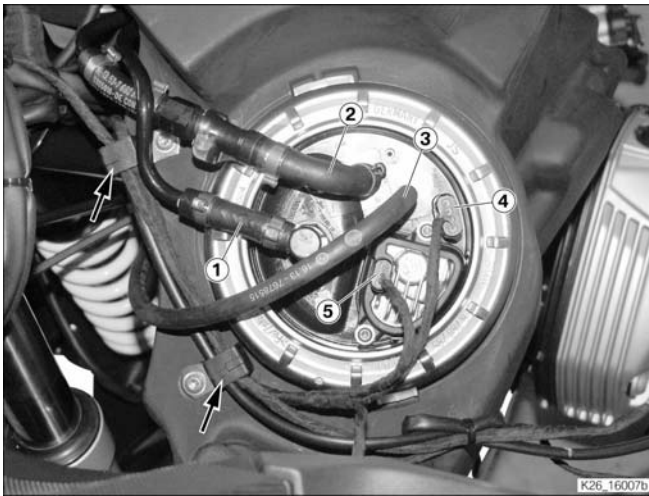
(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.



Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).



- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

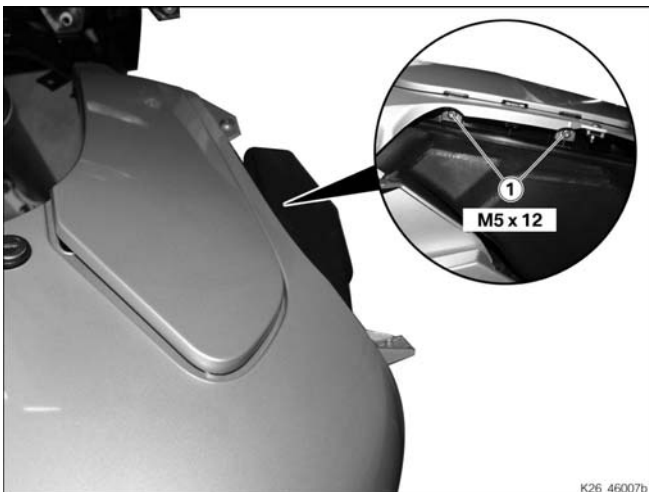
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



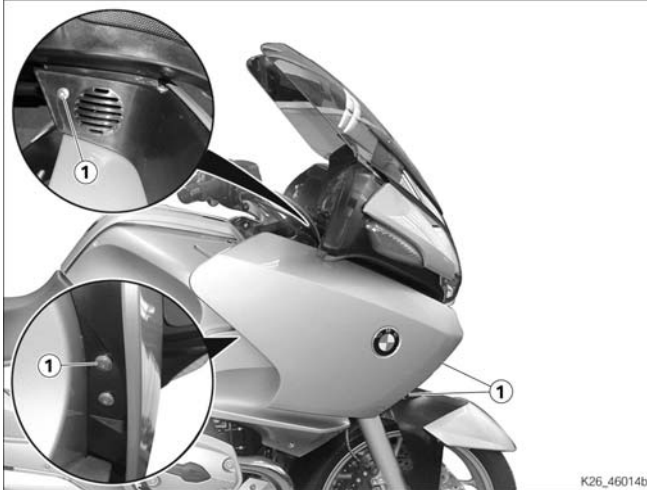
- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



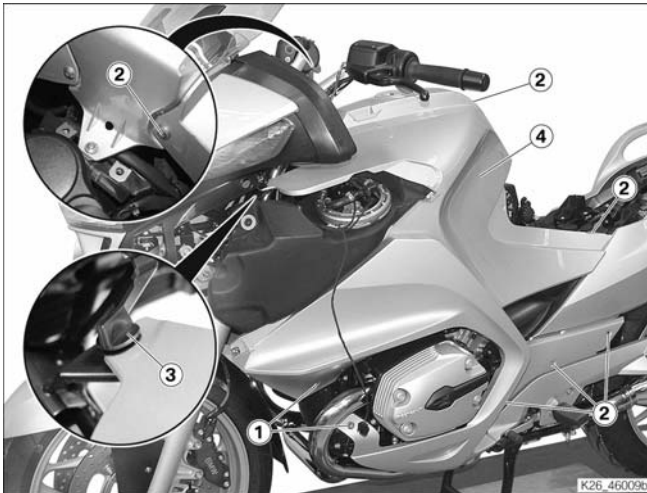
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

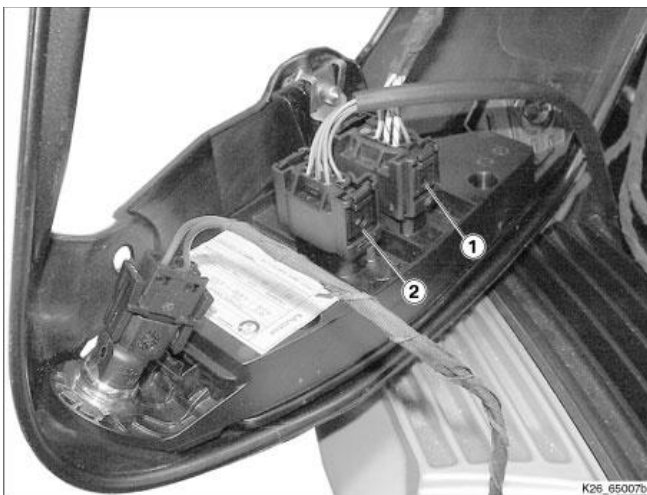
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

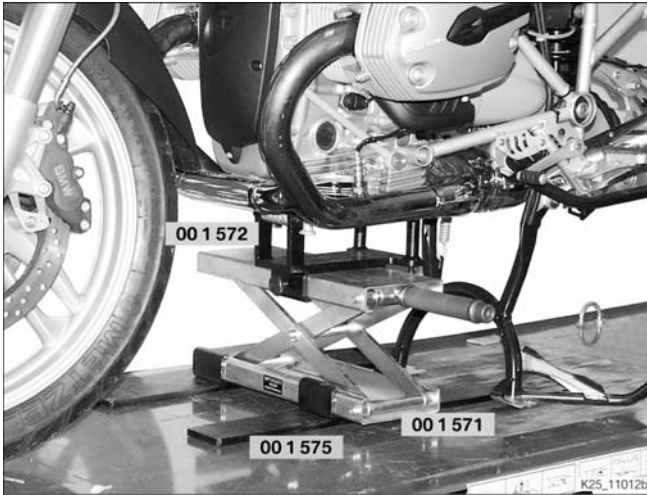
Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

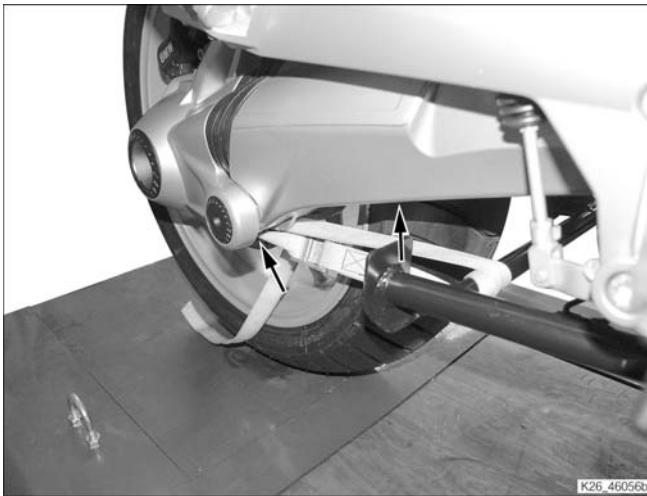
 **46 52 000 Replacing centre stand**



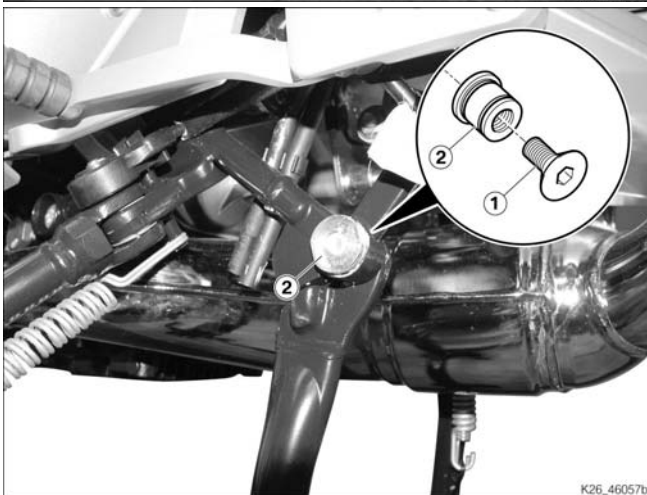
(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

(-) Removing centre stand



- Mask off swinging arm and rear wheel drive in marked positions (arrows) and retract centre stand.
- Fit tensioning strap between centre stand and rear wheel drive and firmly tighten.

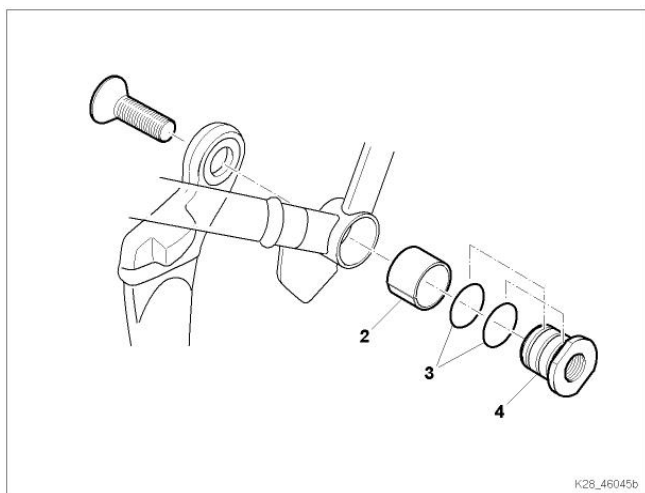


- Extend the side stand.
- Remove screws (1) on left and right, while holding against bearing pin (2).

- Detach centre stand and remove strap.
- Detach springs.


(-) Lubricating centre stand

-



Clean bearing bushings (2) and bearing pins (4) and replace if necessary.

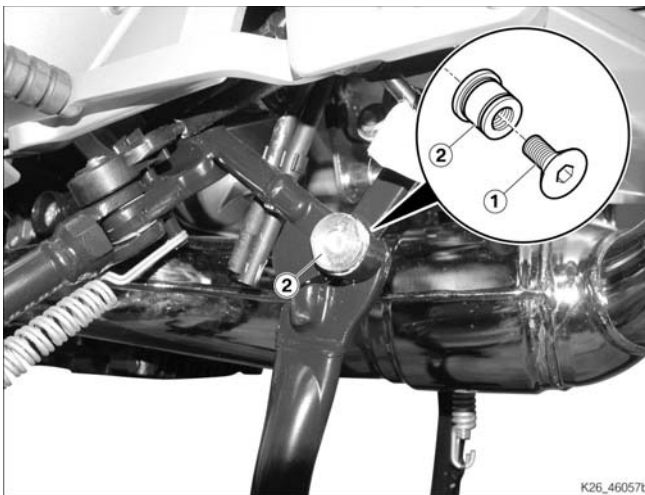
- Use suitable tool to remove worn bearing bushings.
- Replace defective or worn seals (3).
- Grease bearing bushings (2).

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992


(-) Installing centre stand




- Mask off swinging arm and rear wheel drive in the marked positions (arrows).
- Attach centre stand spring.
- Fit tensioning strap between centre stand and rear wheel drive and tighten until the hole in the centre stand is flush with the hole in the frame.



- Lubricate the outside of both bearing pins.

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

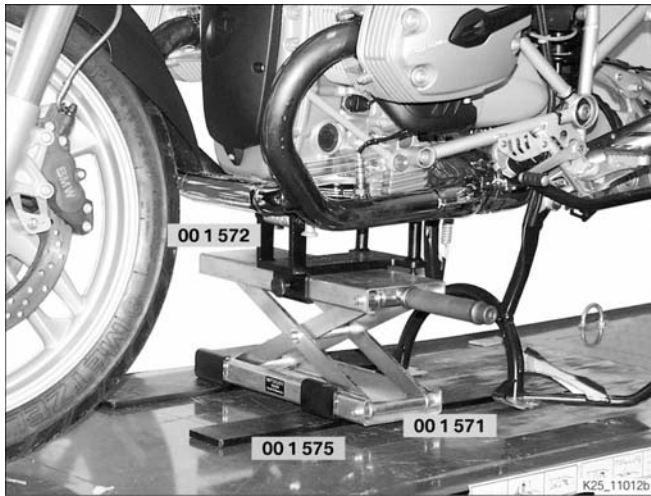
- Insert right bearing pin (2) into frame.
- Hold the centre stand in position, insert (1) on right and tighten the screw enough to hold the centre stand.
- Insert left bearing pin (2) into frame.
- Tighten screws (1) on left and right.

 Tightening torques		
Centre stand to main frame, M10 x 30, Replace screws Micro-encapsulated	42 Nm	

- Retract the side stand.

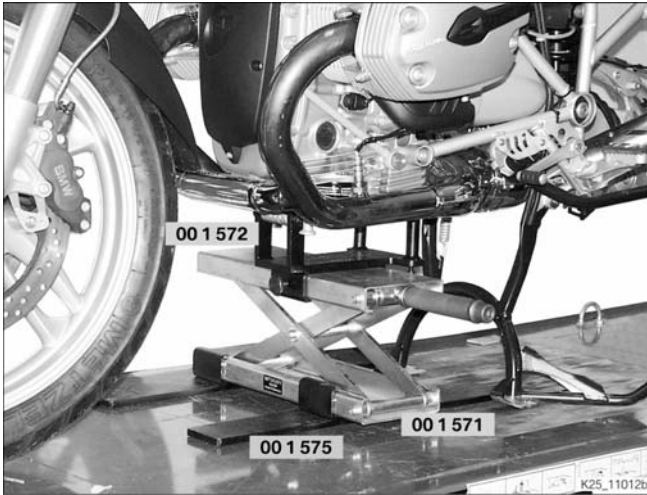
(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



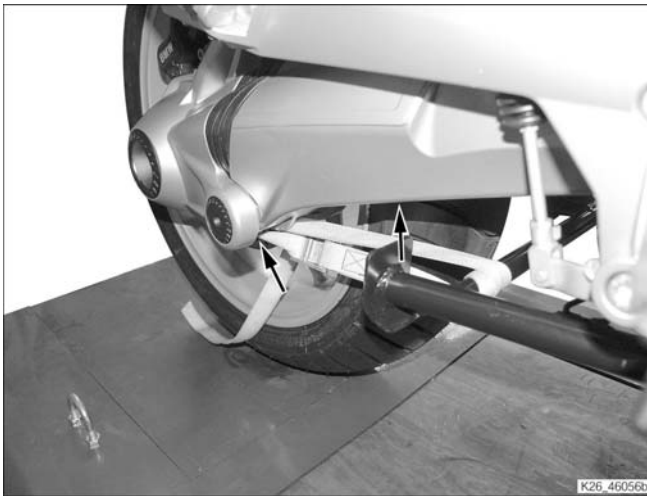
 **46 52 011 Replacing tension spring for centre stand**

(-) Installing engine stand

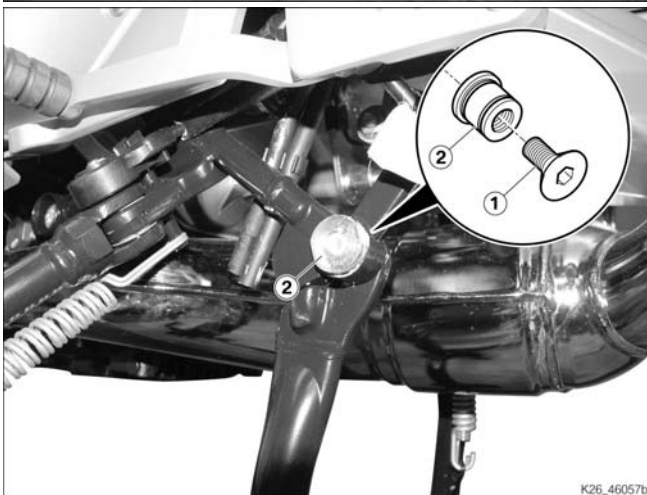


- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

(-) Removing centre stand



- Mask off swinging arm and rear wheel drive in marked positions (arrows) and retract centre stand.
- Fit tensioning strap between centre stand and rear wheel drive and firmly tighten.



- Extend the side stand.
- Remove screws (1) on left and right, while holding against bearing pin (2).

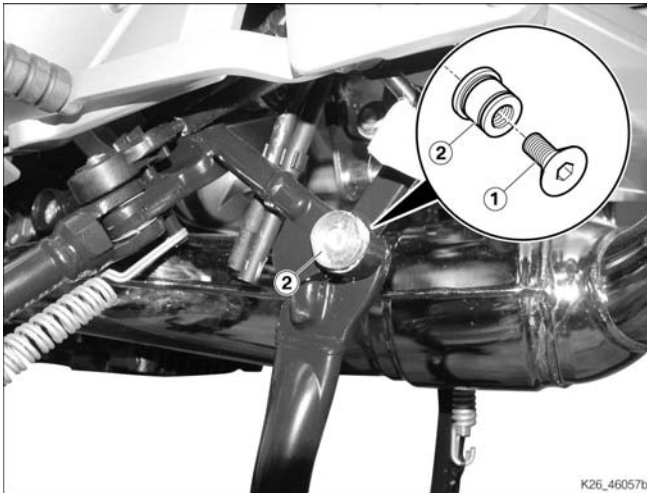
- Detach centre stand and remove strap.
- Detach springs.

(-) Installing centre stand


-




- Mask off swinging arm and rear wheel drive in the marked positions (**arrows**).
- Attach centre stand spring.
- Fit tensioning strap between centre stand and rear wheel drive and tighten until the hole in the centre stand is flush with the hole in the frame.



- Lubricate the outside of both bearing pins.

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

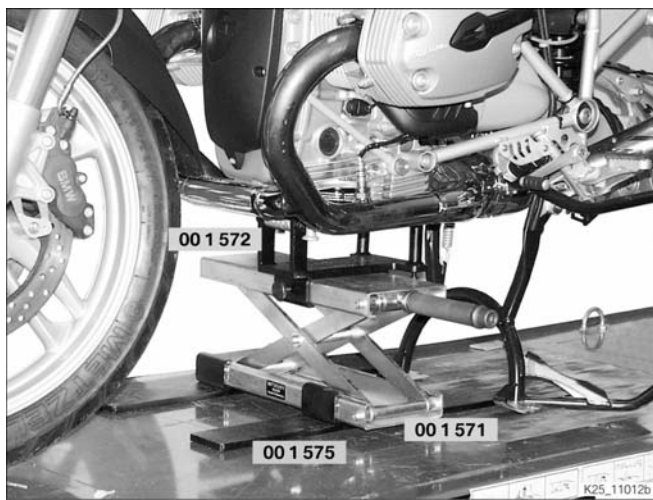
- Insert right bearing pin (**2**) into frame.
- Hold the centre stand in position, insert (**1**) on right and tighten the screw enough to hold the centre stand.
- Insert left bearing pin (**2**) into frame.
- Tighten screws (**1**) on left and right.

 Tightening torques		
Centre stand to main frame, M10 x 30, Replace screws Micro-encapsulated	42 Nm	

- Retract the side stand.

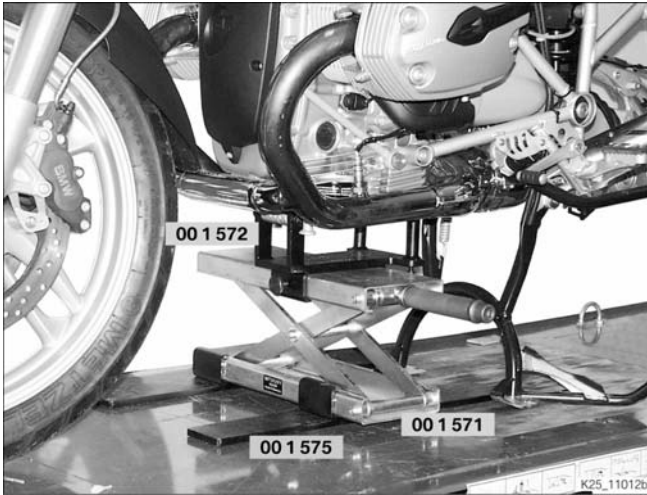
(-) Removing engine stand

- Remove lifter (**No. 00 1 571**) with engine adapter (**No. 00 1 572**) and extension (**No. 00 1 575**).



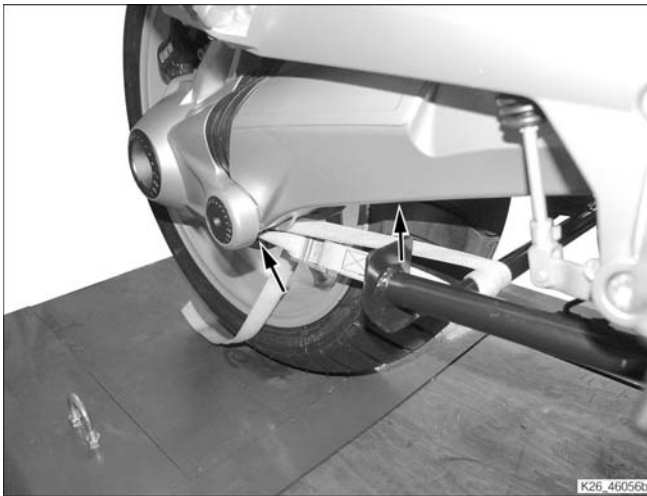
46 52 509 Removing and installing centre stand, cleaning and lubricating

(-) Installing engine stand

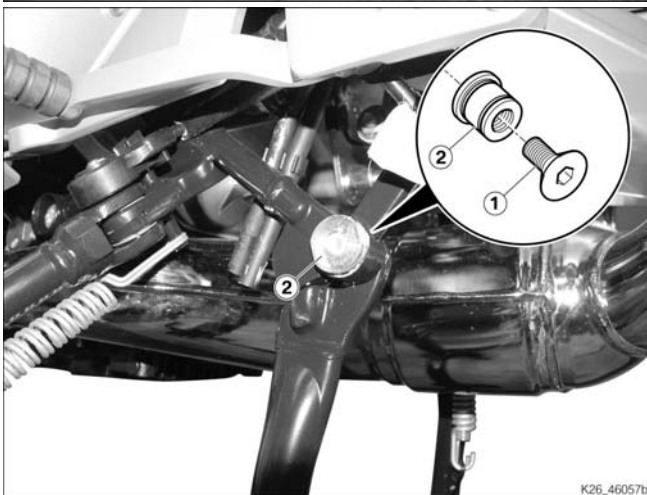


- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.

(-) Removing centre stand



- Mask off swinging arm and rear wheel drive in marked positions (arrows) and retract centre stand.
- Fit tensioning strap between centre stand and rear wheel drive and firmly tighten.

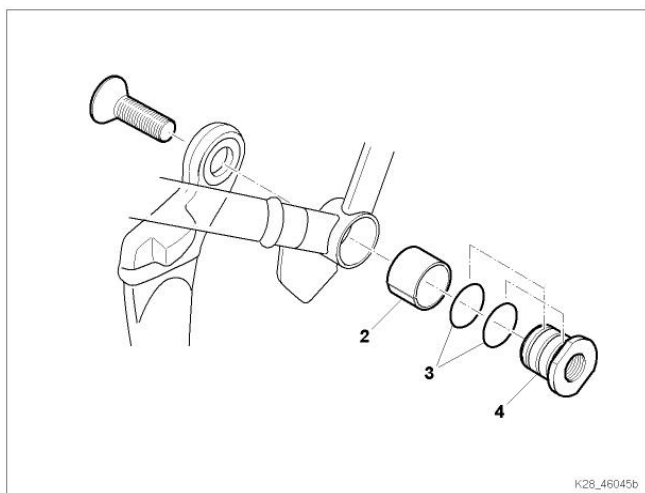


- Extend the side stand.
- Remove screws (1) on left and right, while holding against bearing pin (2).

- Detach centre stand and remove strap.
- Detach springs.


(-) Lubricating centre stand

-



Clean bearing bushings (2) and bearing pins (4) and replace if necessary.

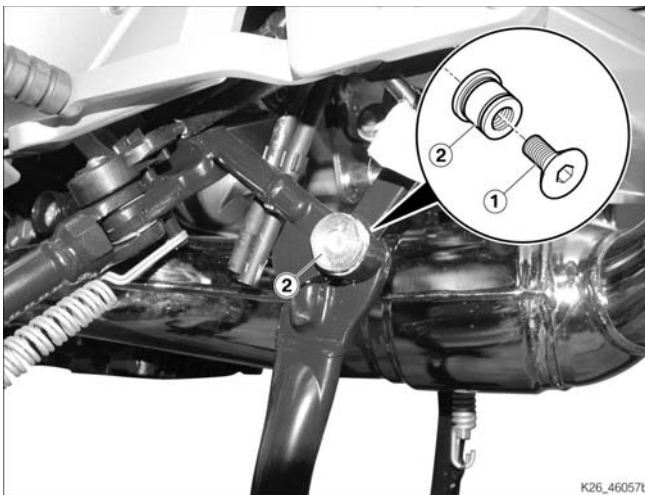
- Use suitable tool to remove worn bearing bushings.
- Replace defective or worn seals (3).
- Grease bearing bushings (2).

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992


(-) Installing centre stand




- Mask off swinging arm and rear wheel drive in the marked positions (arrows).
- Attach centre stand spring.
- Fit tensioning strap between centre stand and rear wheel drive and tighten until the hole in the centre stand is flush with the hole in the frame.



- Lubricate the outside of both bearing pins.

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992

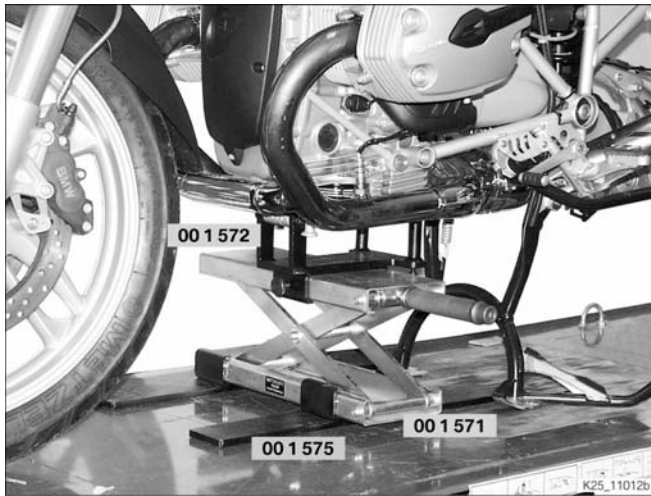
- Insert right bearing pin (2) into frame.
- Hold the centre stand in position, insert (1) on right and tighten the screw enough to hold the centre stand.
- Insert left bearing pin (2) into frame.
- Tighten screws (1) on left and right.

 Tightening torques		
Centre stand to main frame, M10 x 30, Replace screws Micro-encapsulated	42 Nm	

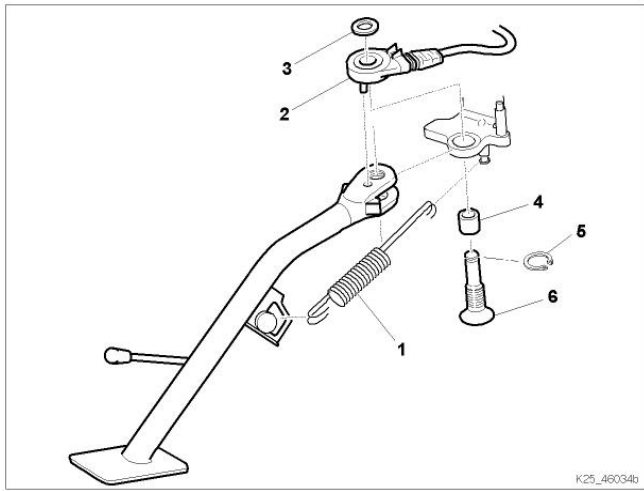
- Retract the side stand.

(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .

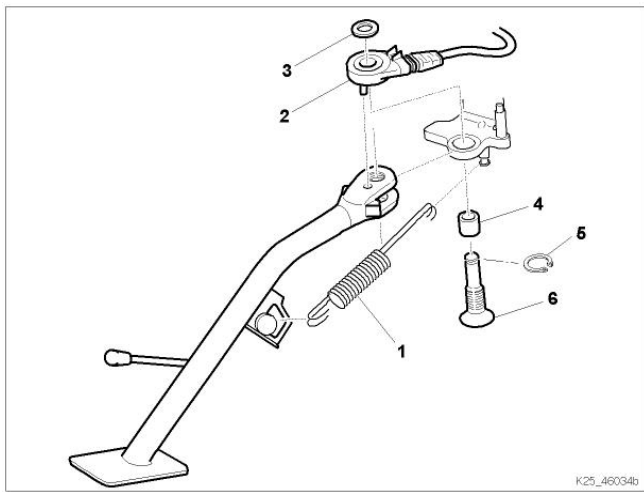


 **46 53 000 Replacing side stand**




(-) Removing side stand

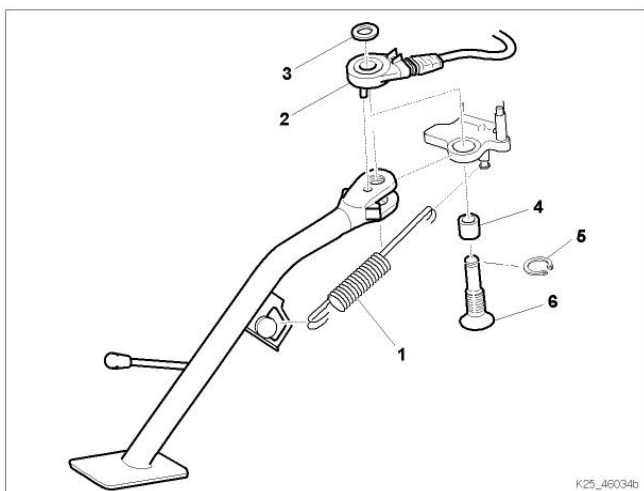
- Disengage springs (1) with assembly/disassembly tool (No. 46 5 721) .
- Remove circlip (5).
- Remove washer (3).
- Remove side-stand switch (2).
- Remove screw (6).
- Remove bushing (4).



(-) Lubricating side stand


- Clean bearing bushing (4) and mount.
- Grease and install the bearing bushing.

 <p>Consumables/lubricants</p>		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992



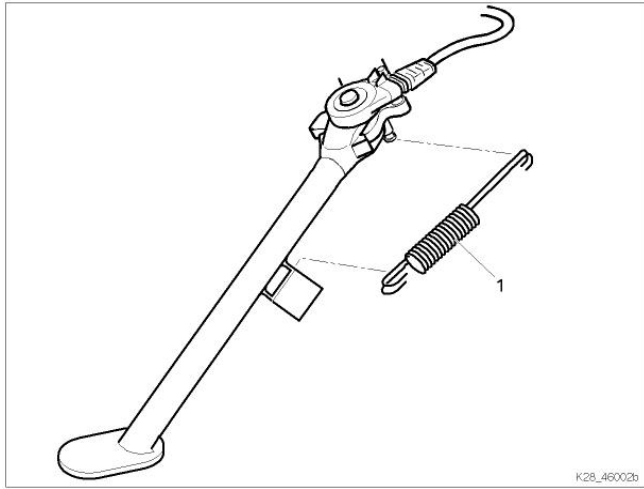
(-) Installing side stand

- Clean the tapped hole in the side stand.
- Fit pin for side stand switch (2) in hole in side stand.
- Hold the side stand in position.
- Install new screw (6) and tighten.

 <p>Tightening torques</p>		
Side stand to pivot mount, M10 x 1-10.9 Micro-encapsulated	42 Nm	

- Place washer (3) in position and install circlip (5).
- Engage springs (1) with hook (No. 46 5 721) .

 **46 53 011 Replacing tension springs for side stand**



(-) Removing tension springs for side stand

- Extend the side stand.

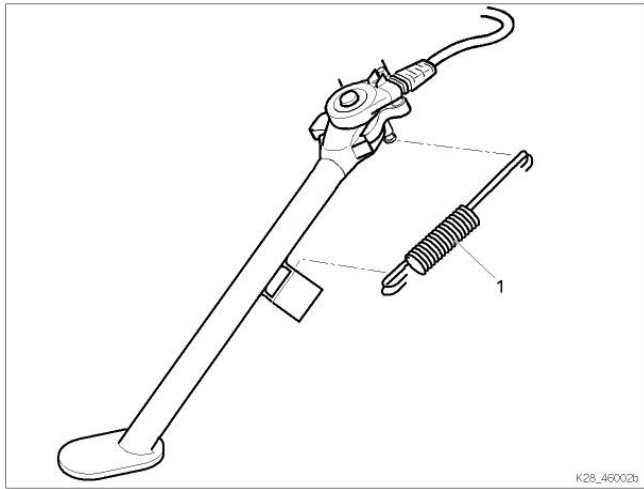


Warning

Nature: Components are spring-loaded. Risk of injury caused by flying parts.

Avoidance: Carefully relieve the spring.

- Disengage springs (1) with assembly/disassembly tool (No. 46 5 721) .



(-) Installing tension springs for side stand

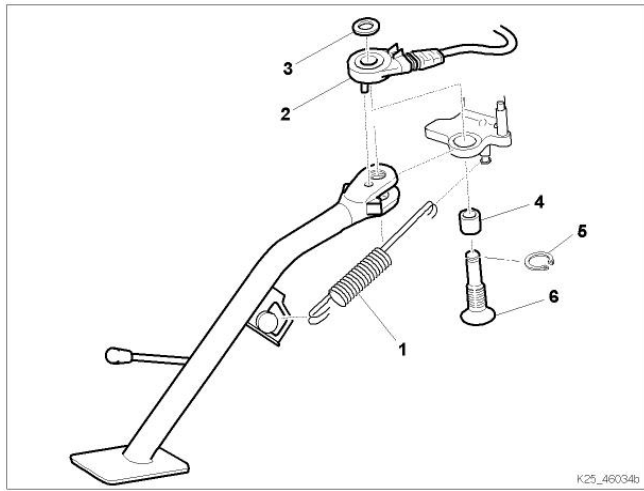
- Engage springs (1) with hook (No. 46 5 721) .



Note

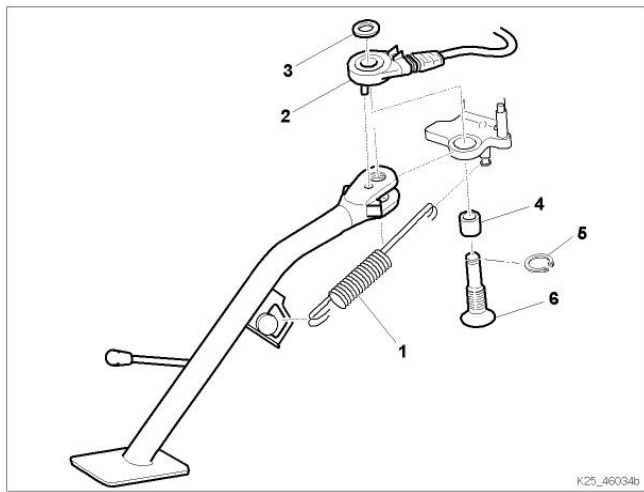
When installing the tension springs, make sure that the thick spring is on the inside and the thin spring on the outside.

46 53 505 Removing and installing side stand, cleaning and lubricating




(-) Removing side stand

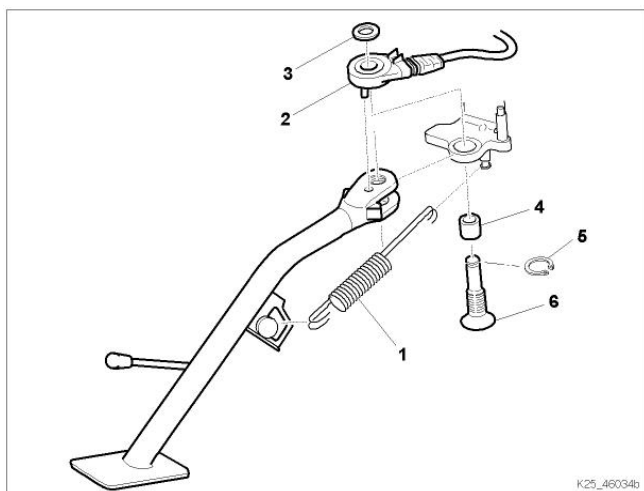
- Disengage springs (1) with assembly/disassembly tool (No. 46 5 721) .
- Remove circlip (5).
- Remove washer (3).
- Remove side-stand switch (2).
- Remove screw (6).
- Remove bushing (4).



(-) Lubricating side stand


- Clean bearing bushing (4) and mount.
- Grease and install the bearing bushing.

 Consumables/lubricants		
Staburags NBU 30 PTM	High-performance lubricating grease	07 55 9 056 992



(-) Installing side stand

- Clean the tapped hole in the side stand.
- Fit pin for side stand switch (2) in hole in side stand.
- Hold the side stand in position.
- Install new screw (6) and tighten.

 Tightening torques		
Side stand to pivot mount, M10 x 1-10.9 Micro-encapsulated	42 Nm	

- Place washer (3) in position and install circlip (5).
- Engage springs (1) with hook (No. 46 5 721) .

 **46 54 200 Replacing luggage carrier**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

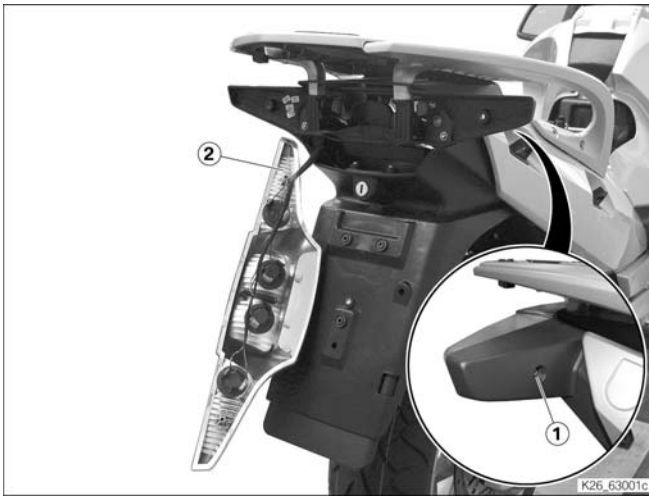


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

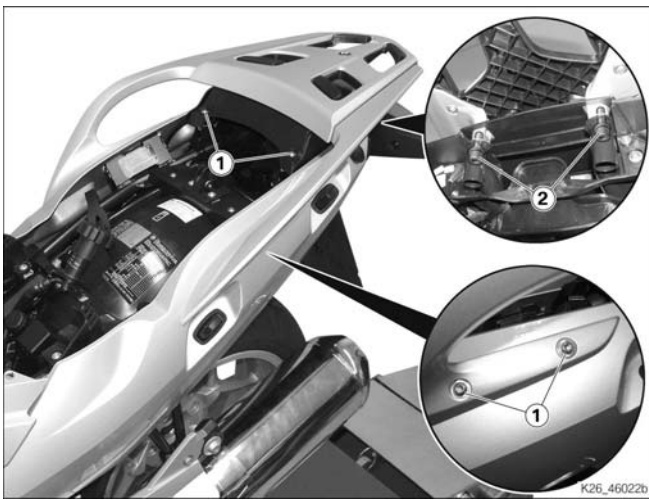
(-) Removing rear light unit

- Remove screws (1).
- Allow rear light unit (2) to dangle from the cable.



(-) Removing luggage carrier

- Remove screws (1).
- Remove screws (2) on rear left and right.
- Remove the luggage carrier.



(-) Replacing luggage carrier

► Disassembling luggage carrier

- Remove screws (1).
- Remove grab handles (2) and (3).




- ◄ • Transfer the reusable small items to the new luggage carrier.


► Assembling luggage carrier



- Hold grab handle (2) in position and secure it with new screws (1).

 Tightening torques		
Grab handle to luggage rack, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

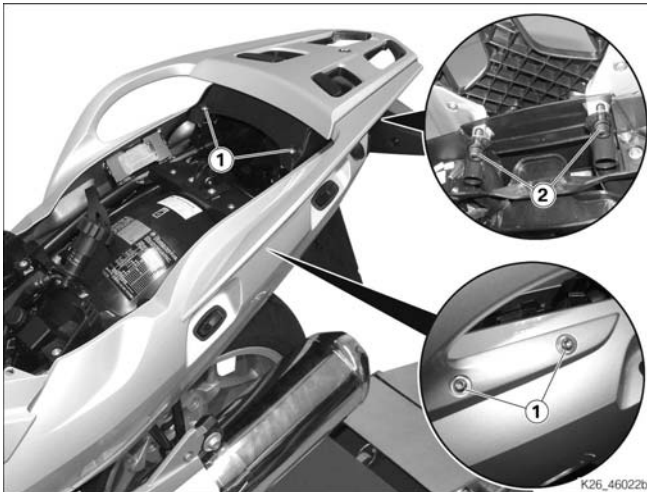
- Hold grab handle (3) in position and secure it with new screws (1).


 Tightening torques		
Grab handle to luggage rack, M6 x 20, Replace screws Micro-encapsulated	8 Nm	




(-) Installing luggage carrier

- Place luggage rack in position.
- Install new screws (1).



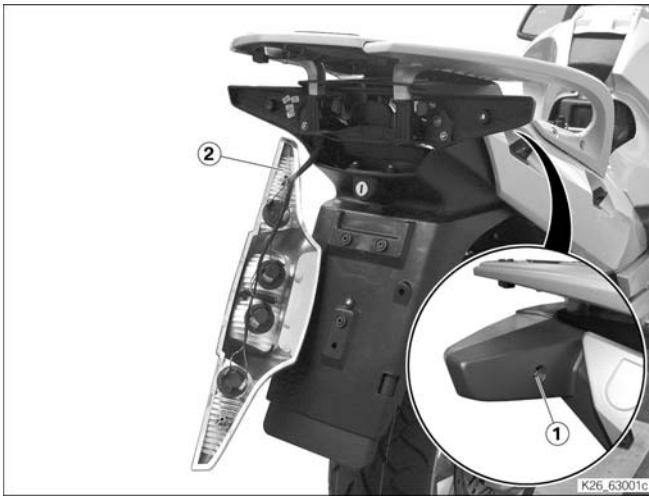
 Tightening torques		
Luggage rack, centre to rear section of frame, M6 x 35, Replace screws Micro-encapsulated	8 Nm	

- Install new screws (2) at rear left and right.

 Tightening torques		
Luggage rack from below to rear section of frame, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

(-) Securing rear light unit

- Hold the rear light unit (2) in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

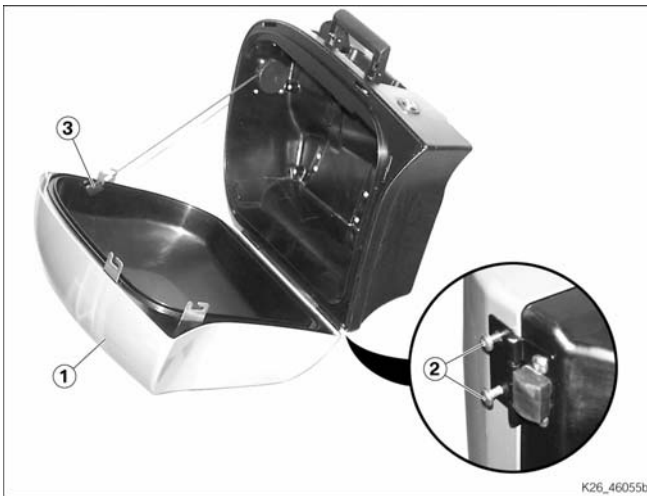


Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

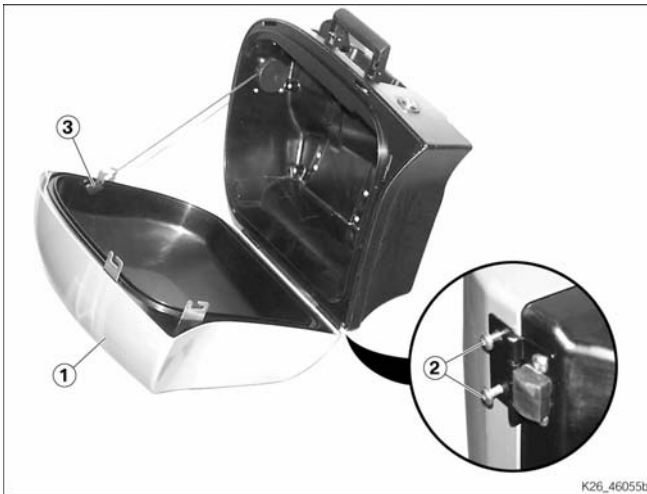


 **46 54 315 Replacing case lid**



(-) Removing case lid

- Open lid (1).
- Disengage the strap from holder (3).
- Remove screws (2).
- Remove lid (1).



(-) Installing case lid

- Place cover (1) in position and align it correctly.
- Install screws (2).
- Engage the strap in holder (3).
- Close cover (1).

 **46 54 330 Replacing left and right holders for cases**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

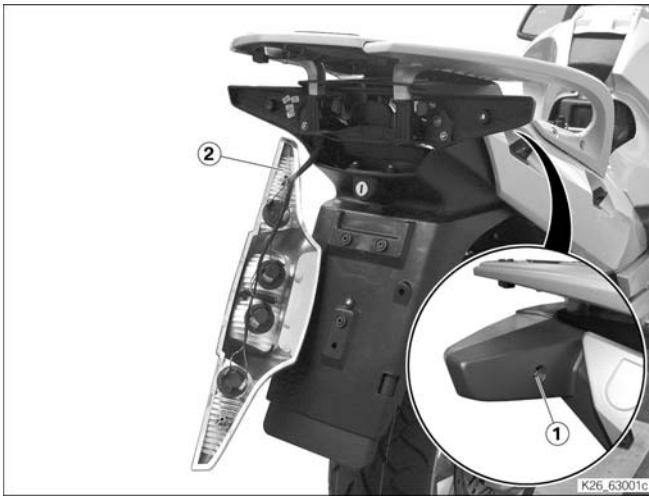


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

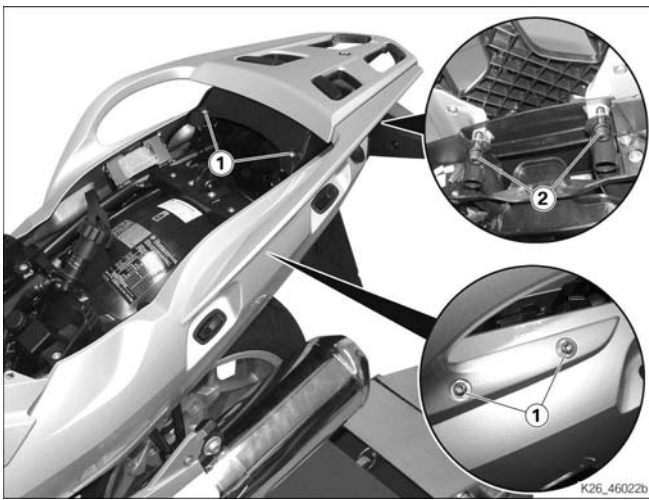
(-) Removing rear light unit

- Remove screws (1).
- Allow rear light unit (2) to dangle from the cable.



(-) Removing luggage carrier

- Remove screws (1).
- Remove screws (2) on rear left and right.
- Remove the luggage carrier.



(-) Removing left rear trim panel

- Undo screws (1) holding bottom section of fairing.
- Remove screw (2).

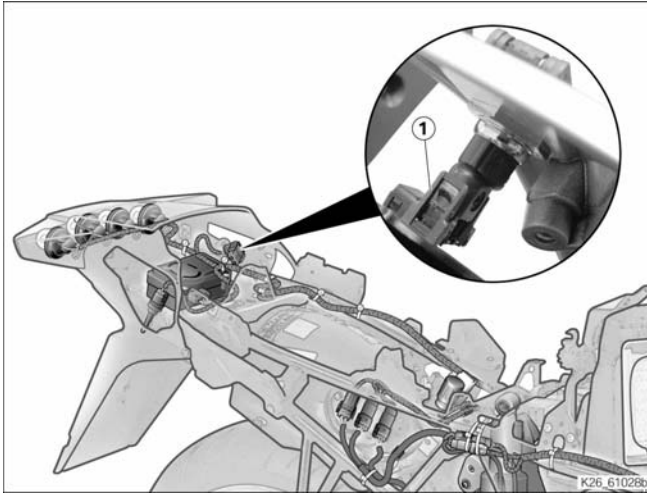


- Carefully bend back the bottom section of the fairing until screw (3) is accessible.
- Remove screw (3).
- Remove screws (1).
- Remove the tail finisher from the motorcycle, noting the flat nuts.



Variant, 2nd socket outlet

- Disconnect plug (1) from socket.



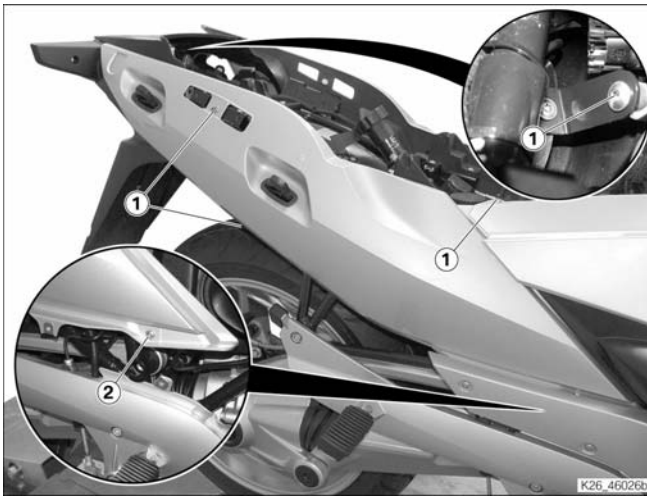
- Remove the tail trimmer from the motorcycle.

(-) Removing rear right trim panel

- Undo screws (1) holding bottom section of fairing.
- Remove screw (2).



- Carefully bend back the bottom section of the fairing until screw (2) is accessible.
- Remove screw (2).
- Remove screws (1).
- Remove the tail trimmer from the motorcycle.



(-) Removing case carrier on left and right

- Remove screws (1).
- Remove screw (2).
- Carefully pull and remove case carrier.




(-) Installing case bracket on left and right

- Place case bracket in position on rear of motorcycle and install.
- Install new screws (1).

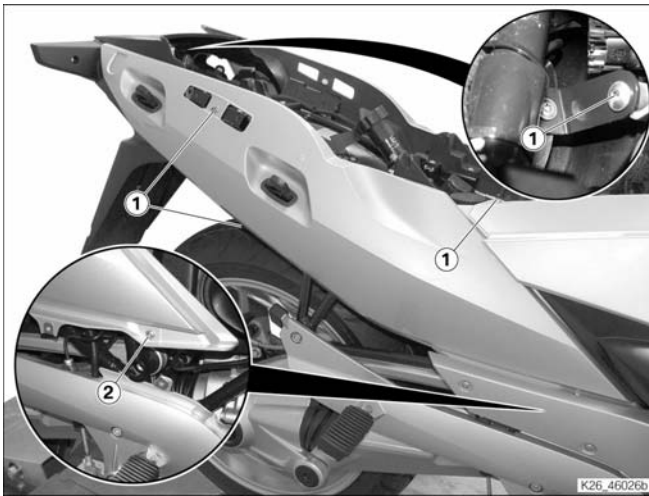


(-) Installing rear trim panel on right

- Carefully bend back the bottom section of the fairing, just far enough to allow screw (2) to be installed.
- Install screw (2).
- Install screws (1).

 Tightening torques		
Case bracket to rear section of frame, M6 x 14, Replace screws Micro-encapsulated	8 Nm	

- Install screw (2).



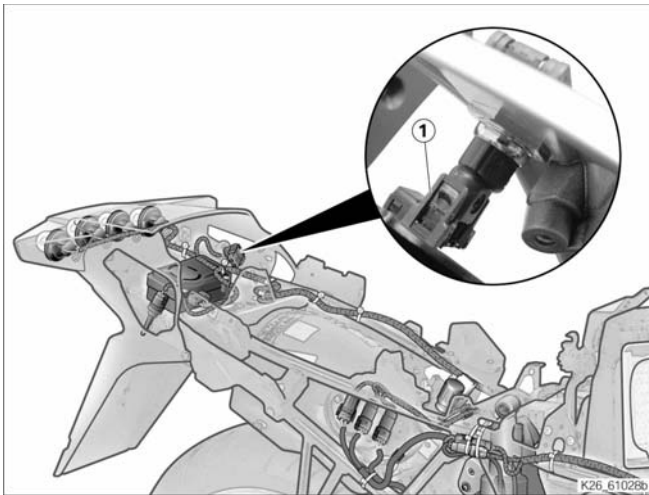
- Install screw (1).
- Fit screws (2) at bottom section of fairing.



(-) Installing rear trim panel on left

Variant, 2nd socket outlet

- Connect plug (1) to the socket.



- Seat the rear trim panel on the motorcycle.
- Carefully bend back the bottom section of the fairing, just far enough to allow screw (3) to be installed.
- Install screw (3).
- Install screws (1).




- Install screw (2).
- Fit screws (1) at bottom section of fairing.




(-) Installing luggage carrier

- Place luggage rack in position.
- Install new screws (1).

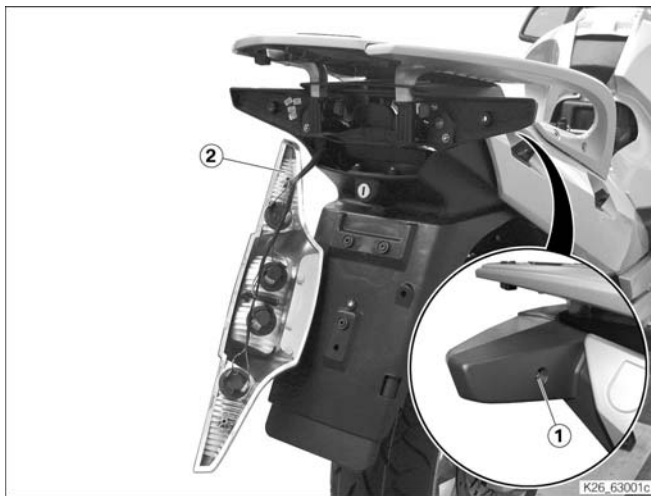
 Tightening torques		
Luggage rack, centre to rear section of frame, M6 x 35, Replace screws Micro-encapsulated	8 Nm	

- Install new screws (2) at rear left and right.

 Tightening torques		
Luggage rack from below to rear section of frame, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

(-) Securing rear light unit

- Hold the rear light unit (2) in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **46 61 004 Replacing front mudguard (front section)**

(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.

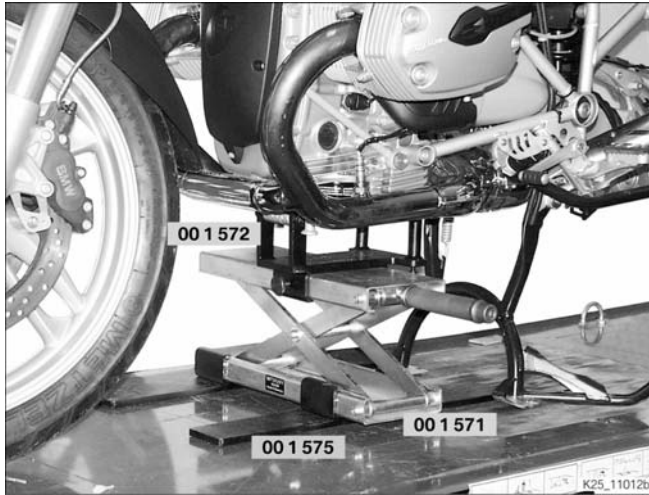


(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.



 **46 61 008 Replacing front mudguard (rear section)**



(-) Installing engine stand

- Secure lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) to the engine and use the engine stand to raise the motorcycle just enough to take the load off the centre stand.



(-) Removing front section of front mudguard

- Remove screws (1) on left and right.
- Press up front section of front mudguard while at the same time pulling in forward direction.
- Detach front section of front mudguard, paying attention to the guide lug.



(-) Removing left brake caliper

 **Attention**

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

 **Attention**

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing right brake caliper



Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.

Avoidance: Do not operate the brakes with a brake caliper removed.

Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

Attention

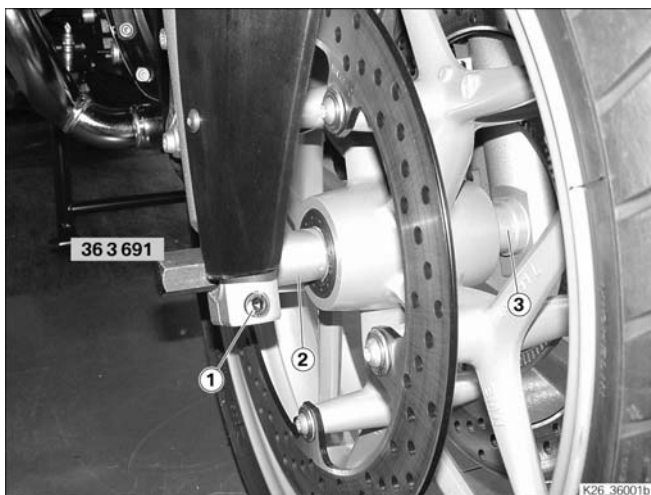
Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Carefully ease the brake caliper off the brake disc.

(-) Removing front wheel

- Slacken axle clamping screw (1).
- Unscrew quick-release axle (2) with hexagon (No. 36 3 691).
- Roll the front wheel forward to remove.



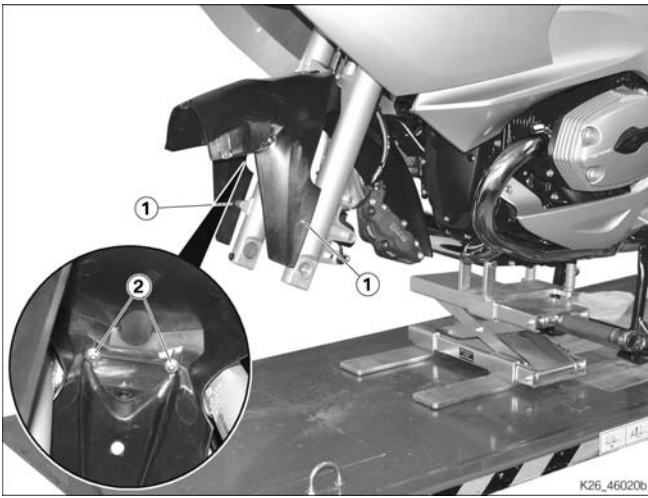
Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.

- Remove spacing bushing (3) from the wheel hub.

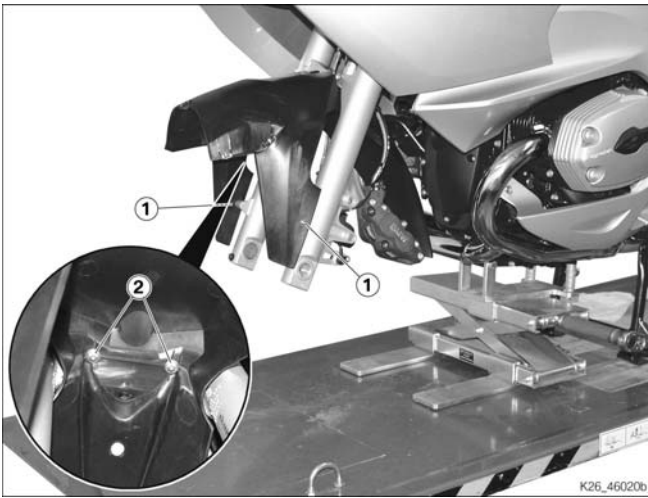
(-) Removing rear section of front mudguard


- Remove screws (1) on left and right.
- Remove screws (2).
- Lightly twist the rear section of the front mudguard and carefully pull in forward direction to remove.
- Detach rear section of front mudguard.




(-) Install rear section of front mudguard

- Fit the rear section of the front mudguard at a slight angle and opposite direction of travel.
- Align rear section of front mudguard and secure with new screws (2).



 Tightening torques		
Front mudguard, rear, to slider tube bridge, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

- Install new screws (1) on left and right.

 Tightening torques		
Front mudguard, rear section, to axle clamp, left/right, M5 x 16, Replace screws Micro-encapsulated	2.5 Nm	

(-) Installing the front wheel

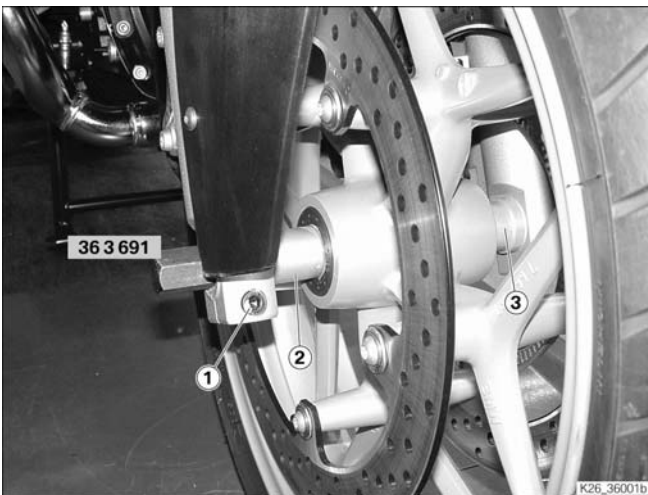
- Seat spacing bushing (3) on the wheel hub at the left.
- Carefully roll the front wheel into position between the fork legs.




Note

Do not damage the ABS sensor when rolling the front wheel in or out between the forks.


- Clean quick-release axle (2) and grease it with lubricant.




 Consumables/lubricants		

Optimoly TA	High-temperature assembly grease	18 21 9 062 599
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- Tighten quick-release axle (2) with hexagon (No. 36 3 691) until hand-tight.
- Lower engine stand.
- Firmly compress the front forks several times.
- Tighten the quick-release axle.


 Tightening torques		
Quick-release axle in axle holder, M24 x 1.5	50 Nm	

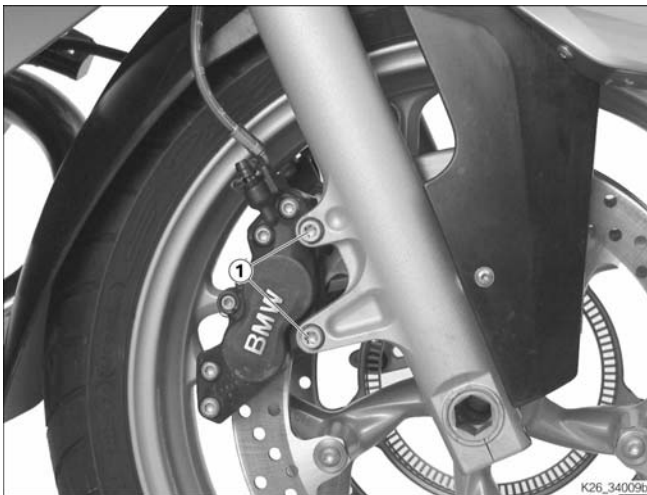
- Tighten axle clamping screw (1).

 Tightening torques		
Quick-release axle clamp screws, M8 x 35	19 Nm	

(-) Securing right brake caliper

- Carefully ease the brake caliper onto the brake disc.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.


Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.



(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

Avoidance: Before and during self-diagnosis, be sure to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

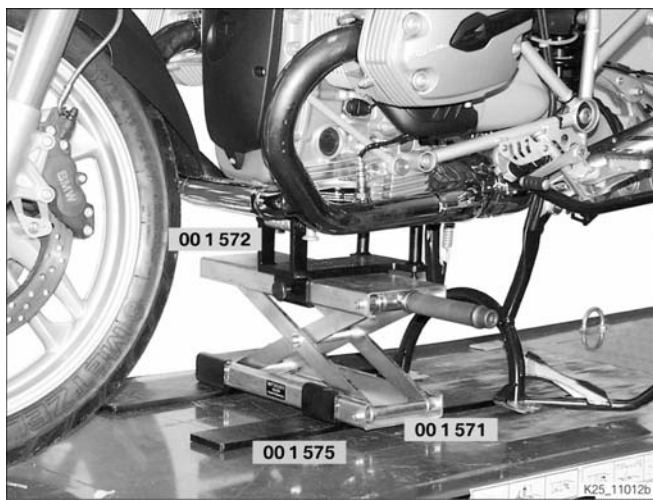
(-) Install front section of front mudguard

- Install front section of front mudguard, making sure the guide lug locks correctly in position.
- Install screws (1) on left and right.



(-) Removing engine stand

- Remove lifter (No. 00 1 571) with engine adapter (No. 00 1 572) and extension (No. 00 1 575) .



 **46 62 000 Replacing rear mudguard**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

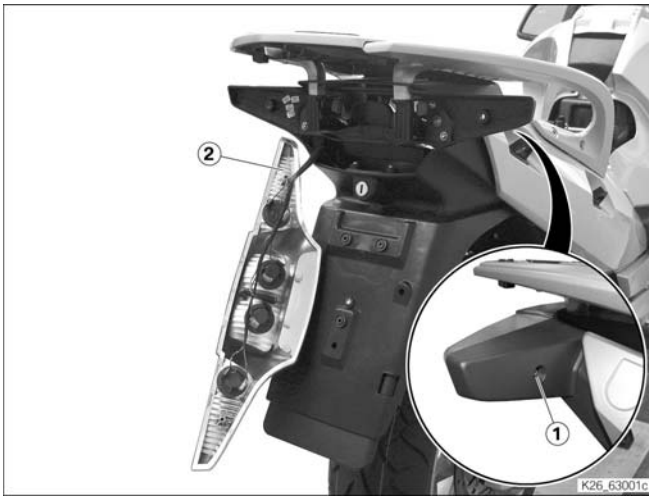


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

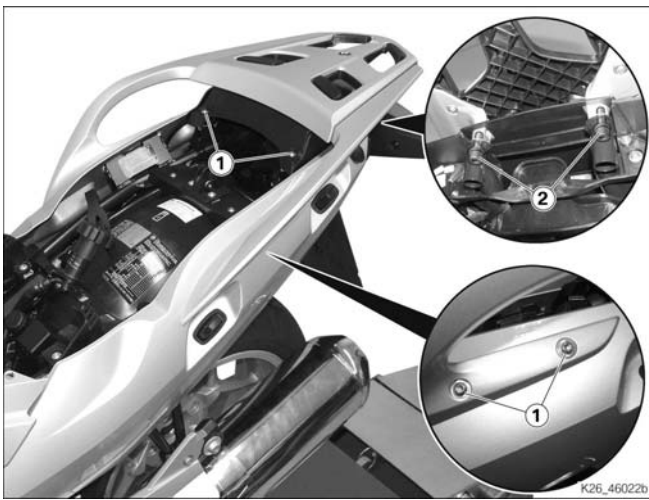
(-) Removing rear light unit

- Remove screws (1).
- Allow rear light unit (2) to dangle from the cable.



(-) Removing luggage carrier

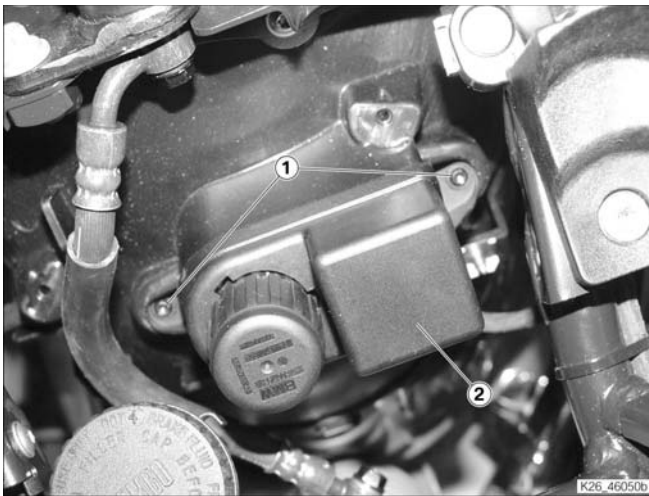
- Remove screws (1).
- Remove screws (2) on rear left and right.
- Remove the luggage carrier.



(-) Replacing rear mudguard

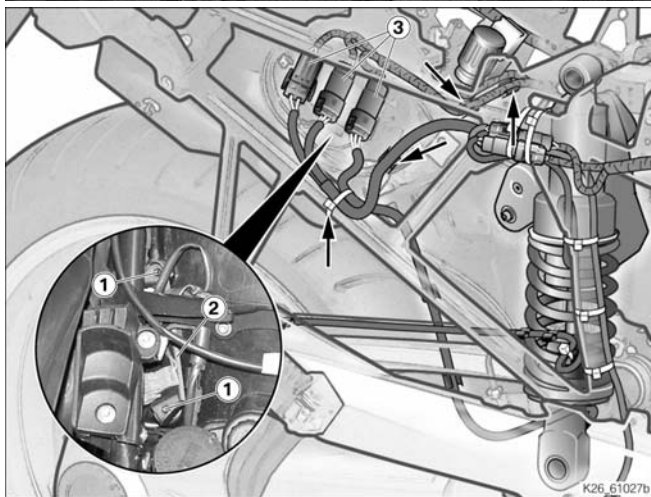
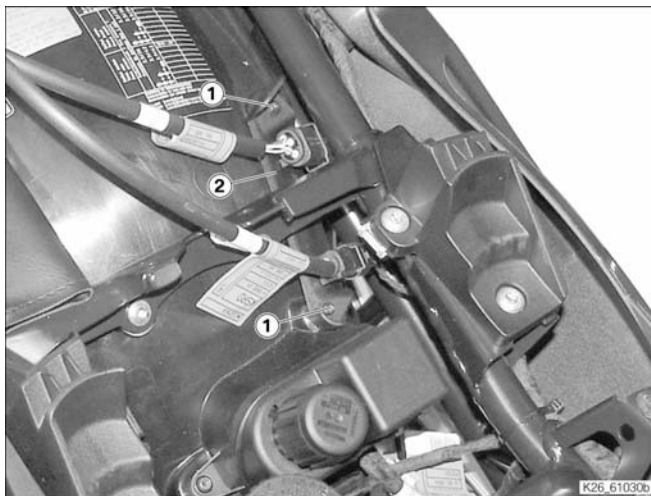
► Removing rear mudguard

- Remove screws (1).
- Remove bracket for diagnosis plug (2).



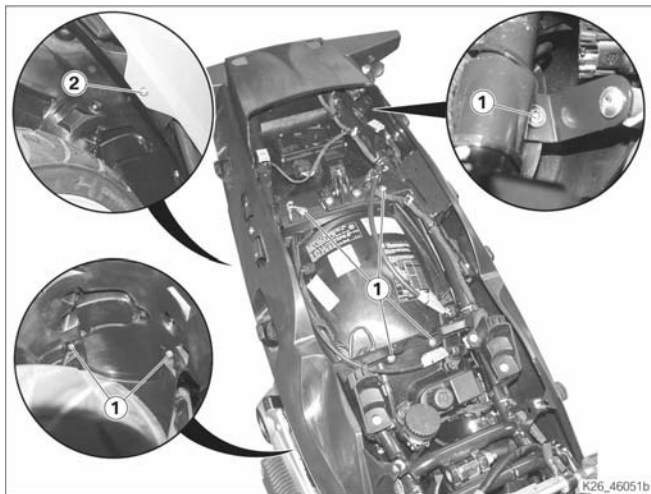
Variant, Seat heating

- Remove screws (1).
- Remove bracket (2).



Variant, ESA

- Remove screws (1).
- Remove bracket (2).



- Remove screws (1).
- Remove screws (2) on left and right.

Variant, On-board computer

- Disconnect plug (1).



Variant, Anti-theft alarm

▷ **Removing control unit for anti-theft alarm**

- Remove screw (1).
- Disconnect plug (2).
- Ease the anti-theft alarm forward to remove.

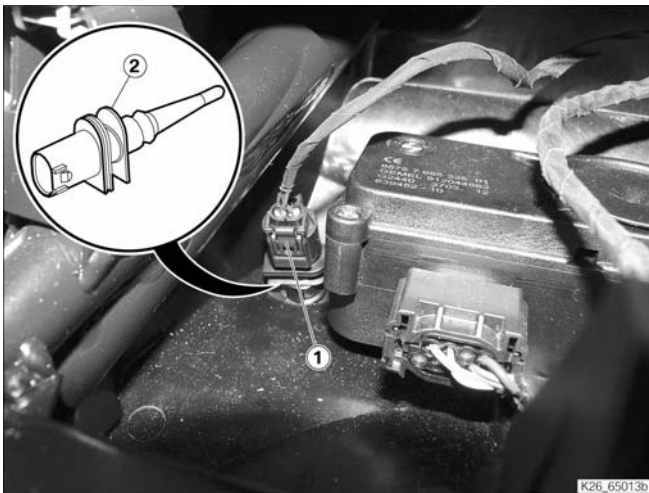


- Remove the rear mudguard.



Variant, On-board computer

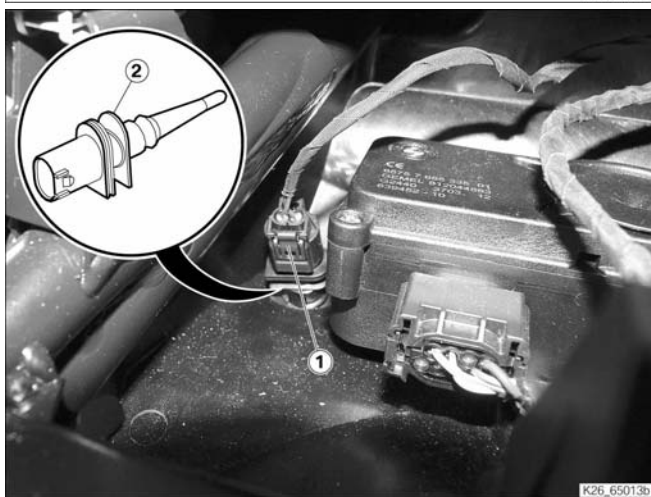
- Remove ambient-temperature sensor (2).



- Remove reusable small items and install them on the new rear mudguard.
- Affix new adhesive labels to the rear mudguard (arrows).



K26_46049b



K26_65013b

Variant, On-board computer

- Clip ambient-temperature sensor (2) into position.

► Installing rear mudguard

- Install the rear mudguard.

Variant, Anti-theft alarm

▷ Installing control unit for anti-theft alarm

- Push anti-theft alarm (3) into the guides from the front.
- Install screw (1).
- Connect plug (2).

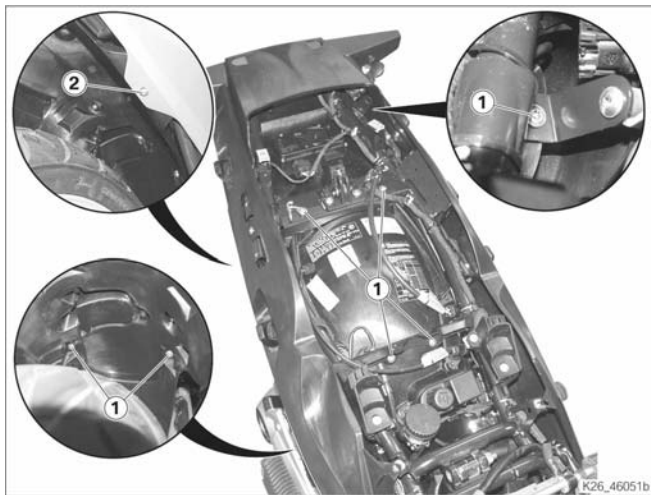


K26_65011b

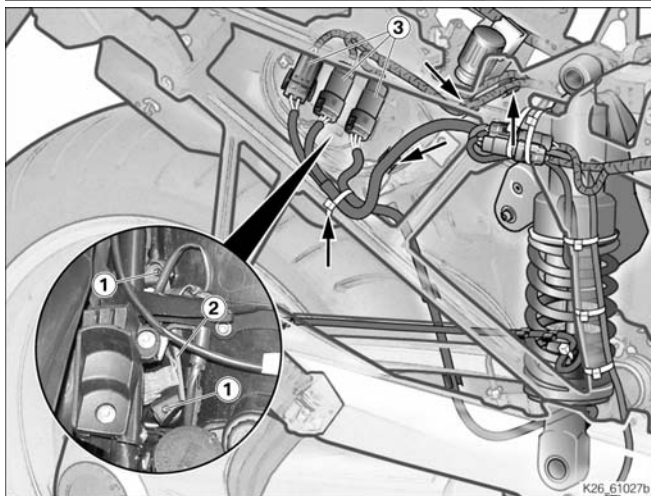


Variant, On-board computer

- Connect plug (1).



- Install screws (2) on left and right.
- Install screws (1).

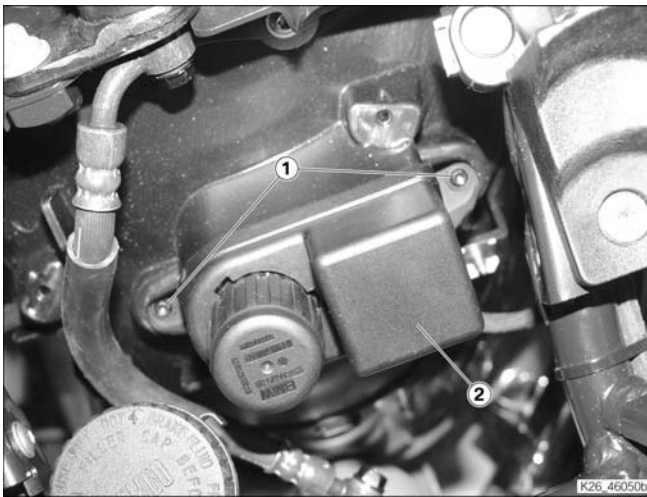
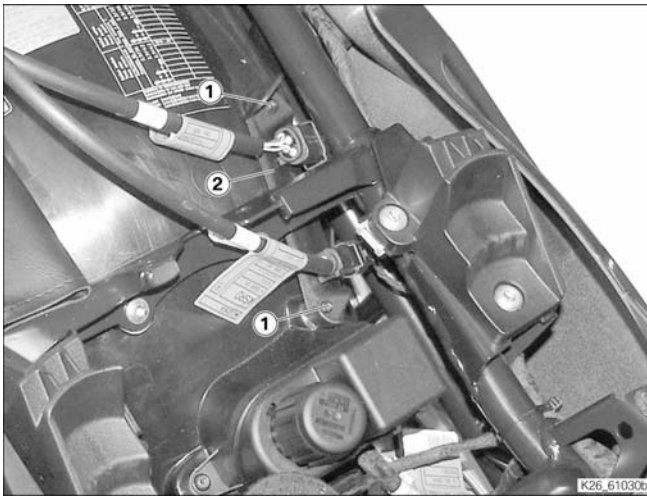


Variant, ESA

- Fit bracket (2) in position.
- Install screws (1).

Variant, Seat heating

- Fit bracket (2) in position.
- Install screws (1).




- Install bracket for diagnosis plug (2).
- Install screws (1).




(-) Installing luggage carrier

- Place luggage rack in position.
- Install new screws (1).

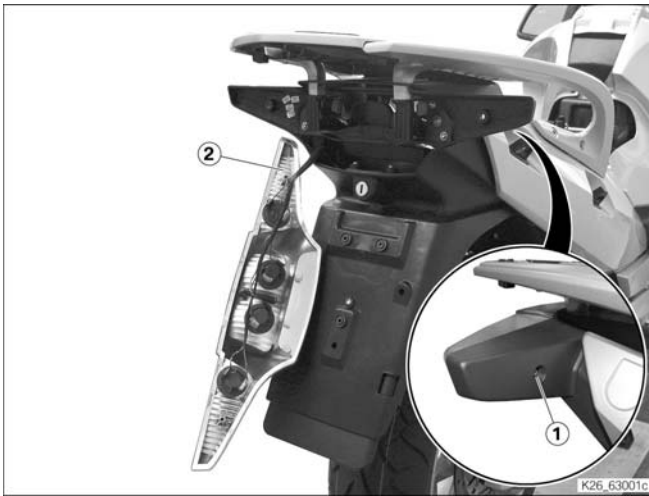
 Tightening torques		
Luggage rack, centre to rear section of frame, M6 x 35, Replace screws Micro-encapsulated	8 Nm	

- Install new screws (2) at rear left and right.

 Tightening torques		
Luggage rack from below to rear section of frame, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

(-) Securing rear light unit

- Hold the rear light unit (2) in position.



- Install screws (1).

(-) Installing seat



- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.

Variant, Seat heating



- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **46 62 050 Replacing number-plate carrier**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

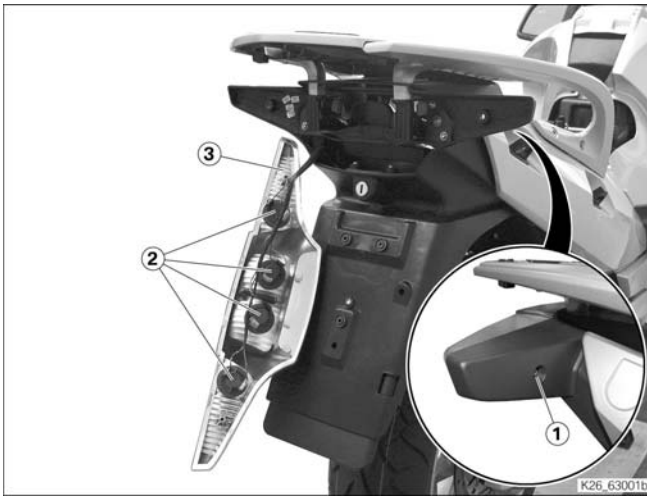


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

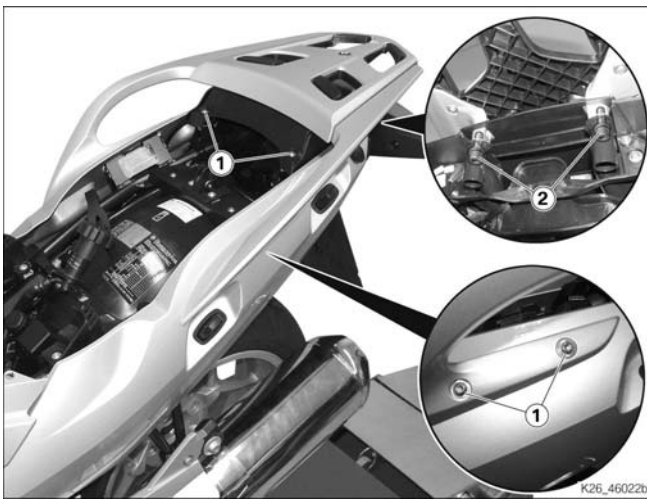
(-) Removing rear-light unit

- Remove screws (1).
- Release bulb sockets (2).
- Remove rear-light unit (3).



(-) Removing luggage carrier

- Remove screws (1).
- Remove screws (2) on rear left and right.
- Remove the luggage carrier.



(-) Removing left rear trim panel

- Undo screws (1) holding bottom section of fairing.
- Remove screw (2).

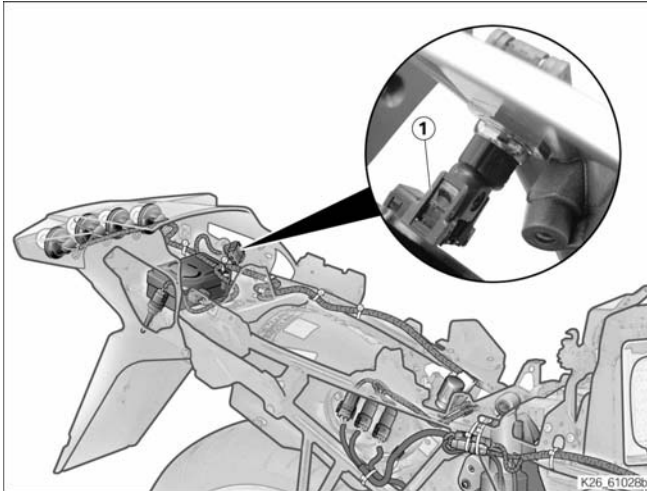


- Carefully bend back the bottom section of the fairing until screw (3) is accessible.
- Remove screw (3).
- Remove screws (1).
- Remove the tail finisher from the motorcycle, noting the flat nuts.



Variant, 2nd socket outlet

- Disconnect plug (1) from socket.



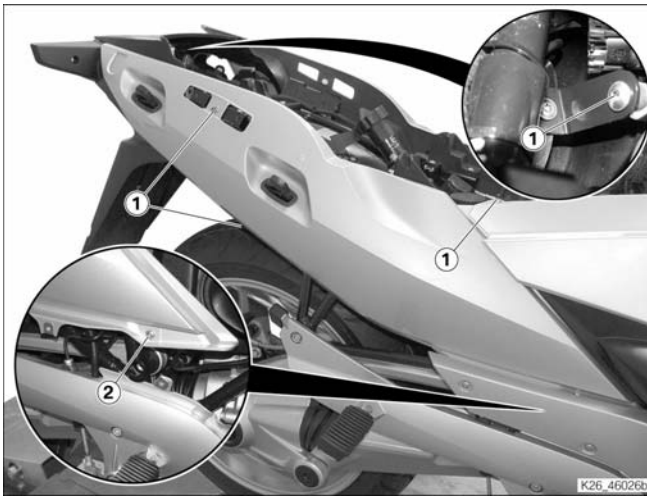
- Remove the tail trimmer from the motorcycle.

(-) Removing rear right trim panel

- Undo screws (1) holding bottom section of fairing.
- Remove screw (2).

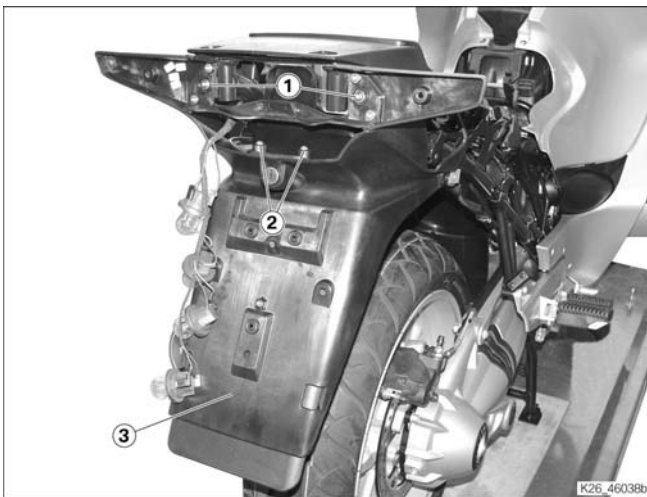


- Carefully bend back the bottom section of the fairing until screw (2) is accessible.
- Remove screw (2).
- Remove screws (1).
- Remove the tail trimmer from the motorcycle.



(-) Removing number-plate carrier

- Remove screws (1).
- Remove screws (2).
- Remove license-plate carrier (3).



(-) Disassembling license-plate carrier

- Remove screws (1).
- Remove rear-light holder (2).



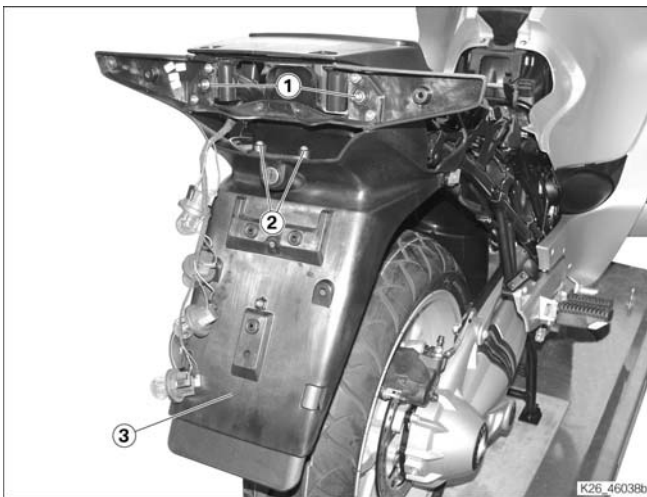
(-) Assembling license-plate carrier


- Seat rear-light holder (2) on the license-plate carrier.
- Install screws (1).




(-) Installing number-plate carrier

- Hold license-plate holder (3) in position at the rear of the motorcycle.
- Install screws (1).



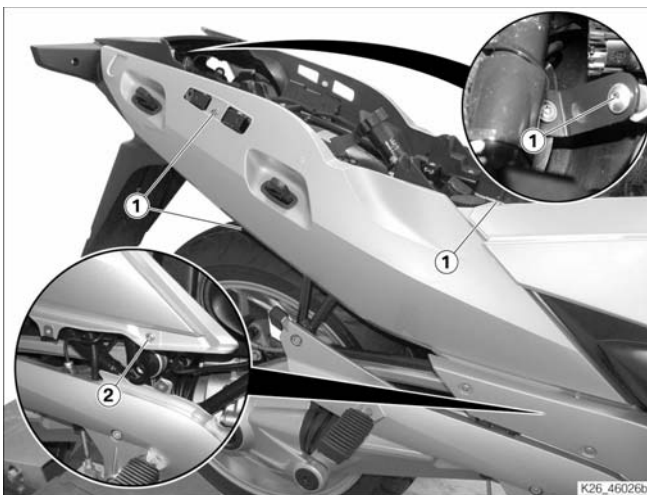
 Tightening torques		
Licence plate carrier to rear frame, M6 x 25	6 Nm	

- Install screws (2).

 Tightening torques		
Pillion catch to rear frame, M6 x 16	6 Nm	

(-) Installing rear trim panel on right

- Carefully bend back the bottom section of the fairing, just far enough to allow screw (2) to be installed.
- Install screw (2).
- Install screws (1).



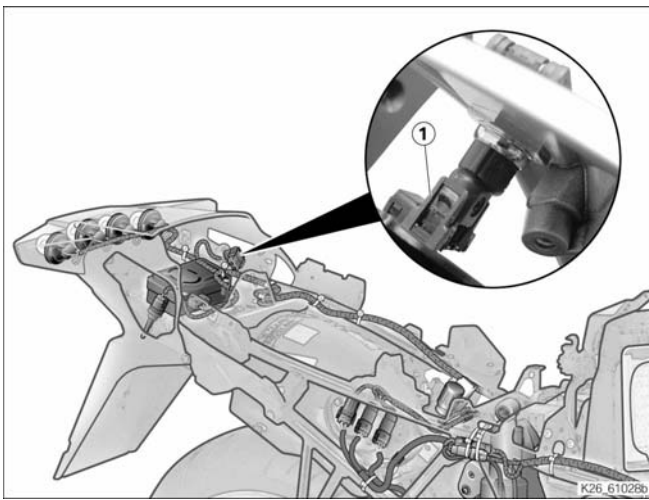
- Install screw (1).
- Fit screws (2) at bottom section of fairing.



(-) Installing rear trim panel on left

Variant, 2nd socket outlet

- Connect plug (1) to the socket.



- Seat the rear trim panel on the motorcycle.
- Carefully bend back the bottom section of the fairing, just far enough to allow screw (3) to be installed.
- Install screw (3).
- Install screws (1).


- Install screw (2).
- Fit screws (1) at bottom section of fairing.




(-) Installing luggage carrier

- Place luggage rack in position.
- Install new screws (1).



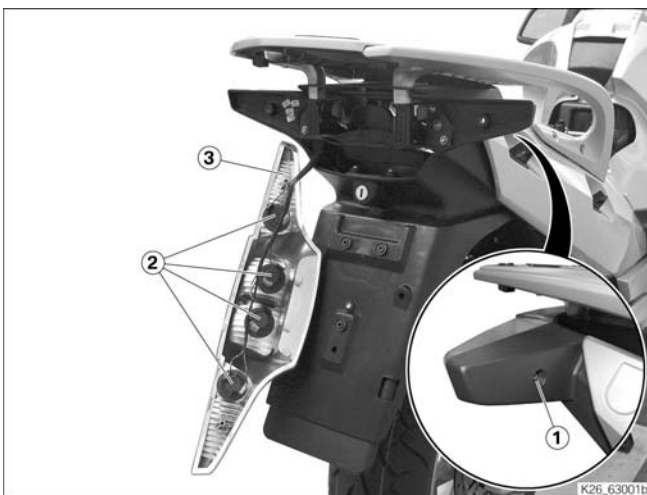
 Tightening torques		
Luggage rack, centre to rear section of frame, M6 x 35, Replace screws Micro-encapsulated	8 Nm	

- Install new screws (2) at rear left and right.

 Tightening torques		
Luggage rack from below to rear section of frame, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

(-) Installing rear-light unit

- Install bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).



(-) Installing seat

- Introduce the front seat into the front latching



mechanism.

- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

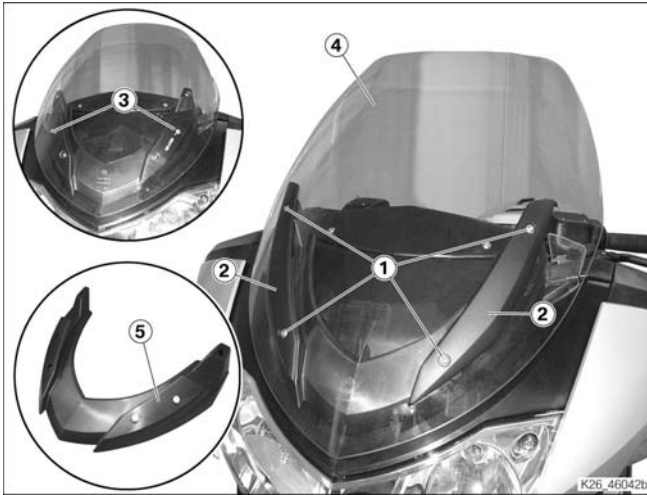
- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

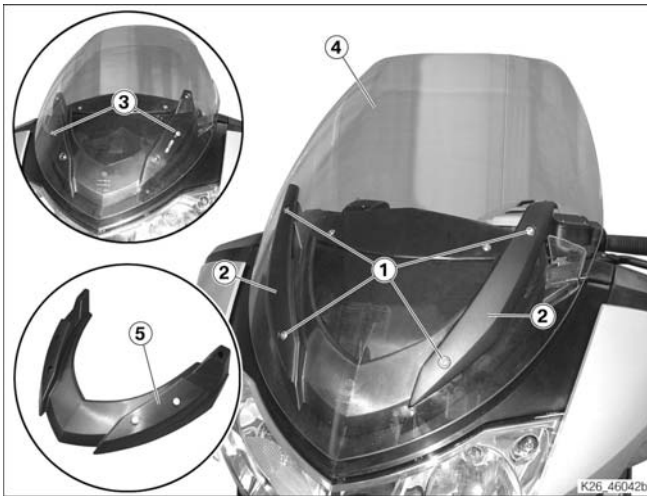
- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **46 63 031 Replacing windscreen**




(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).



(-) Installing the windscreen

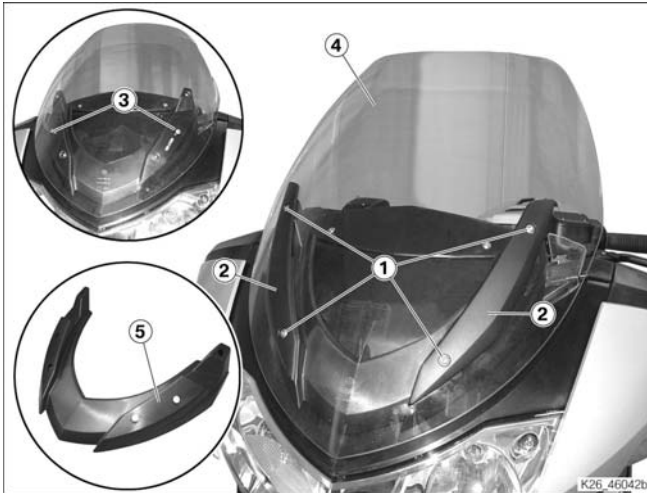
- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.

 Tightening torques		
Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	

- Fit left and right trim panels (2) and secure with screws (1).

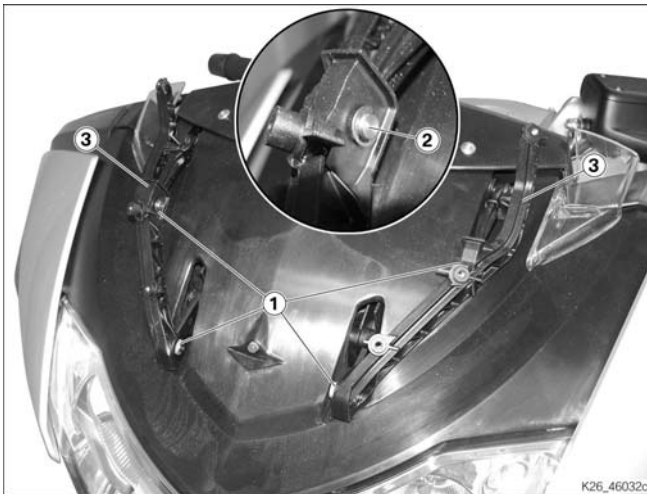
 **46 63 032 Replacing left and right holders for windscreen**

(-) Removing windscreen



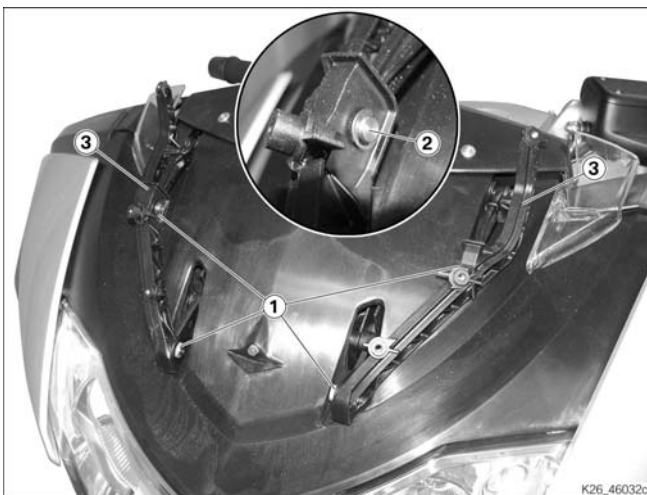
- Remove screws (1), remove left and right trim covers (2).
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Removing bracket for windscreen



- Remove clips (1).
- Press out pin (2).
- Remove bracket (3).

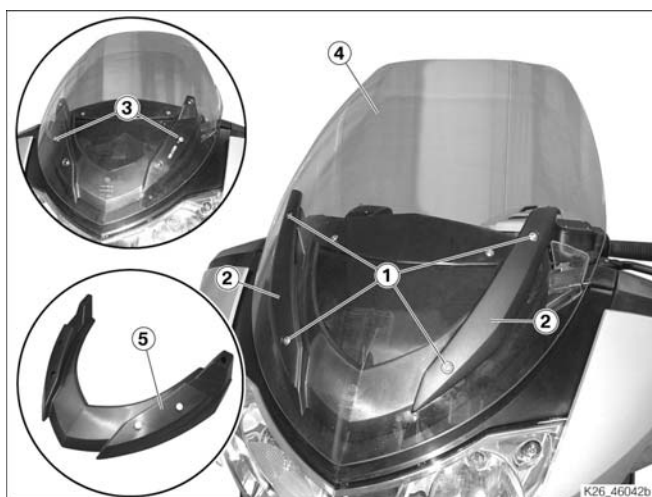
(-) Installing bracket for windscreen




- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).

(-) Installing the windscreen

- Install cover (5).



- Place windscreen (4) in position.
- Fit screws (3) with washers.

 Tightening torques		
Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	

- Fit left and right trim panels (2) and secure with screws (1).

 **46 63 039 Replacing adjustable windscreen holder**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing left-hand trim panel

- Remove screws (1).

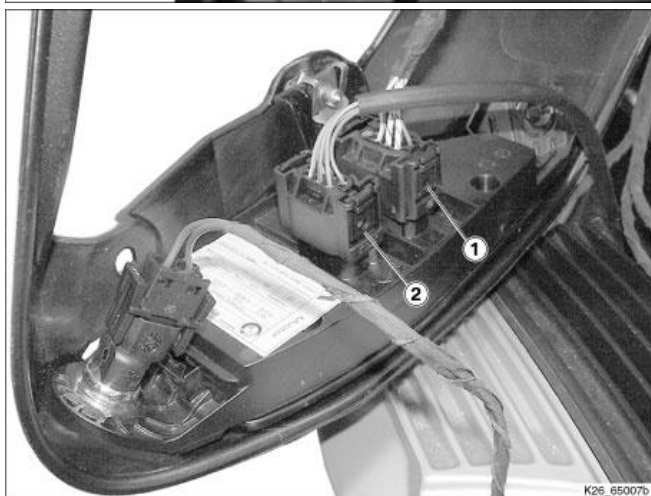


- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

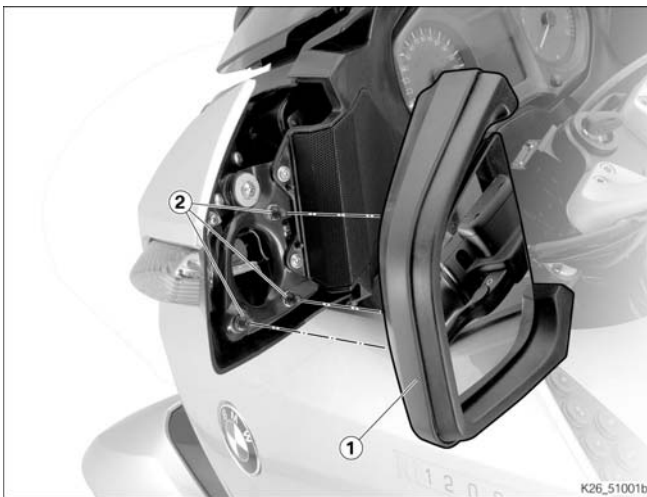
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing mirror

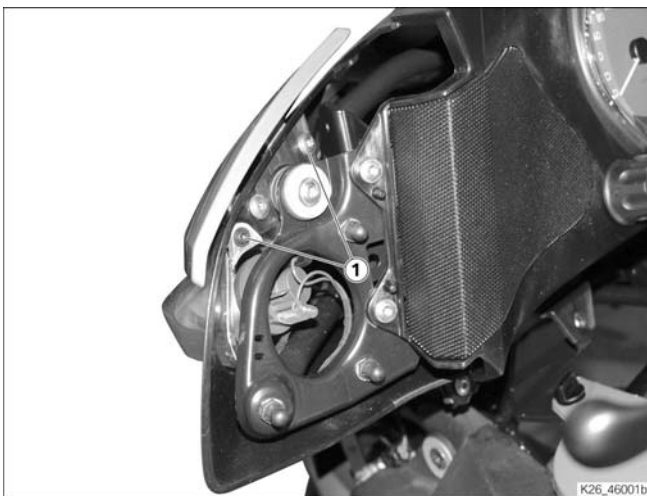
- Detach mirror (1).



Variant, Radio with CD player

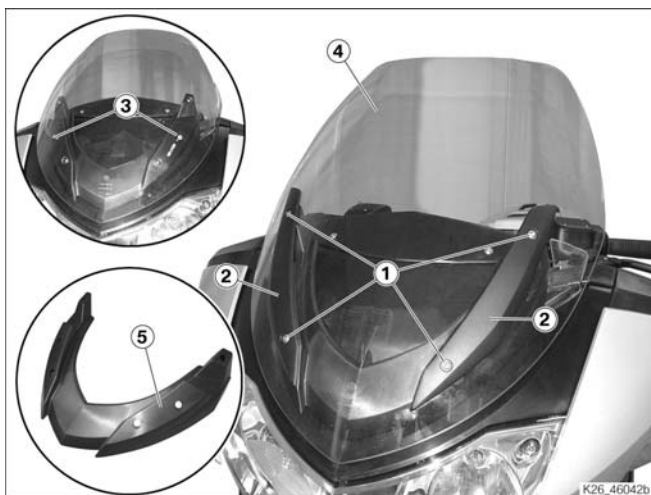
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



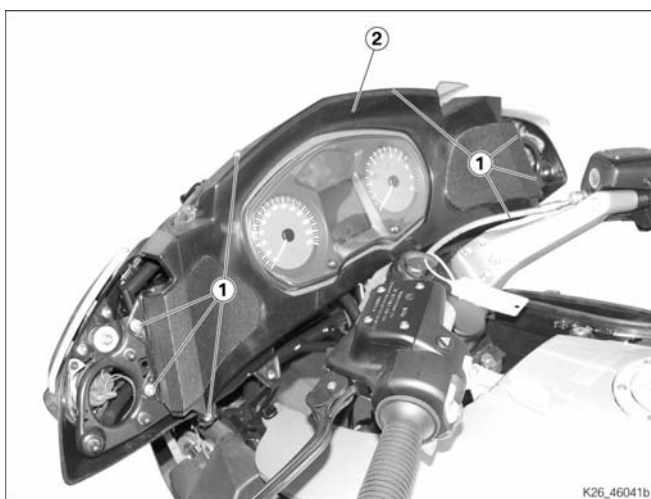
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).



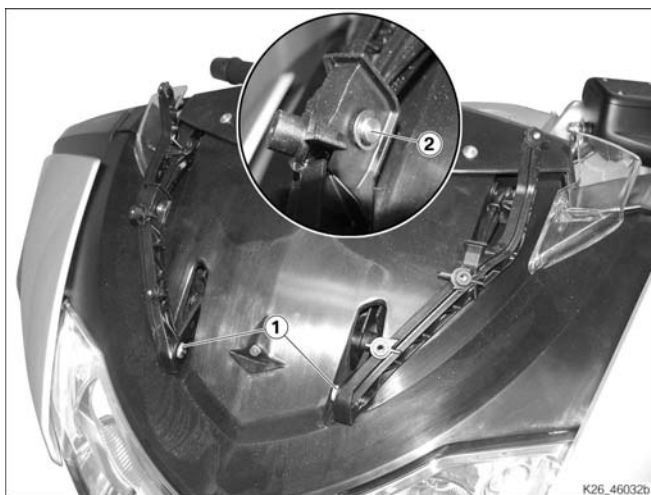
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Removing inner trim for instruments



- Remove screws (1).
- Remove inner trim (2).

(-) Partially removing holder for windscreen



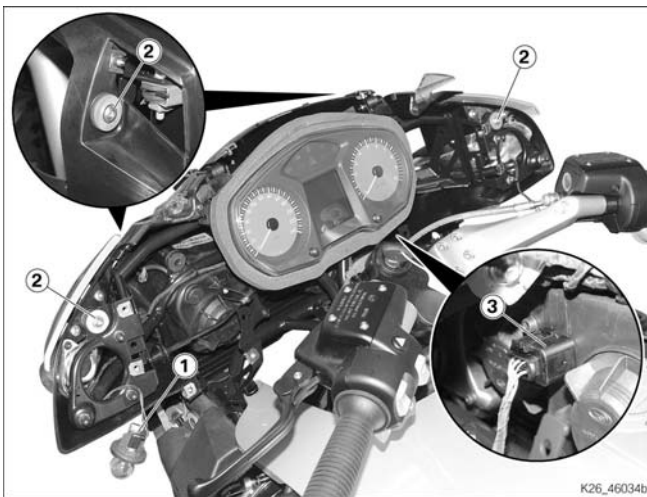
- Remove clips (1).
- Press out pin (2).

- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

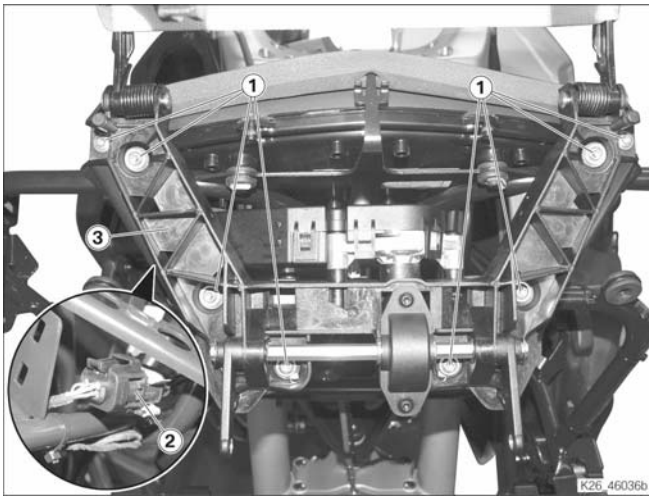
- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

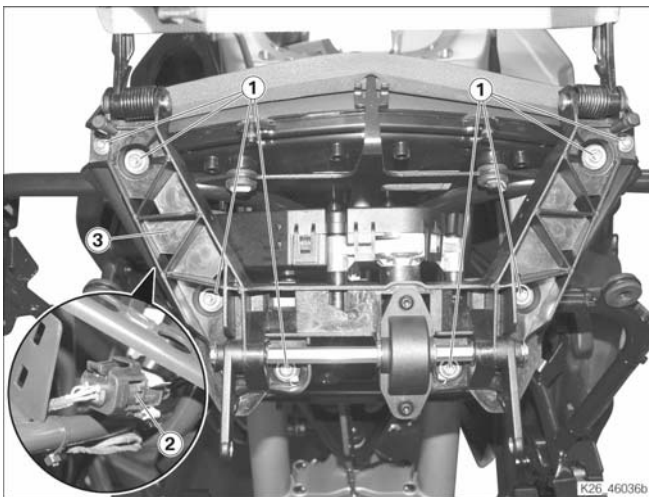
(-) Removing adjustable windscreen holder

- Remove screws (1).
- Disconnect plug (2).
- Remove windscreen holder (3) together with drive unit.



(-) Installing adjustable windscreen holder

- Place windscreen holder (3) together with drive unit in position.
- Connect plug (2).
- Install screws (1).




(-) Installing entire top section of fairing

- Carefully place upper section of fairing in position.

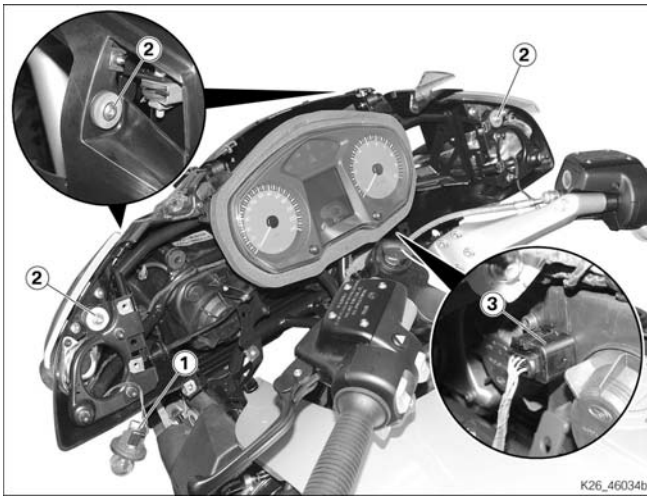
Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



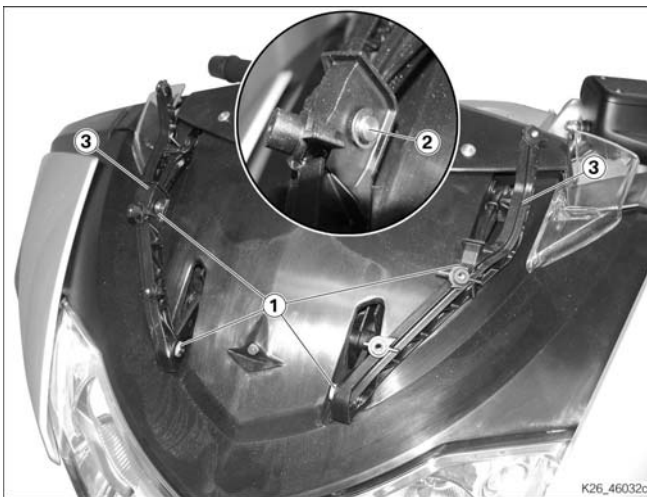
 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	

- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.



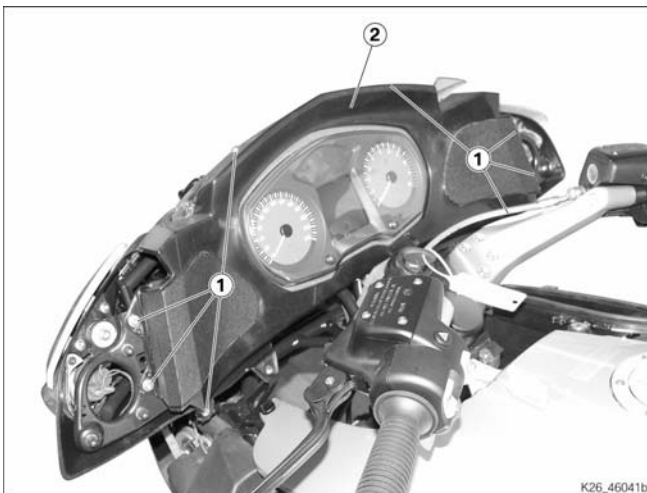
(-) Installing bracket for windscreen

- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).



(-) Installing inner trim for instruments

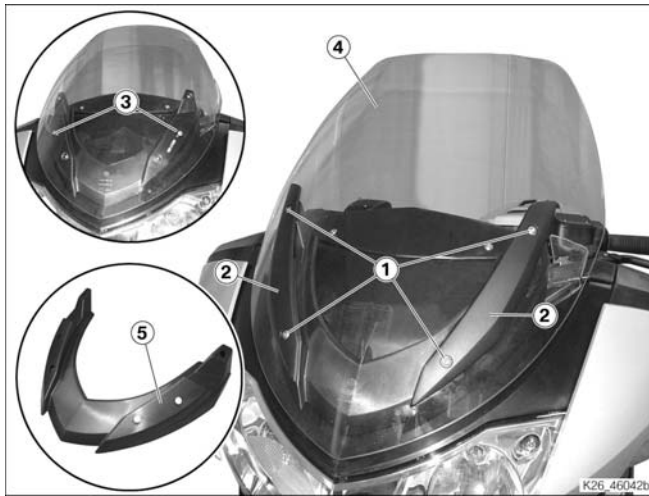
- Place inner trim (2) in position.
- Install screws (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.





Tightening torques

Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	
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- Fit left and right trim panels (2) and secure with screws (1).

(-) Preparation for initialising/calibrating new parts

Precondition

- Engine switched off.
- Prop the motorcycle in such a way that it cannot move while initialisation/calibration is in progress.
- Motorcycle's battery is fully charged.



Note

Do not attempt to perform work of any other kind on the motorcycle while programming/coding are in progress.

- Switch off all electrical consumers.



Attention

Nature: Programming/coding is aborted if the voltage in the on-board system drops below 12.6 volts.

Avoidance: Connect the charger to the battery.

- Connect charger (No. 61 1 581) with cables (No. 61 1 582) to the battery. While initialisation/calibration is in progress, **do not** connect or disconnect the charger.

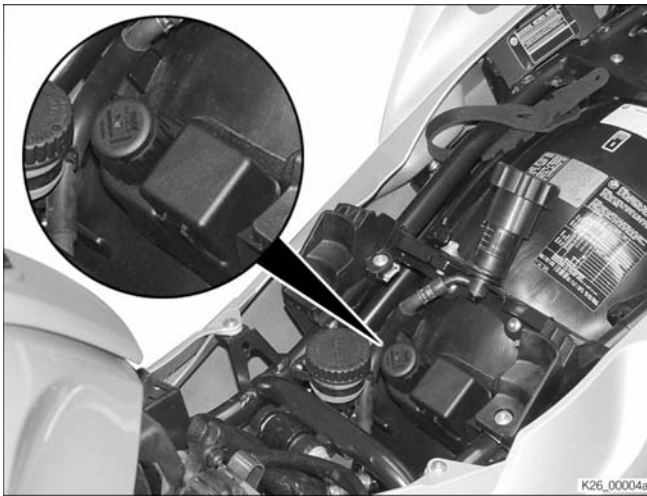
► Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581), (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.



- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

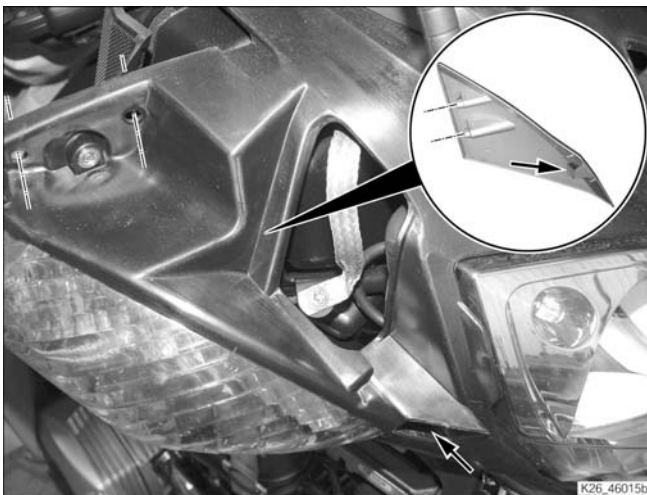
- ◀
- Perform diagnosis. Rectify faults, if found, **before** starting initialisation/calibration.
- Start initialisation/calibration with the CIP program and follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

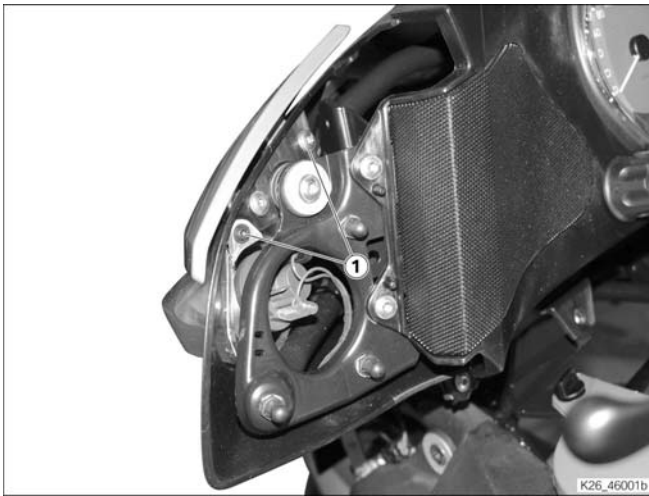
Variant, Radio with CD player

(-) Installing both left and right mirror trim panels



- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.

- Install screws (1).



(-) Installing mirrors



Attention

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

Avoidance: Do not grease the rubber holder or snap-fit stud.



- Press mirror (1) in forward direction on to snap-fit studs (2).

(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



K26_65007b

- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **46 63 119 Replacing tank rail**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **46 63 195 Replacing top section of fairing**

(-) Removing left-hand trim panel

- Remove screws (1).

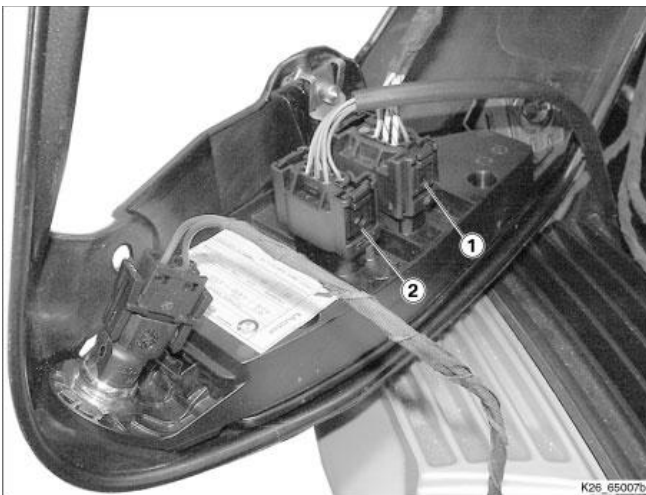


- Disconnect plug (1) from socket.



Variant, Radio with CD player

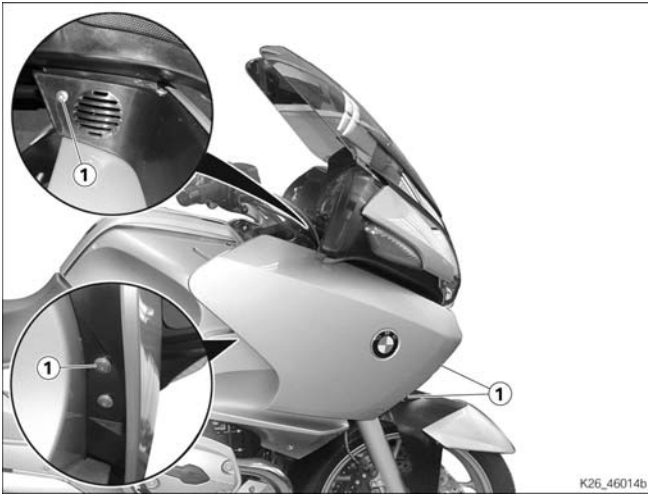
- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

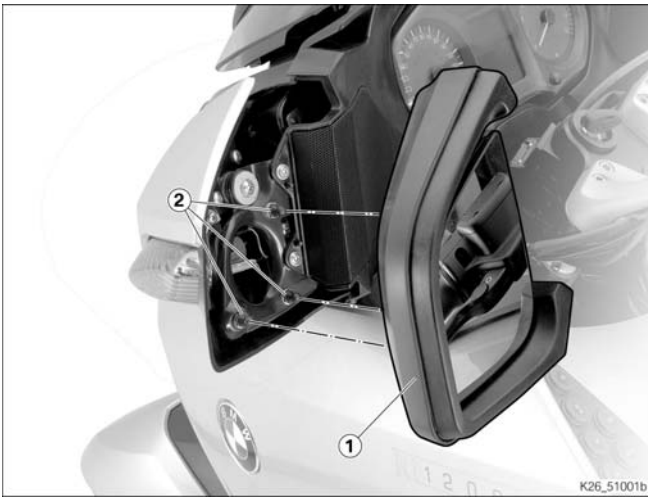
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing mirror

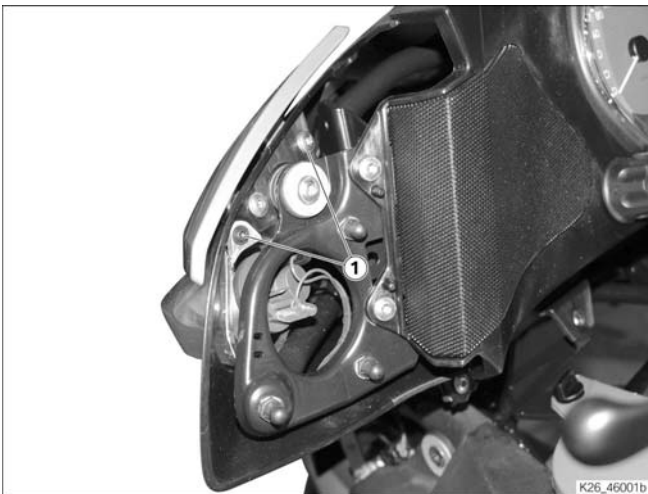
- Detach mirror (1).



Variant, Radio with CD player

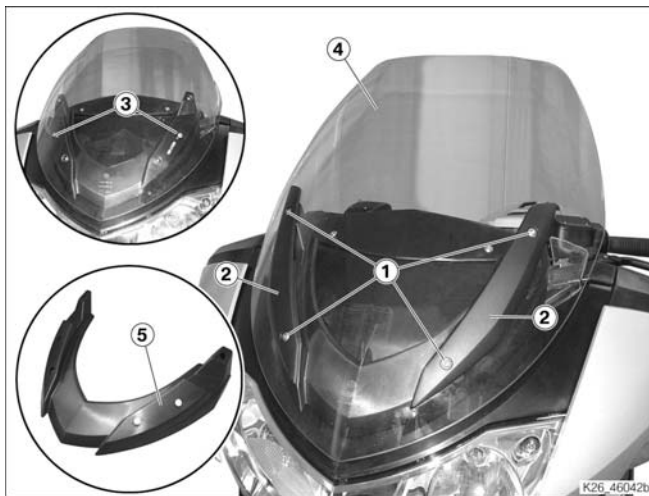
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



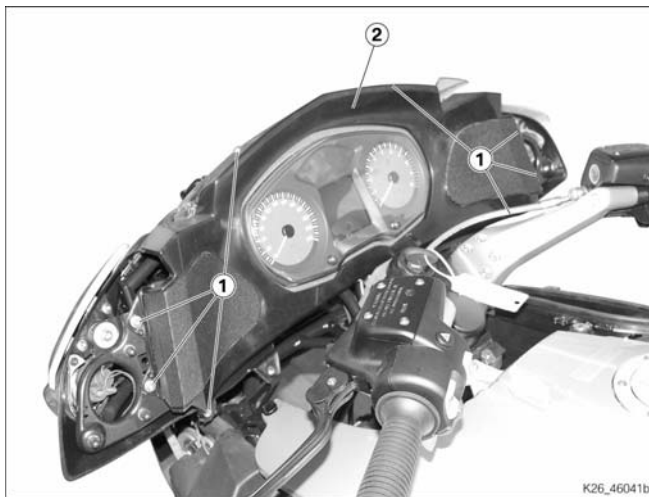
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).



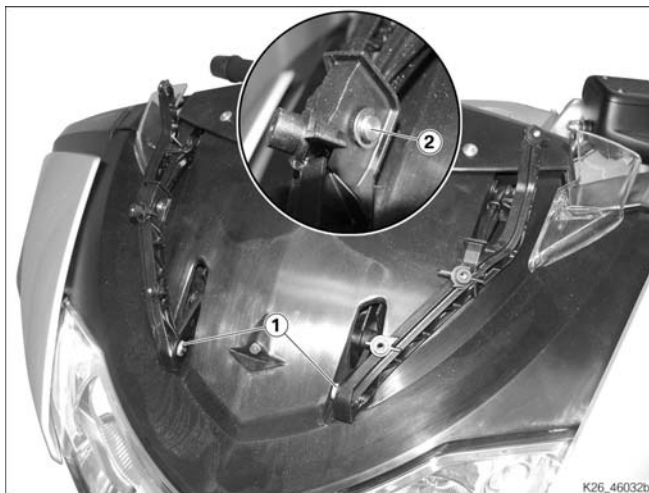
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Removing inner trim for instruments



- Remove screws (1).
- Remove inner trim (2).

(-) Partially removing holder for windscreen



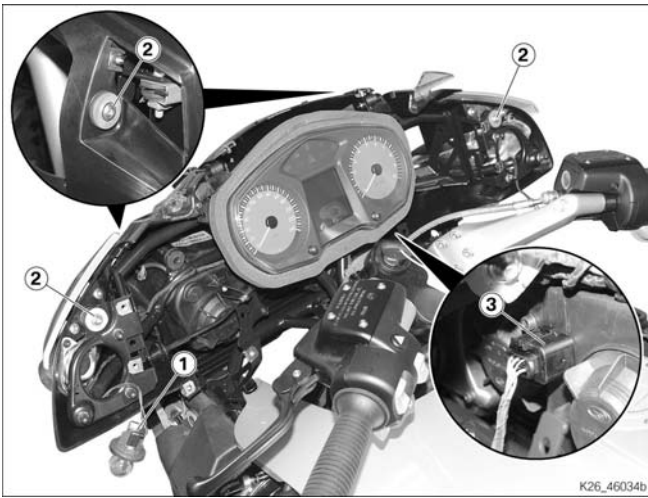
- Remove clips (1).
- Press out pin (2).

- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

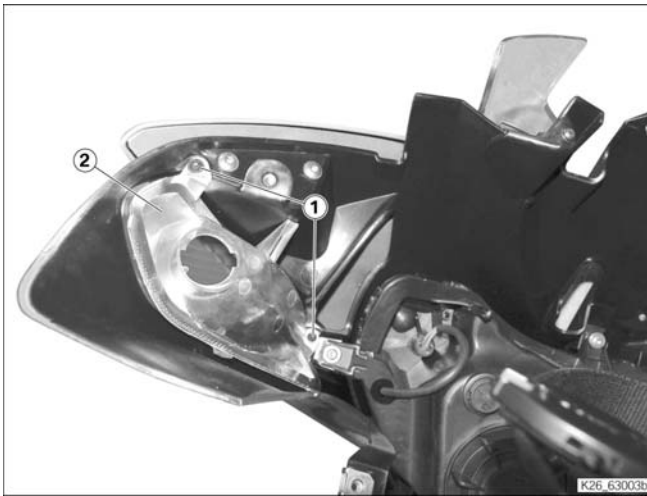
- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

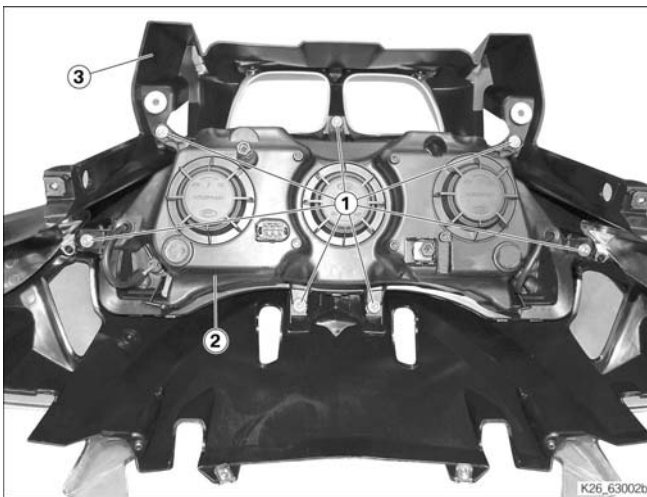
(-) Removing front flashing turn indicator

- Remove screws (1).
- Remove flashing turn indicator (2) in the direction opposite the forward direction of travel.



(-) Removing headlight

- Remove screws (1).
- Remove headlight (2) from top section of fairing (3).

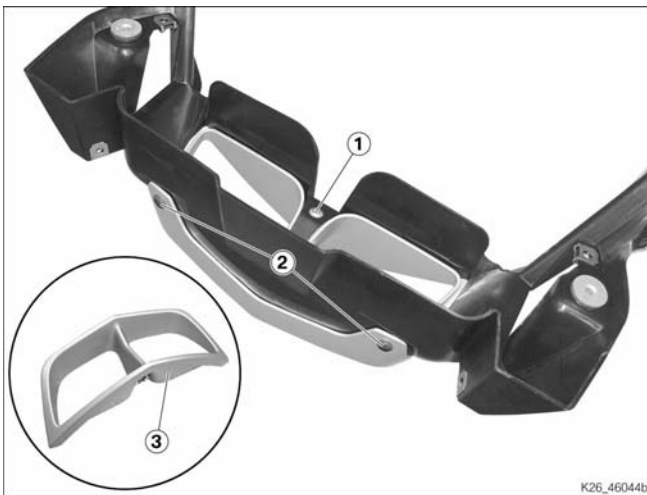


(-) Replacing top section of fairing

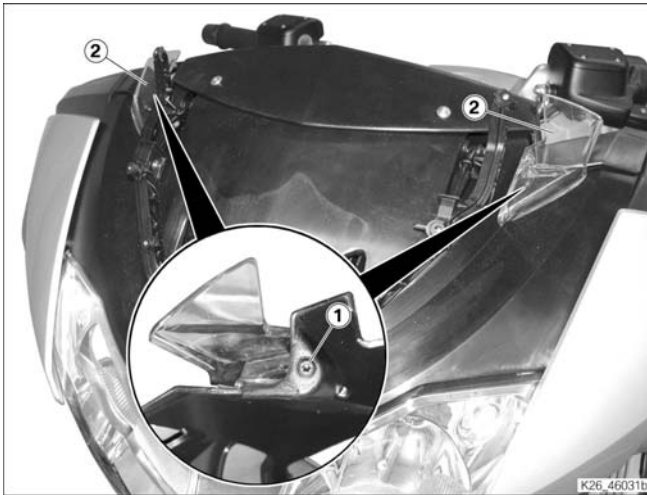
► Disassembling top section of fairing

▷ Removing oil cooler panelling

- Remove rivets (2).
- Remove screw (1).
- Remove oil cooler panelling (3).



- Remove screws (1).



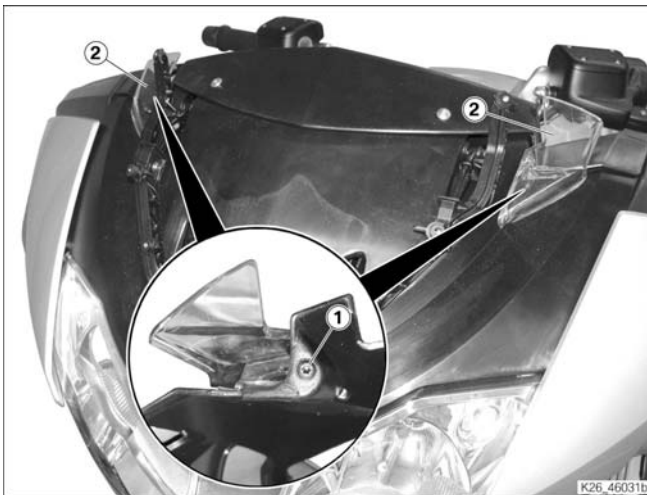
- Remove slipstream deflector (2).



- Remove reusable small items and install them on the new fairing top section.

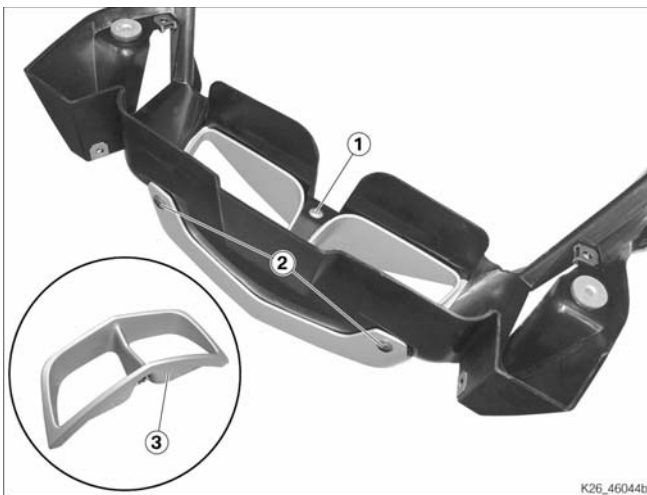
▶ **Assembling top section of fairing**

- Install slipstream deflector (2).
- Install screws (1).

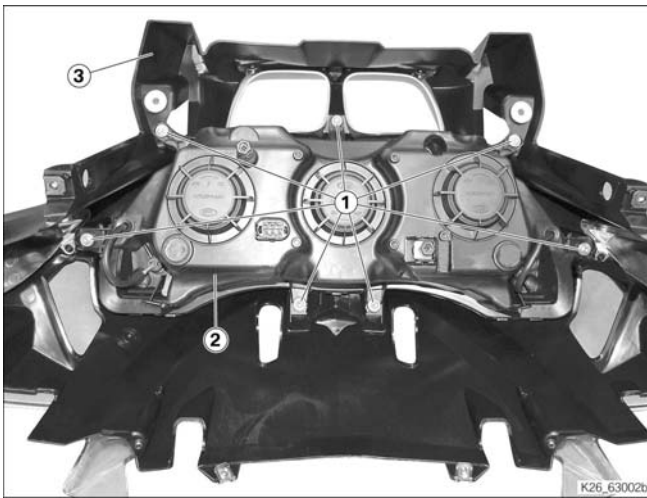


▷ **Installing oil cooler panel**

- Place oil cooler panel (3) in position.
- Install screw (1).
- Install rivets (2).

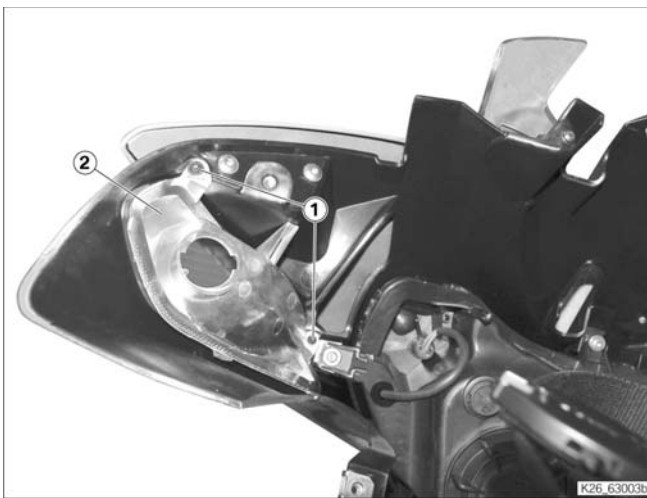


(-) Installing headlight



- Install headlight (2) in top section of fairing (3).
- Install screws (1).

(-) Installing front flashing turn indicator



- Insert flashing turn indicator (2) in the forward direction of travel.
- Install screws (1).


(-) Installing entire top section of fairing



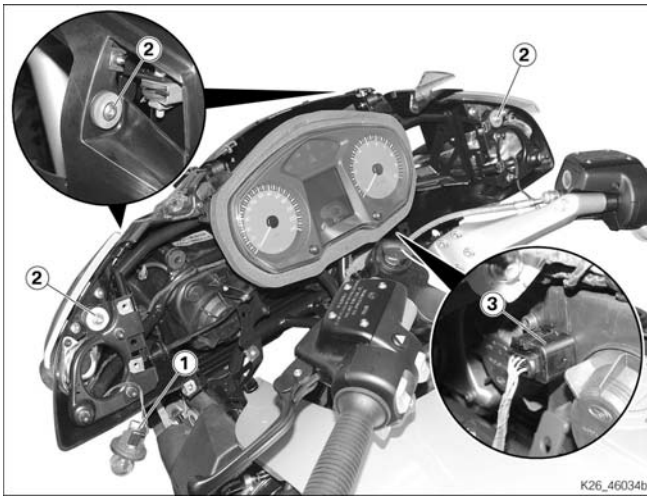
- Carefully place upper section of fairing in position.

Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).

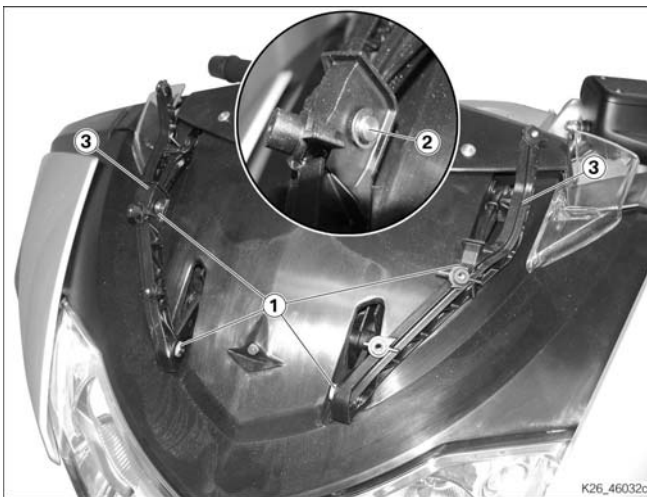
 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	

- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.



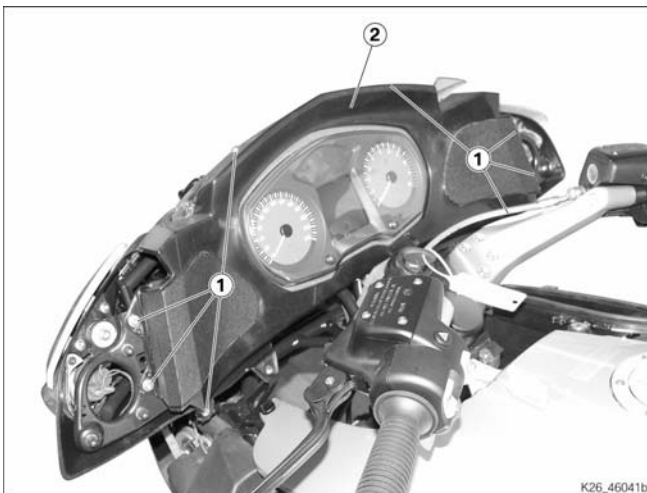
(-) Installing bracket for windscreen

- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).



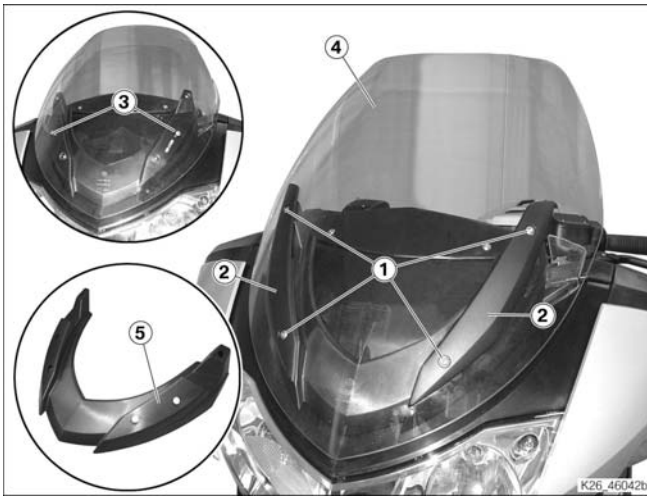
(-) Installing inner trim for instruments

- Place inner trim (2) in position.
- Install screws (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.



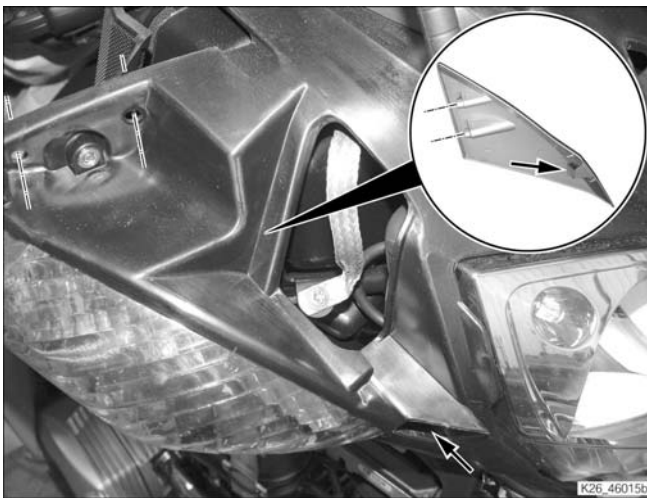
Tightening torques

Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	
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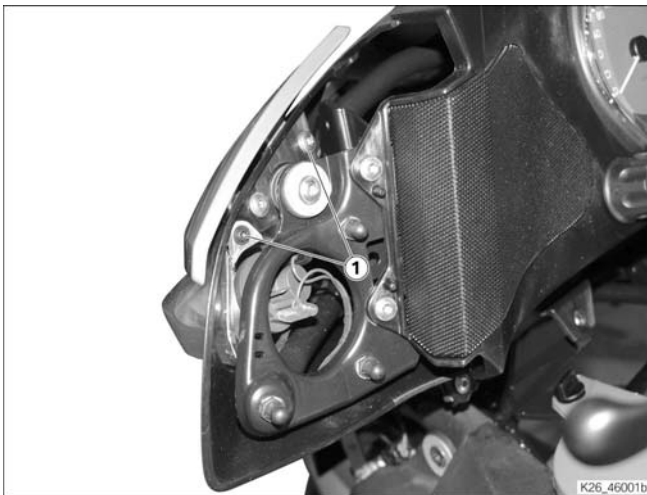
- Fit left and right trim panels (2) and secure with screws (1).

Variant, Radio with CD player

(-) Installing both left and right mirror trim panels



- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



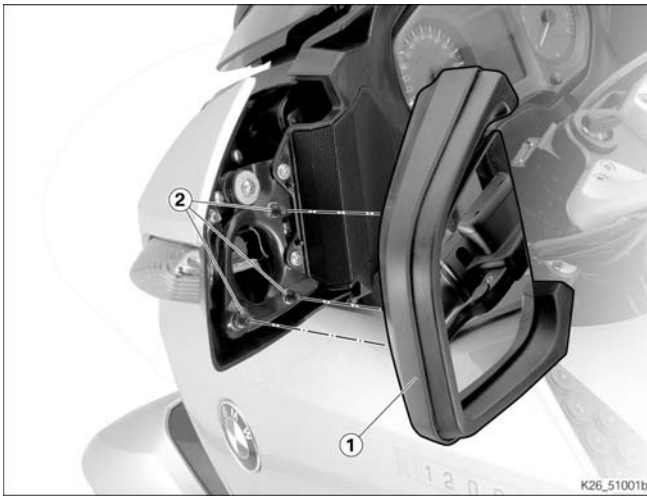
- Install screws (1).

(-) Installing mirrors



Attention

Nature: The mirrors can easily work loose from



their anchoring if the rubber holders or snap-fit studs are greased.

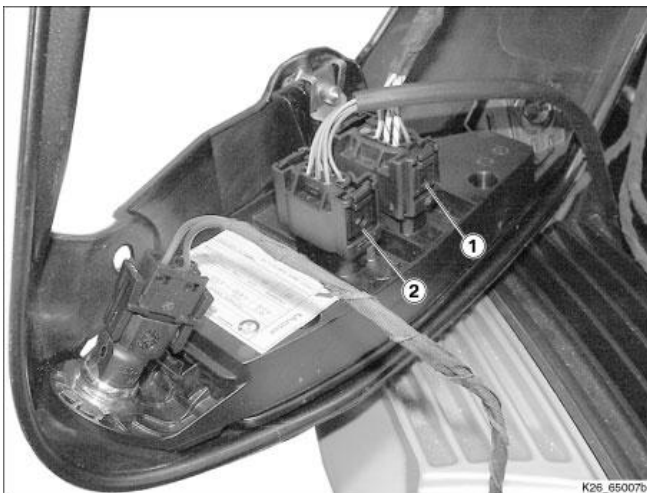
Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



K26_46017b



K26_46013b

- Hold the panel in position.
- Install screws (1).

 **46 63 198 Replacing fairing bracket on frame**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

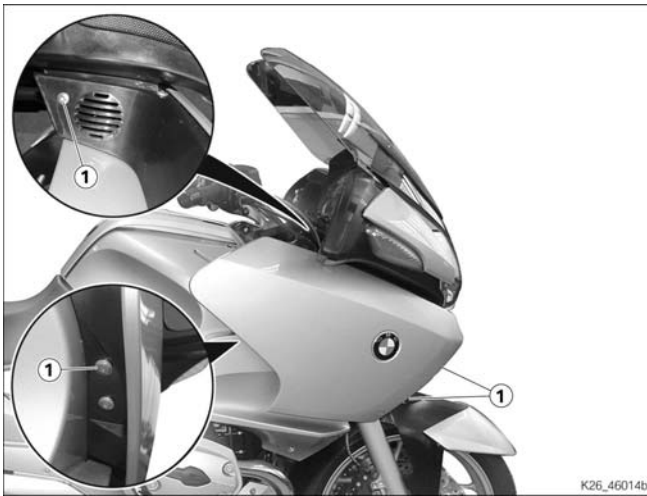
- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



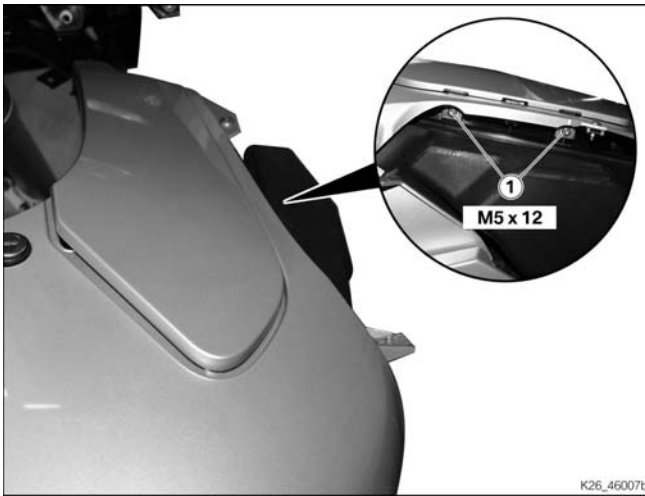
(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



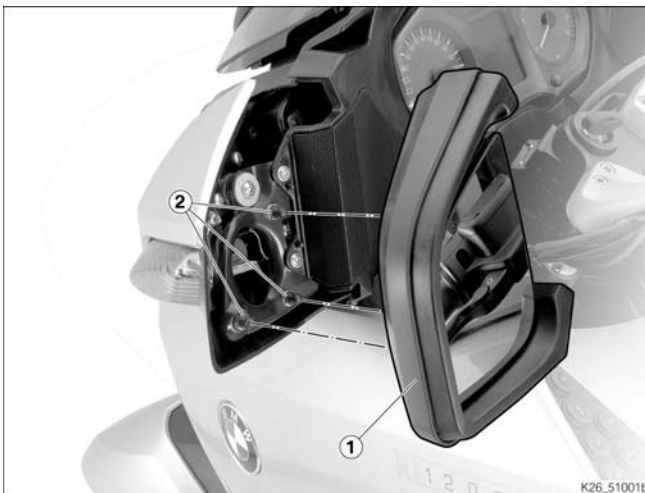
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing mirror

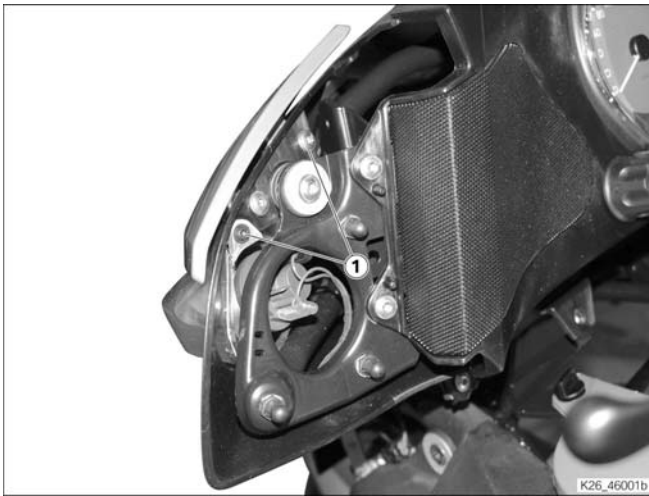
- Detach mirror (1).



Variant, Radio with CD player

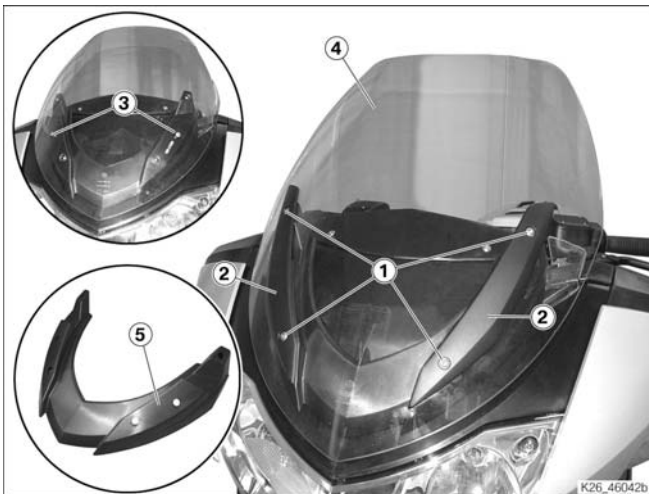
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



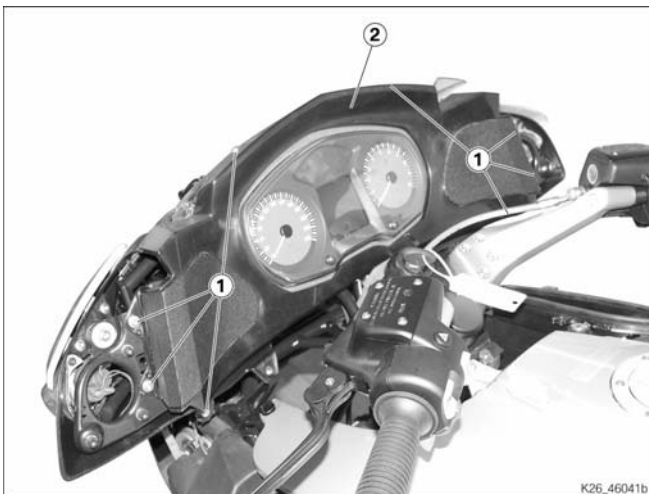
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).



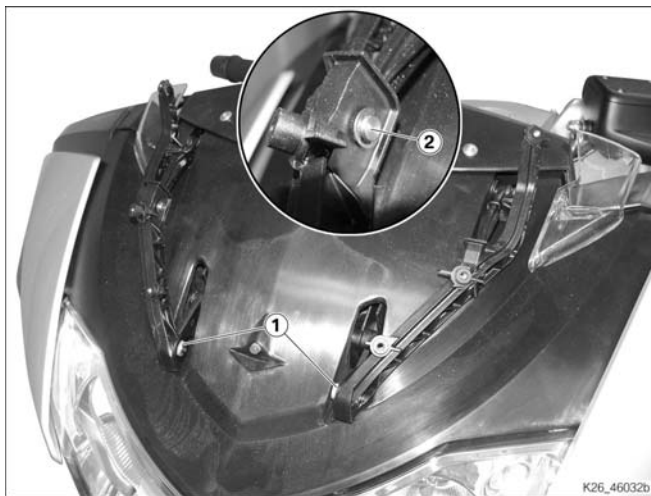
(-) Removing inner trim for instruments

- Remove screws (1).
- Remove inner trim (2).



(-) Partially removing holder for windscreen

- Remove clips (1).
- Press out pin (2).

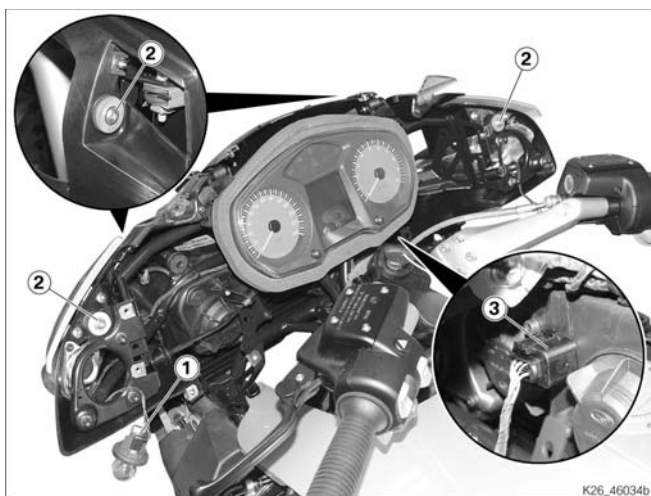


- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



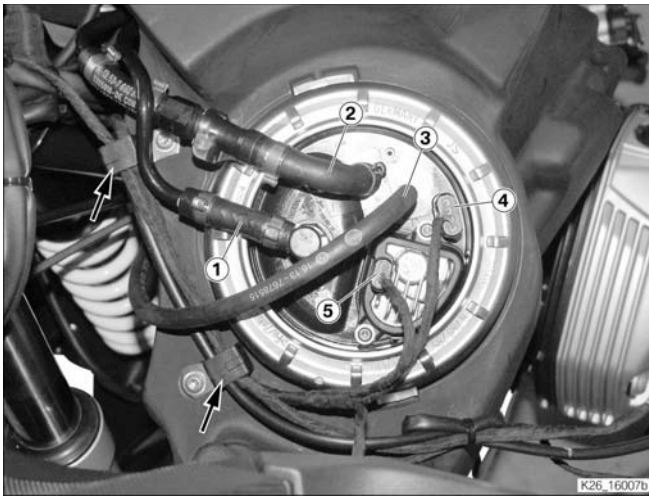
Variant, Radio with CD player

- Remove screw (4).
- Disconnect plug (5).

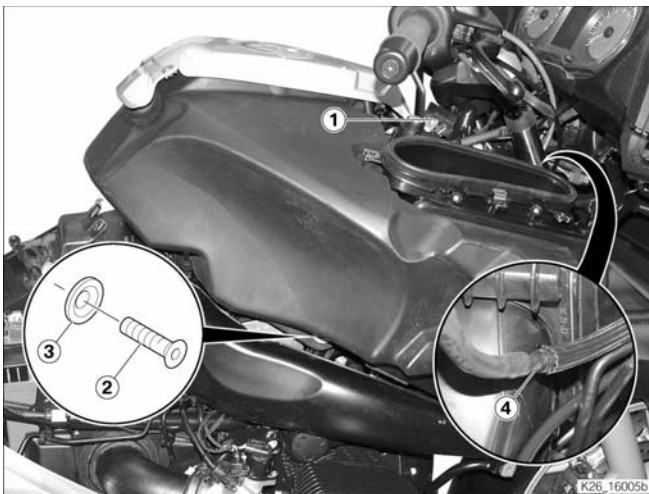


- Carefully pull upper section of fairing in forward direction to remove.

(-) Removing fuel tank



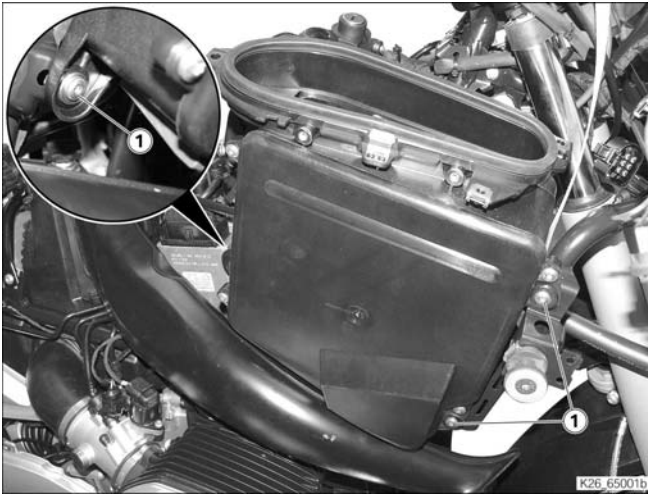
- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

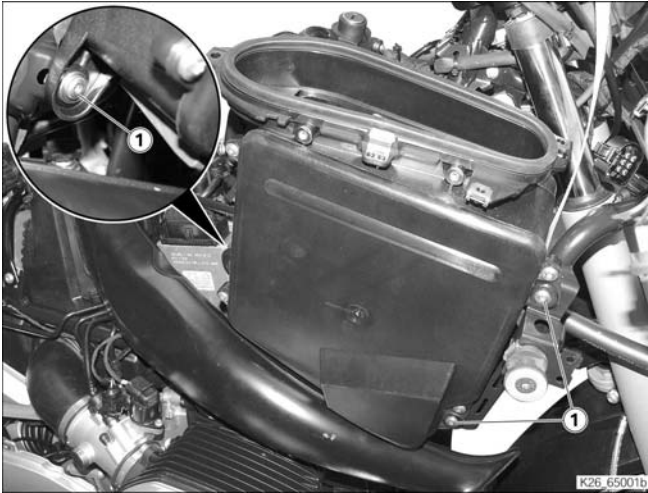
(-) Removing stowage compartment

- Remove screws (1).
- Remove the stowage compartment.



Variant, Radio with CD player

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



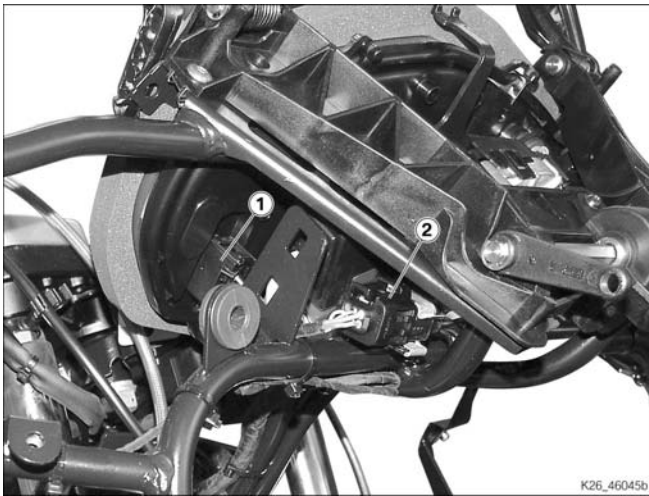
(-) Removing oil cooler

- Remove screws (1).
- Carefully lower oil cooler (2) to the floor.



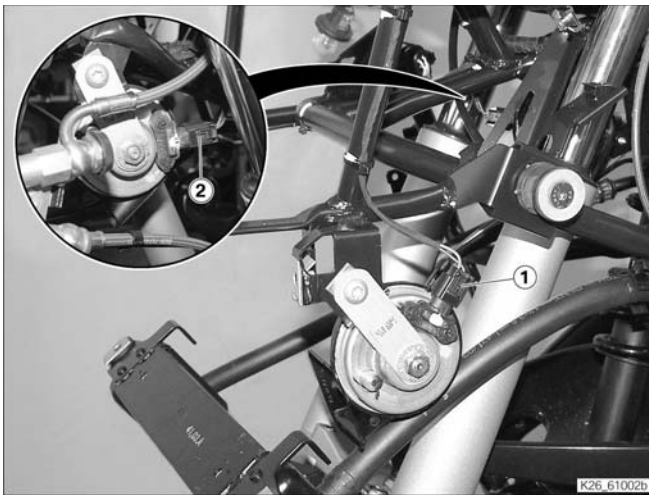
(-) Removing fairing bracket

- Disconnect plugs (1) and (2).



► **Removing horn**

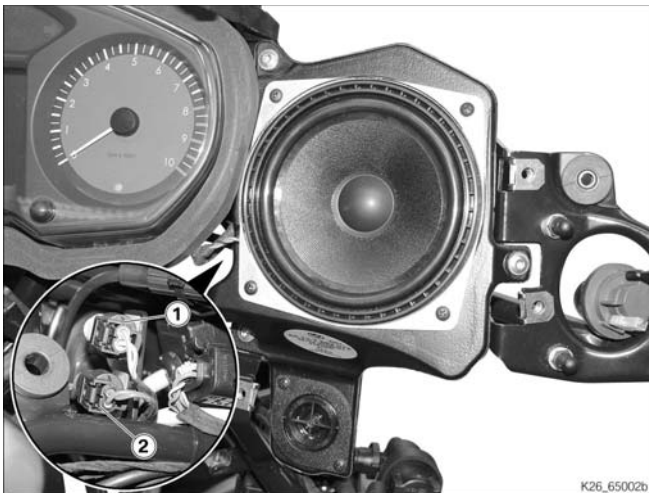
- Disconnect plugs (1) and (2).



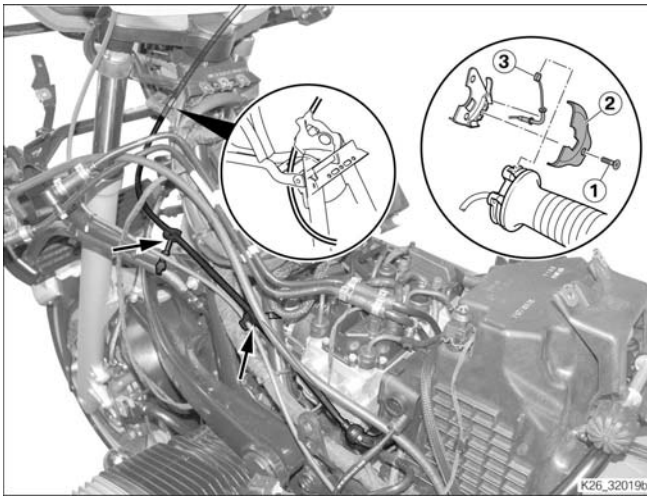
◄ **Variant, Radio with CD player**

► **Removing left and right speakers**

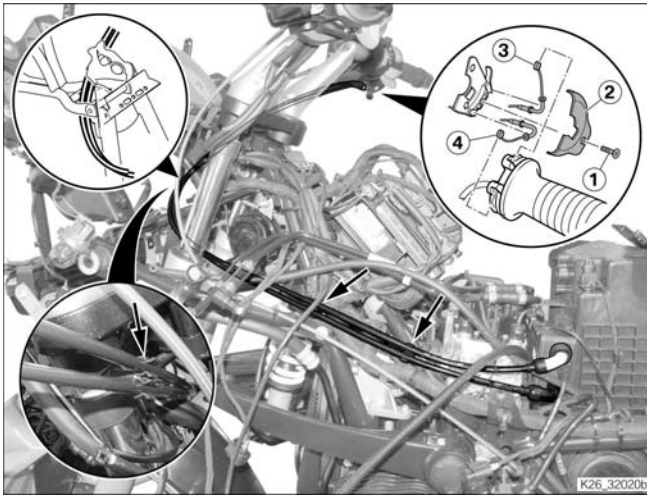
- Disconnect plug (1).
- Disconnect plug (2).



- ◄
- Remove screw (1).
 - Remove cover (2) from throttle twistgrip.
 - Disengage Bowden cable (3).



- Unclip Bowden cable (3) from retainers (arrows) on frame.



Variant, cruise control

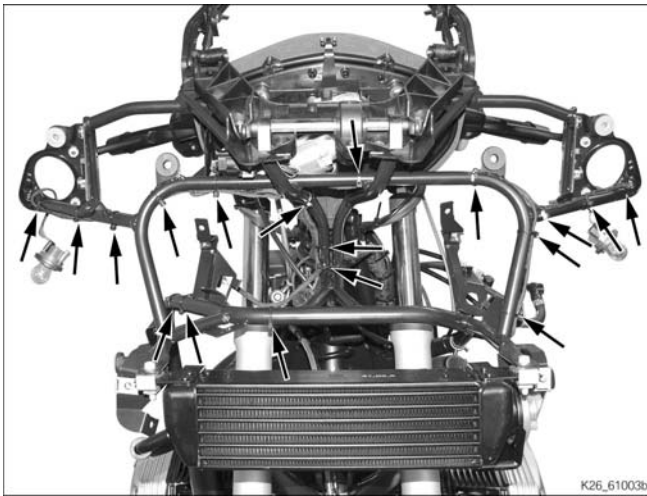
- Remove screw (1).
- Remove cover (2) from throttle twistgrip.
- Disengage Bowden cables (3) and (4).
- Unclip Bowden cables (3) and (4) from retainers (arrows) on frame.



- Release left and right retaining clips (1).
- Release retaining clip (2).
- Cut through cable ties (3).

► Disengaging wiring harness at front

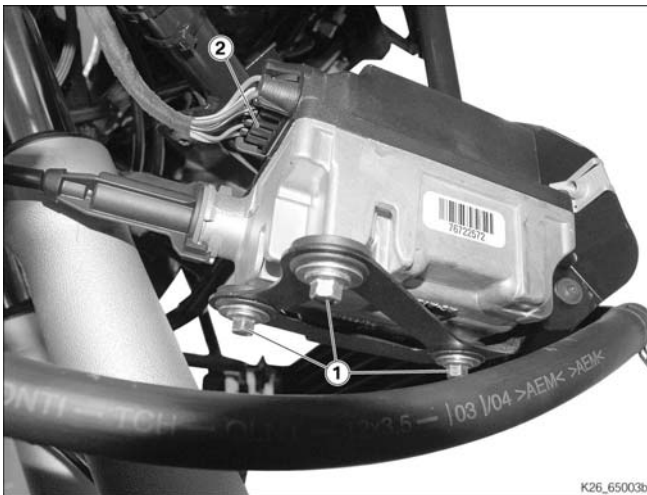
- Cut through all cable ties (arrows) on the fairing bracket.
- Thread the cable clear of the fairing bracket.



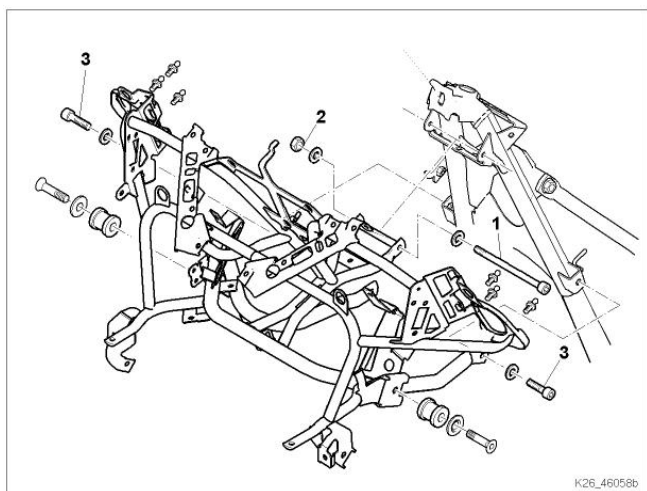
◀ **Variant, cruise control**

▶ **Removing control unit for cruise control**

- Remove screws (1).
- Disconnect plug (2).
- Use cable ties to hold the control unit out of the way.



- ◀
- Remove quick-release axle (1) with nut (2).
 - Remove screws (3) on left and right.
 - Carefully pull fairing bracket in forward direction to remove.

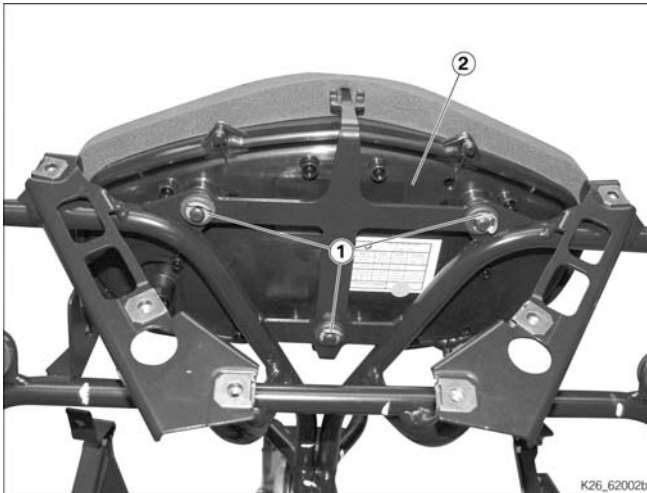


(-) Replacing fairing bracket

▶ **Disassembling fairing bracket**

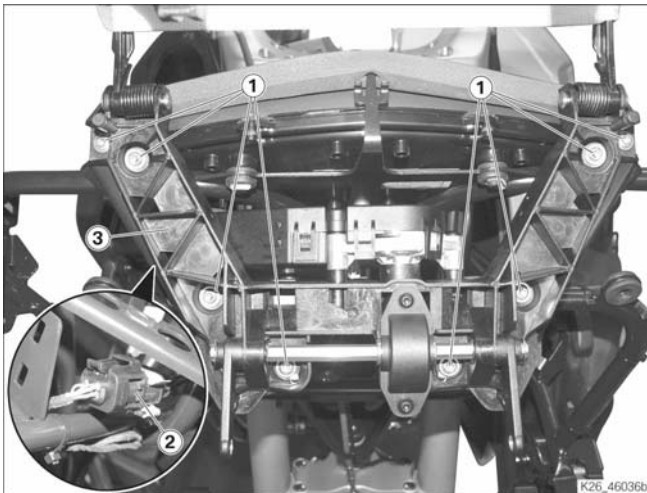
▷ **Removing instrument panel (fairing bracket removed)**

- Remove clips (1).
- Remove instrument panel (2).



▷ **Removing adjustable windscreen holder**

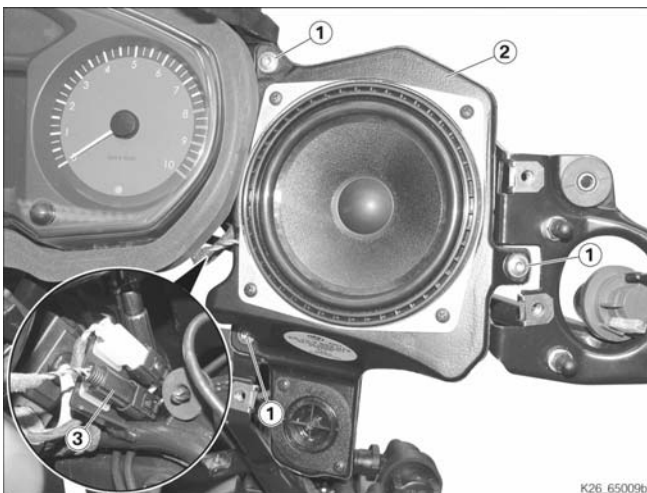
- Remove screws (1).
- Disconnect plug (2).
- Remove windscreen holder (3) together with drive unit.



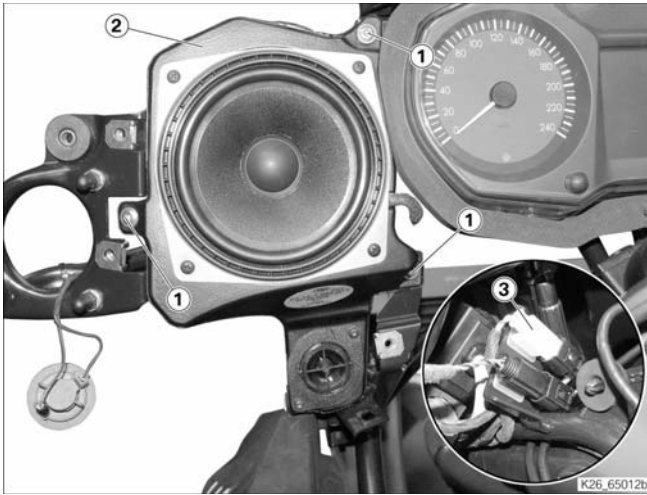
▷ **Variant, Radio with CD player**

▷ **Removing right loudspeaker box**

- Remove screws (1).
- Remove loudspeaker box (2) from its holder.
- Remove plug (3) from the holder.
- Remove loudspeaker box (2).



▷ **Removing left loudspeaker box**

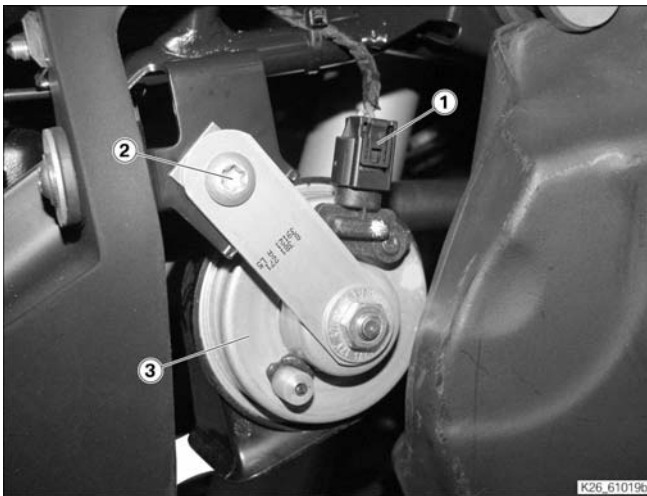


- Remove screws (1).
- Remove loudspeaker box (2) from its holder.
- Remove plug (3) from the holder.
- Pass the cable through to the left.
- Remove loudspeaker box (2).



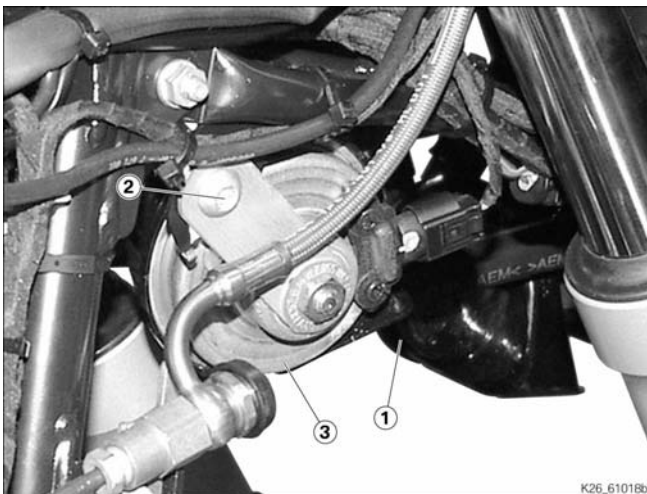
▷ **Removing front horn**

- Remove screw (2) and remove horn (3).

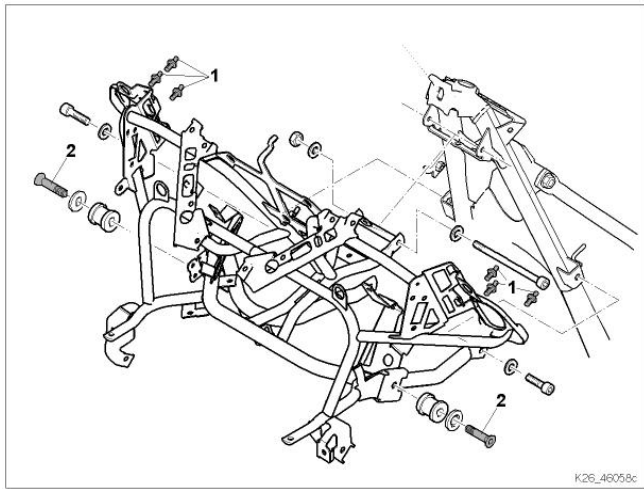


▷ **Removing rear horn**


- Remove screw (2) and remove horn (3).



- Remove locking stud (1).
- Remove screws (2) with washers and rubber mounts.



- Remove reusable small items and install them on the new fairing bracket.
- Install screws (2) with washers and rubber mounts.

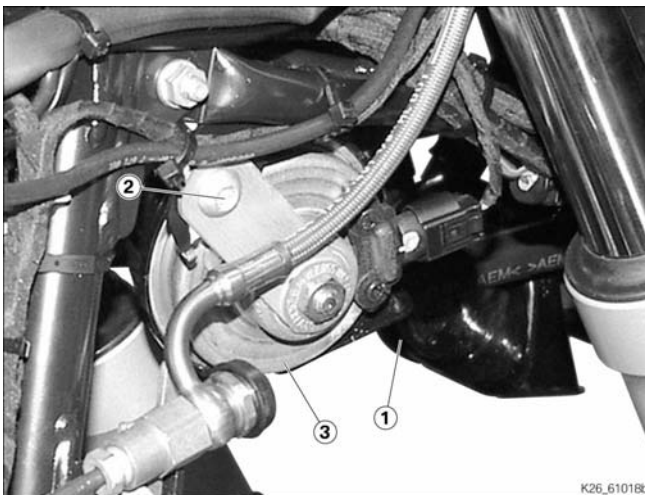
 Tightening torques		
Rubber mount for fuel tank to fairing bracket, front left/right, M8 x 40	16 Nm	


- Install locking stud (1).

► **Assembling fairing bracket**

▷ **Installing rear horn**

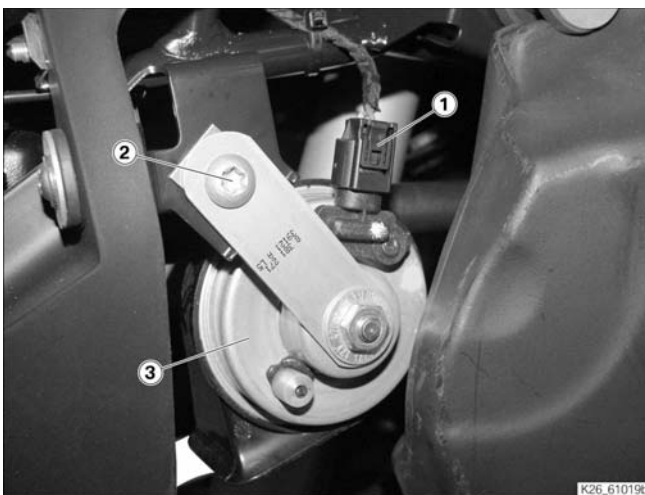
- Place horn (3) in position.
- Install screw (2).




 Tightening torques		
Horn to fairing bracket, M8 x 16	16 Nm	

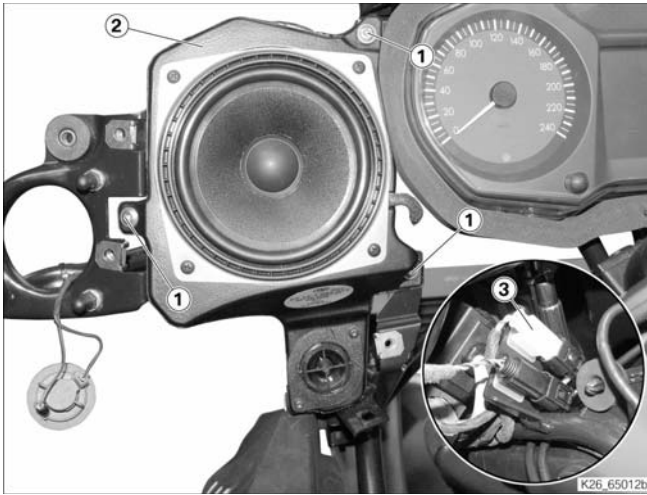
▷ **Installing front horn**

- Place horn (3) in position.
- Install screw (2).



 Tightening torques		
Horn to fairing bracket, M8 x 16	16 Nm	

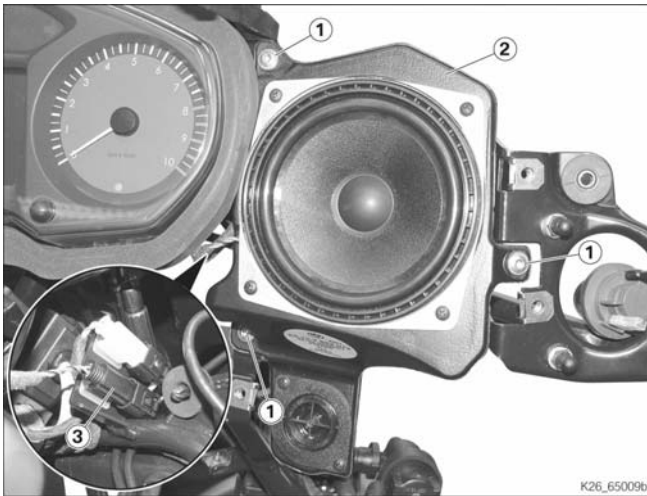
- ▷ **Variant, Radio with CD player**
- ▷ **Installing left loudspeaker box**



- Seat loudspeaker box (2) in the holder.
- Install screws (1).
- Pass the cable through toward the right.
- Clip plug (3) into the holder.



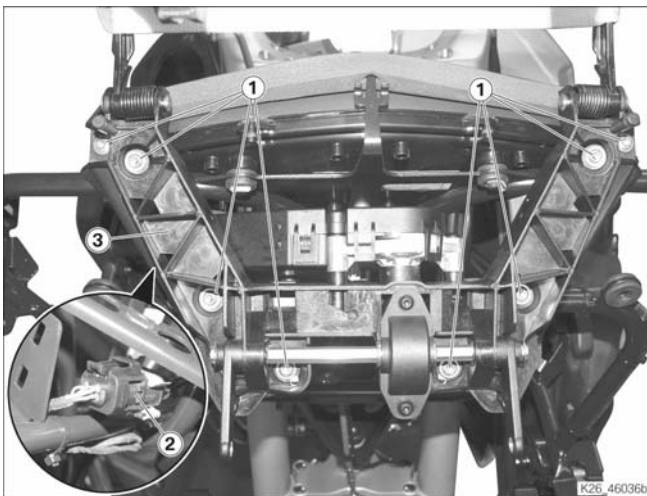
▷ **Installing right loudspeaker box**



- Clip plug (3) into the holder.
- Seat loudspeaker box (2) in the holder.
- Install screws (1).



▷ **Installing adjustable windscreen holder**

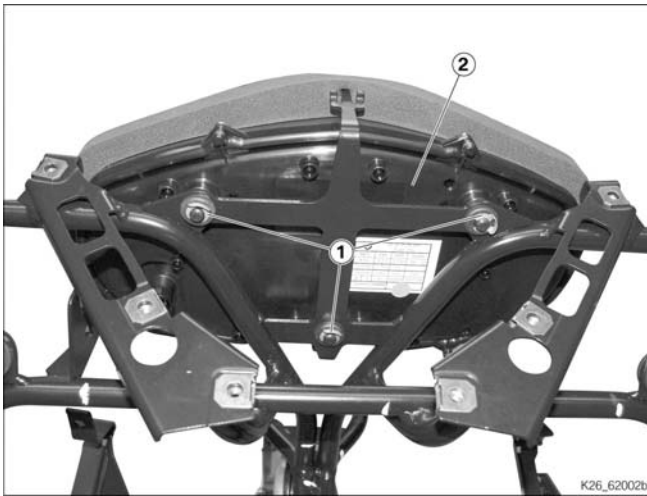


- Place windscreen holder (3) together with drive unit in position.
- Connect plug (2).
- Install screws (1).



▷ **Installing instrument panel (fairing bracket installed)**

- Place instrument panel (2) in position.

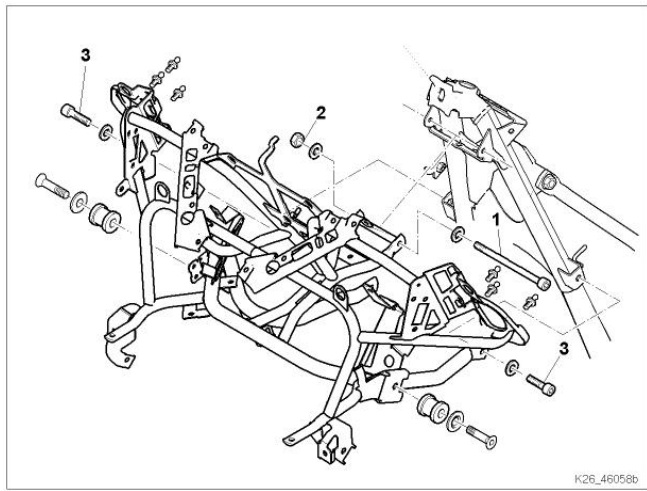



- Install clips (1).



(-) Installing fairing bracket

- Place fairing bracket in position on frame.
- Install quick-release axle (1) with nut (2).



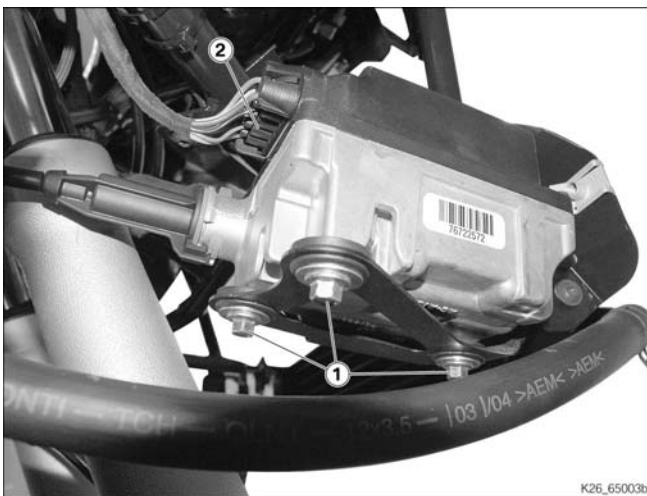
 Tightening torques		
Fairing bracket to front frame, M6 x 100, Replace nut	9 Nm	

- Install screws (3) on left and right.

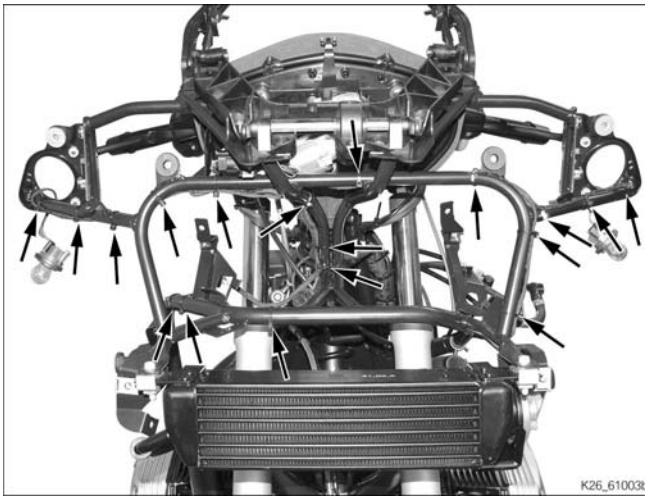
Variant, cruise control

► Installing control unit for cruise control

- Open the cable tie at the control unit.
- Connect plug (2).
- Install screws (1).



► Securing wiring harness at front



⚠ Attention

Nature: Incorrectly routed electrical cables can cause cable breaks/open circuits and chafing.

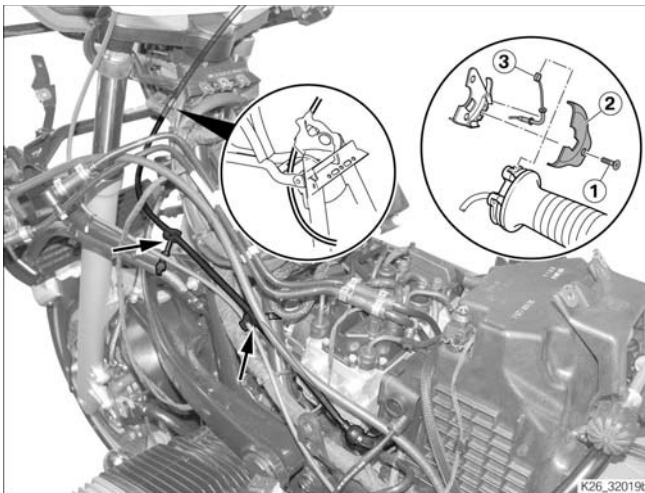
Avoidance: Always take care to route cables correctly.

Note the number of cable ties, and where the individual ties are installed.

- Thread the cable over the fairing bracket, making sure that cable routing is correct.
- Secure the wiring harness to the fairing bracket with cable ties (arrows).



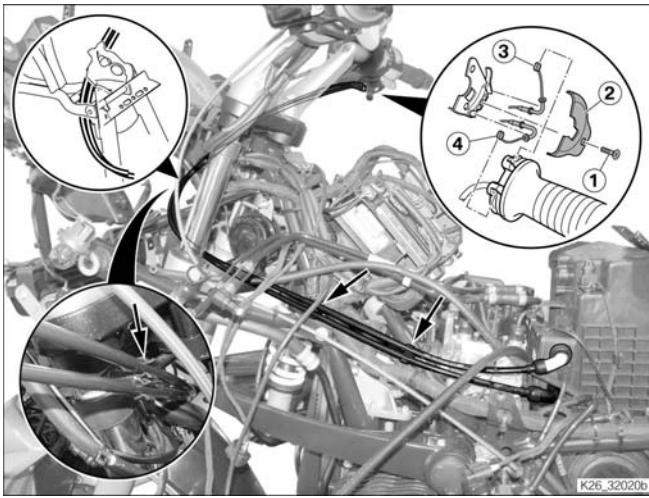
- Secure cable tie (3).
- Secure retaining clip (2) on fairing bracket.
- Secure retaining clip (1) on left and right of fairing bracket.



- Clip Bowden cable (3) into retainers (arrows) on frame.
- Engage Bowden cable (3) on the throttle twistgrip.
- Fit cover (2) on throttle twistgrip and secure with screw (1).

Variant, cruise control

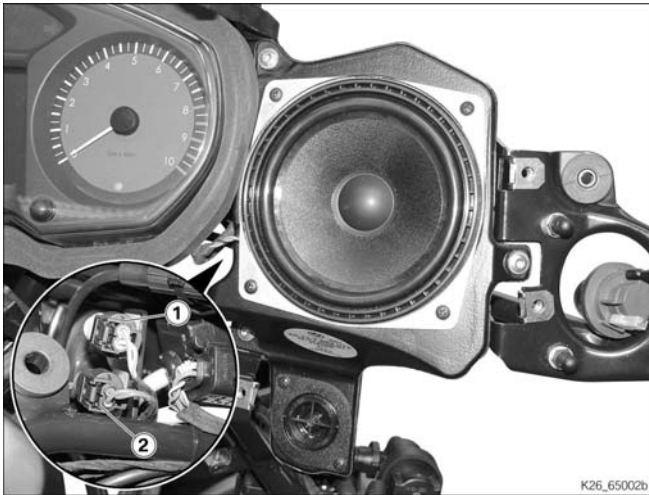
- Clip Bowden cables (3) and (4) into retainers on frame.
- Engage Bowden cables (3) and (4) on the throttle twistgrip.
- Fit cover (2) on throttle twistgrip and secure with screw (1).



Variant, Radio with CD player

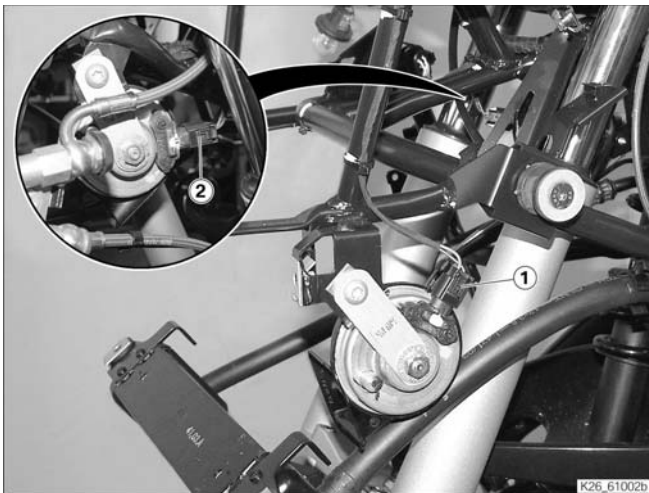
► **Securing left and right speakers**

- Secure plug (2).
- Secure plug (1).

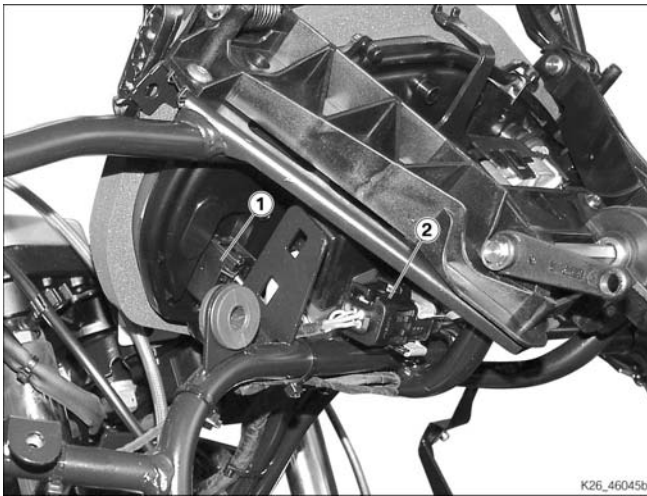


► **Securing horn**

- Secure plugs (1) and (2).




- Connect plugs (1) and (2).



(-) Installing oil cooler

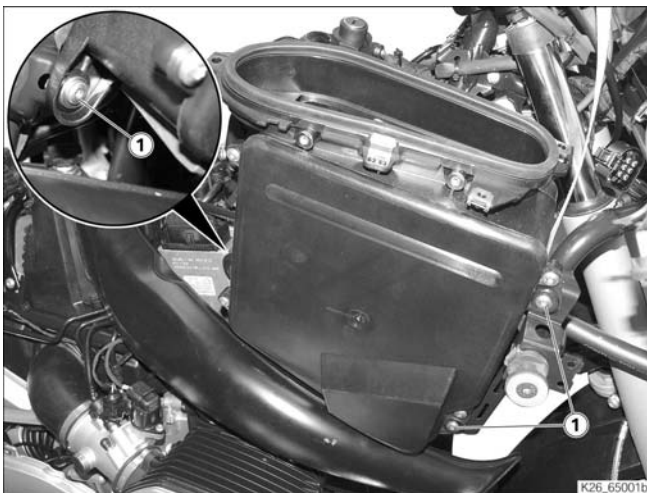
- Hold oil cooler (2) in position at the fairing bracket.
- Install screws (1).



 Tightening torques		
Oil cooler to fairing bracket, M6 x 30	8 Nm	

(-) Installing stowage compartment

- Place the stowage compartment in position and align it correctly.
- Install screws (1).



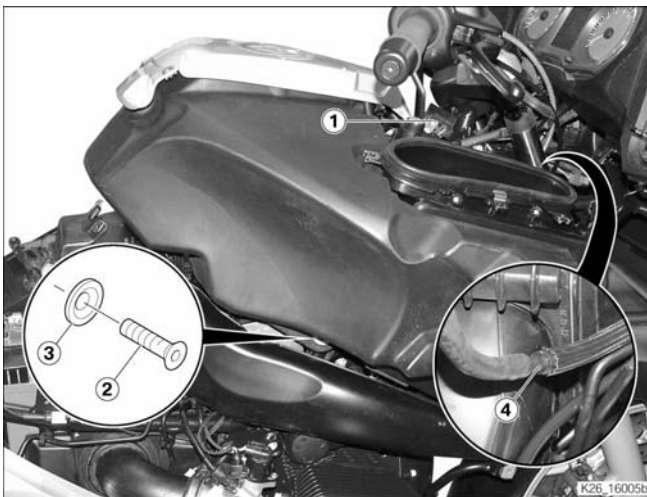
Variant, Radio with CD player


- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).



(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.



 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.


(-) Installing entire top section of fairing

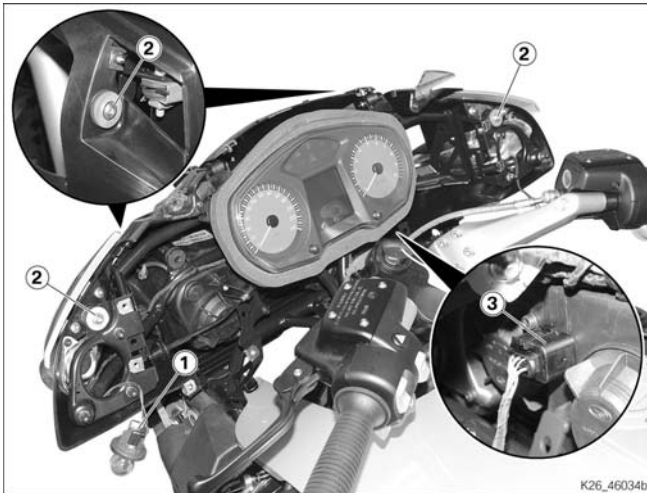
- Carefully place upper section of fairing in position.

Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



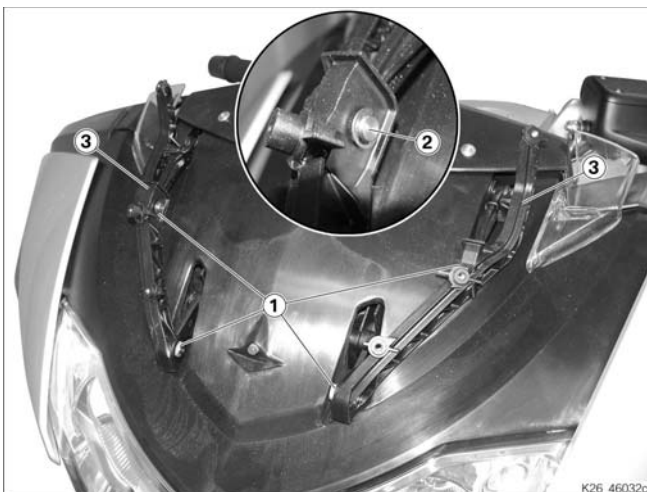
 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	



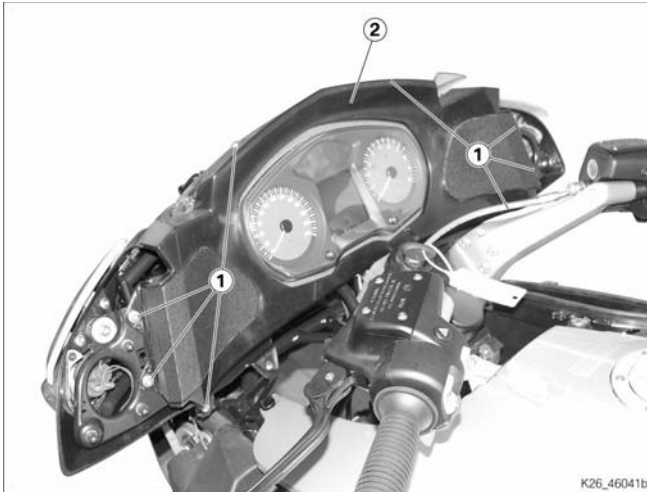
- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.

(-) Installing bracket for windscreen

- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).

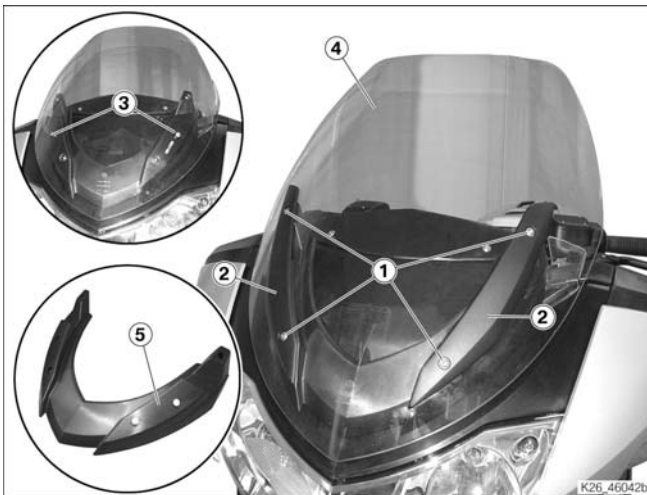


(-) Installing inner trim for instruments




- Place inner trim (2) in position.
- Install screws (1).

(-) Installing the windscreen



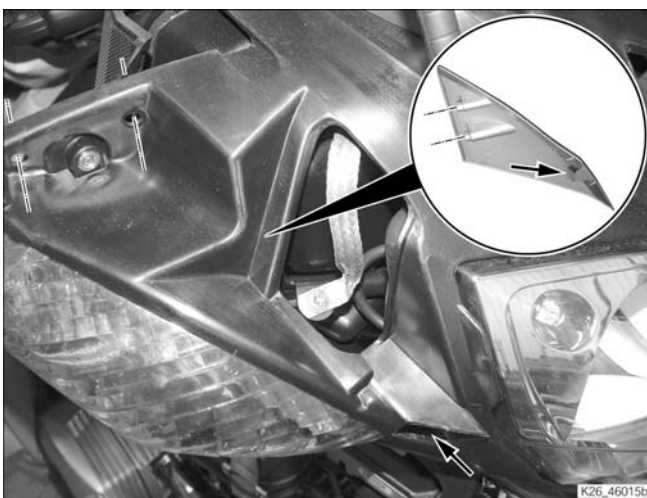
- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.

 Tightening torques		
Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	

- Fit left and right trim panels (2) and secure with screws (1).

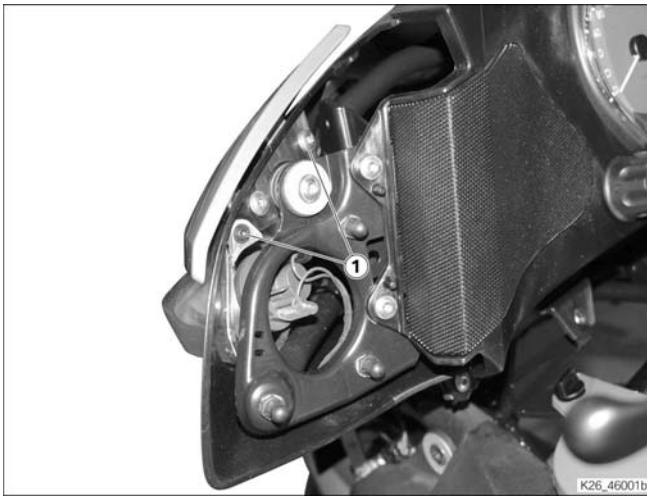
Variant, Radio with CD player

(-) Installing both left and right mirror trim panels



- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.

- Install screws (1).



(-) Installing mirrors

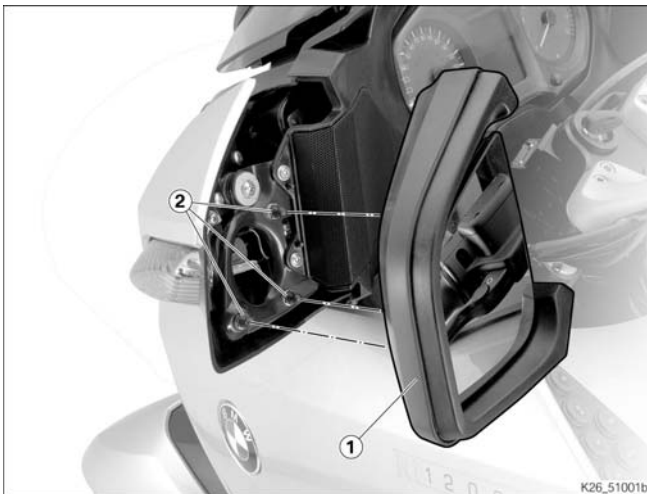


Attention

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



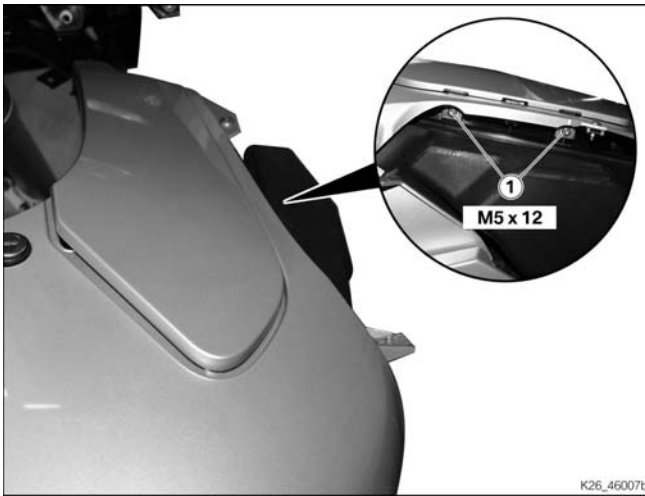
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



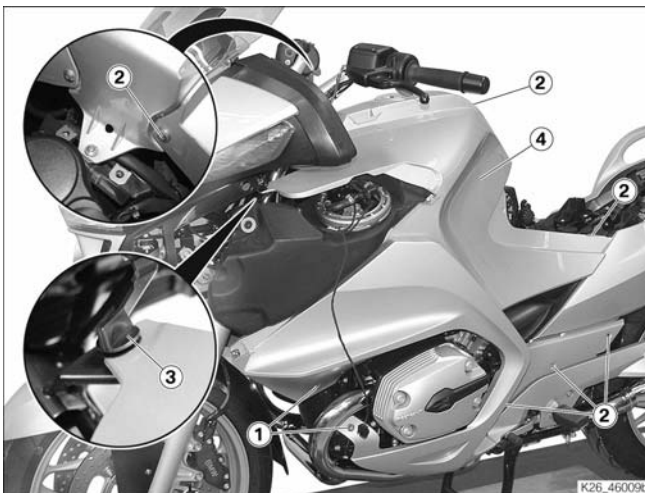
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

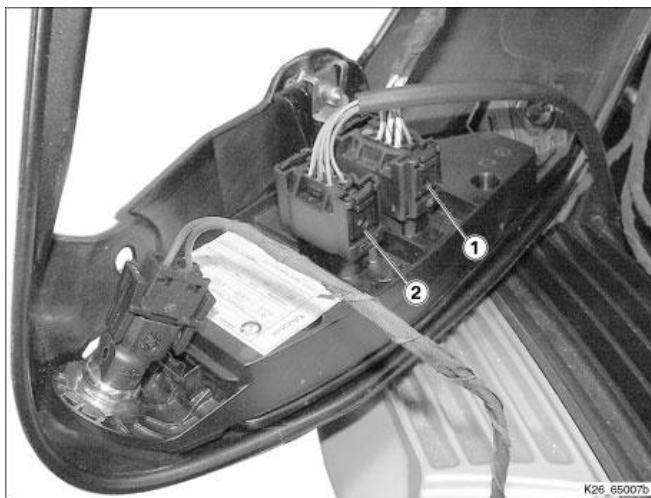
- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **46 63 200 Replacing centre cover of fuel tank**

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.

Variant, Seat heating



- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating



- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



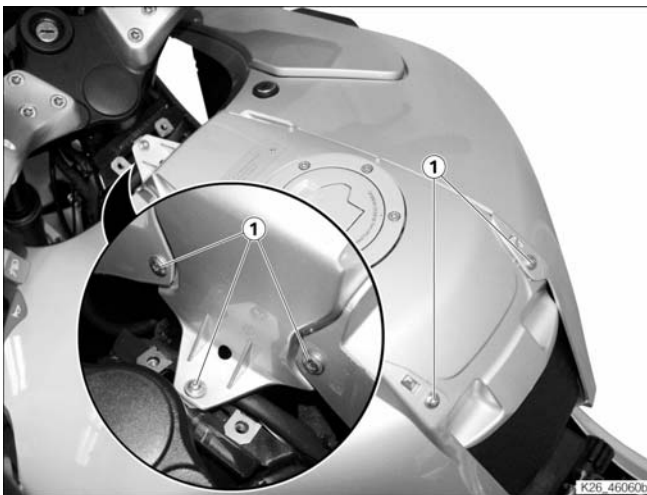
(-) Removing fuel tank cover

- Remove screws (1).
- Close off fuel filler pipe in fuel tank.
- Remove fuel tank cover.

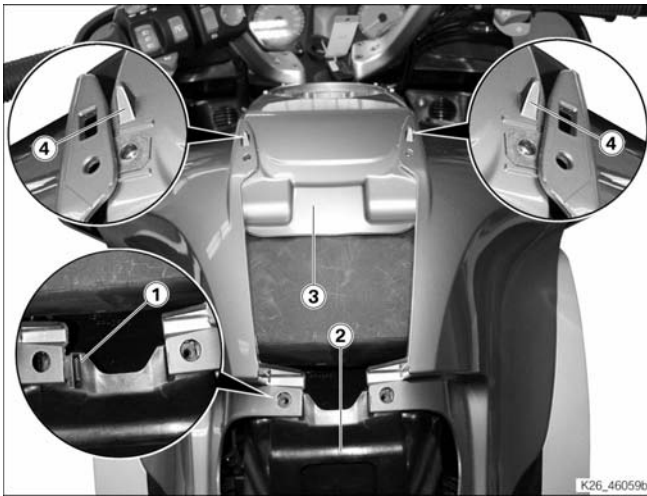


(-) Removing centre fuel-tank cover

- Remove screws (1).



- Disengage locating lug of left-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Disengage locating lug of right-hand tank cover from groove (1) of seat bracket (2).
- Disengage middle tank cover (3) by carefully pressing



it down, noting panel lug (4).

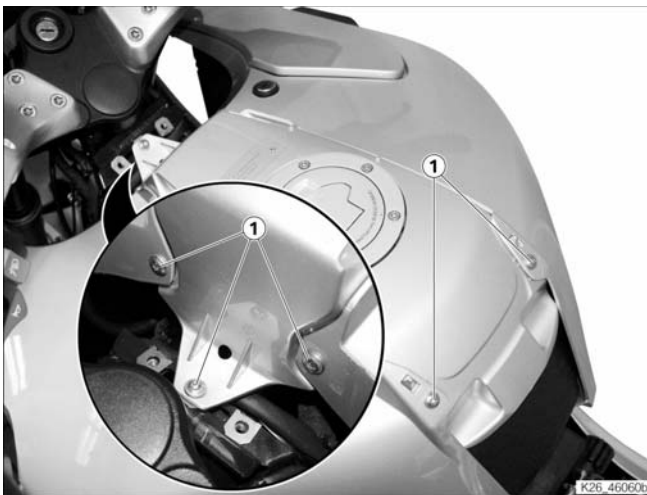
- Pull middle tank cover (3) in forward direction and remove.

(-) Installing middle tank cover



- Fit middle tank cover (3) aligned in forward direction.
- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the right-hand tank cover in groove (1) of seat bracket (2).
- Engage middle tank cover (3) by carefully pressing it down, noting panel lug (4).
- Engage the locating lug of the left-hand tank cover in groove (1) of seat bracket (2).

- Install screws (1).



(-) Installing fuel tank cover

- Remove cap from fuel filler neck.
- Make sure that the seal is seated correctly under the fuel filler neck.
- Place fuel tank cover in position, fit screw (1) and evenly tighten crosswise.



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **46 63 204 Replacing left cover of fuel tank**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing left-hand trim panel

- Remove screws (1).

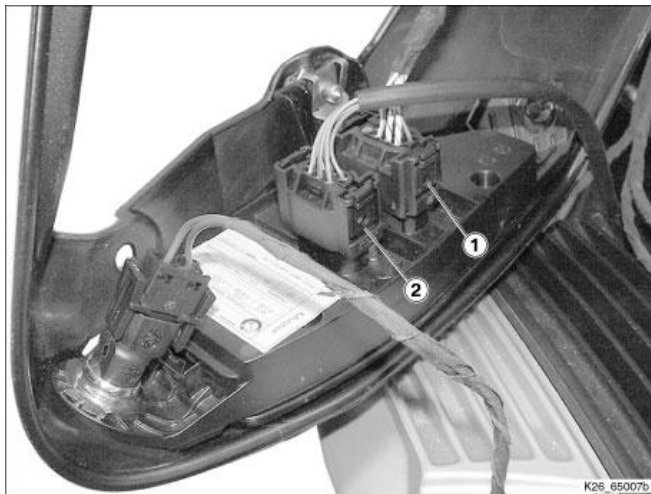


- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

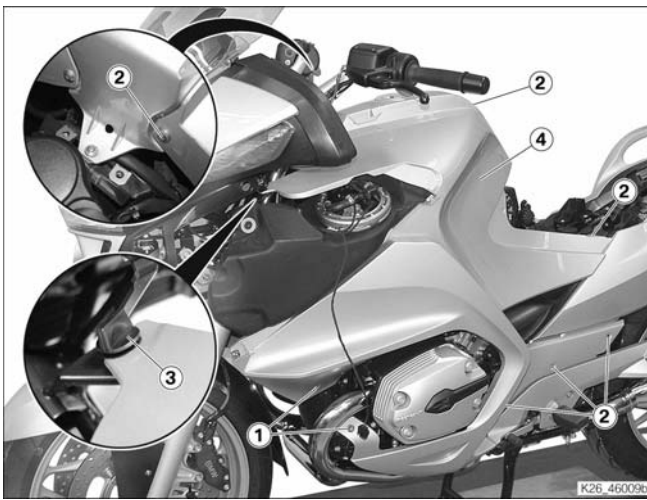
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing entire left side tank cover

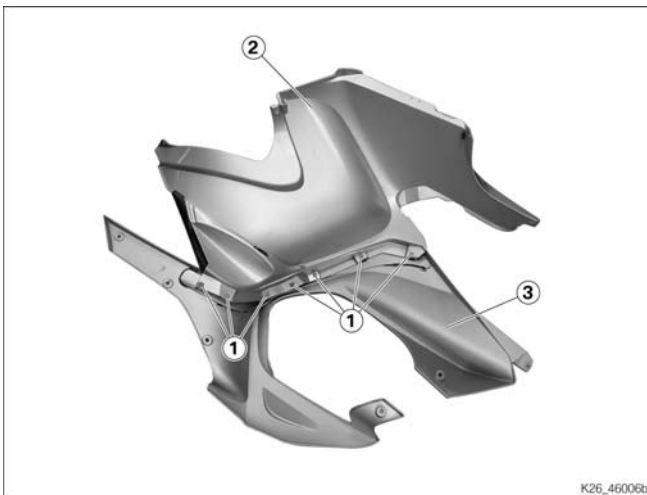
- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



(-) Replacing left fuel-tank cover

► Removing fuel-tank cover from bottom section of fairing

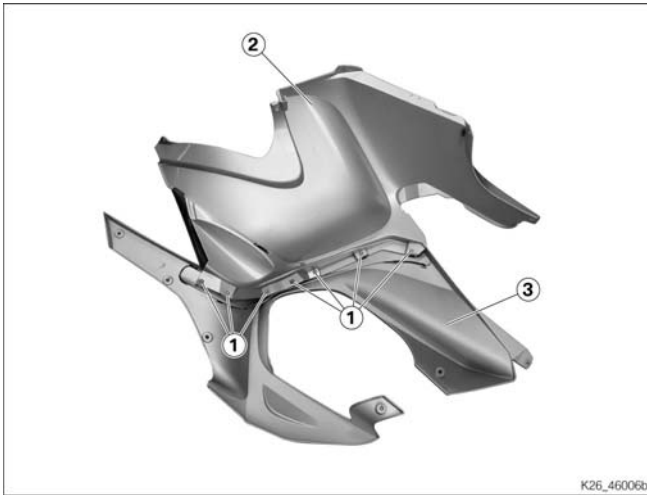
- Remove screws (1).
- Remove fuel-tank cover (2) from bottom section of fairing (3).



- ◀
- Remove cover of throttle-valve stub (1).
 - Remove reusable small items and install them on the new fuel-tank cover.

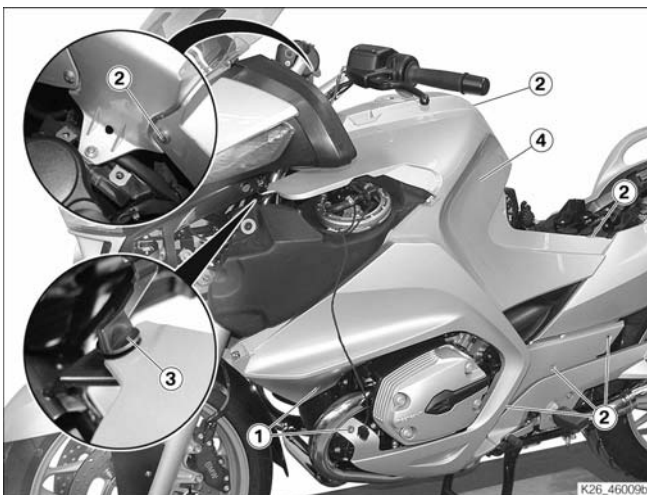


- Install cover for throttle-valve stub (1), noting the guides (2).



► **Securing fuel-tank cover to bottom section of fairing**

- Position fuel-tank cover (2) on fairing bottom section (3), noting the cover for the throttle-valve stub.
- Install screws (1).



◄ **(-) Installing entire left side tank cover**

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing tank rail

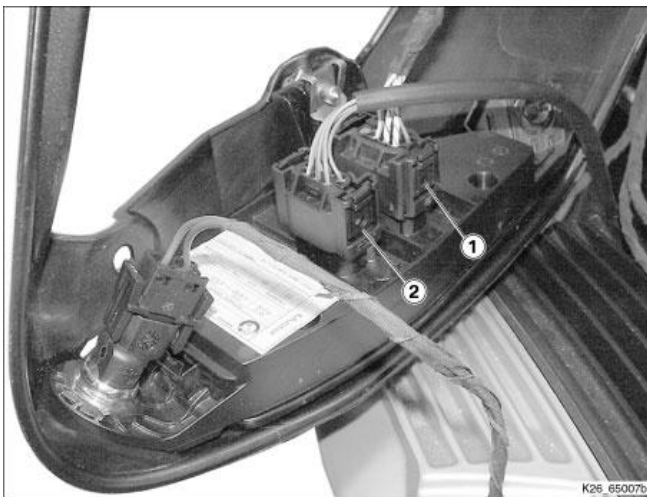
- Fit tank rail.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **46 63 208 Replacing right cover of fuel tank**

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

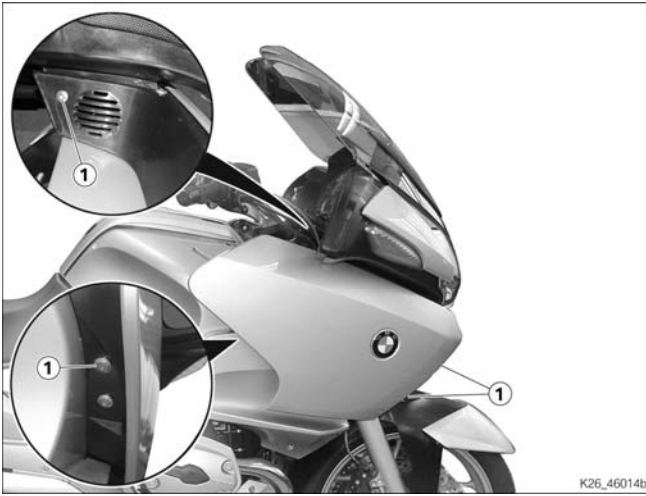


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



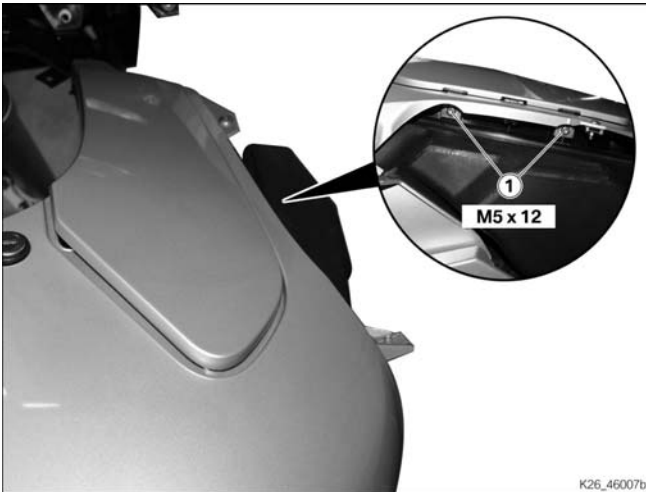
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Placing right fuel-tank cover

► Removing fuel-tank cover from bottom section of fairing

- Remove screws (1).
- Remove fuel-tank cover (2) from bottom section of fairing (3).

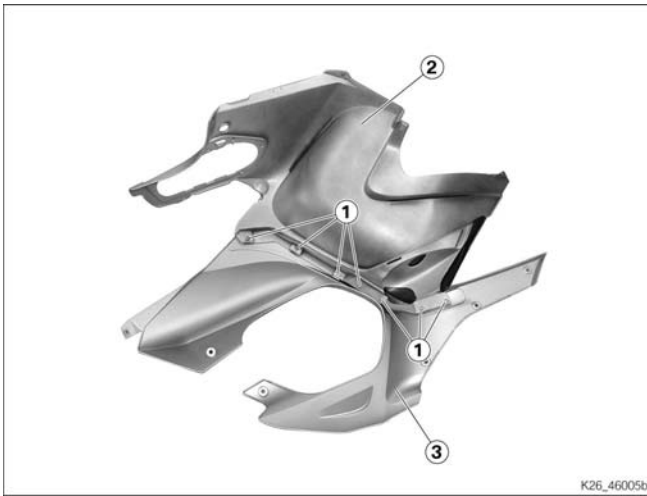


- Remove cover of throttle-valve stub (1).
- Remove reusable small items and install them on the new fuel-tank cover.
- Install cover for throttle-valve stub (1), noting the guides (2).



► Securing fuel-tank cover to bottom section of fairing

- Position fuel-tank cover (2) on fairing bottom section



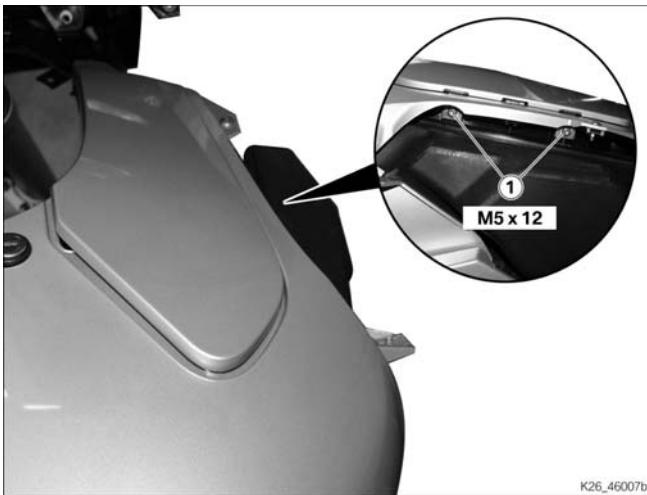
- (3), noting the cover for the throttle-valve stub.
- Install screws (1).

◀
(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **46 63 249 Replacing left bottom section of fairing**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing left-hand trim panel

- Remove screws (1).

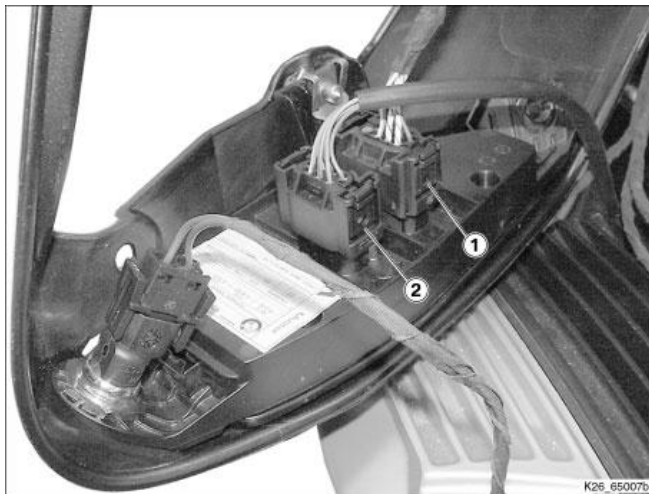


- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

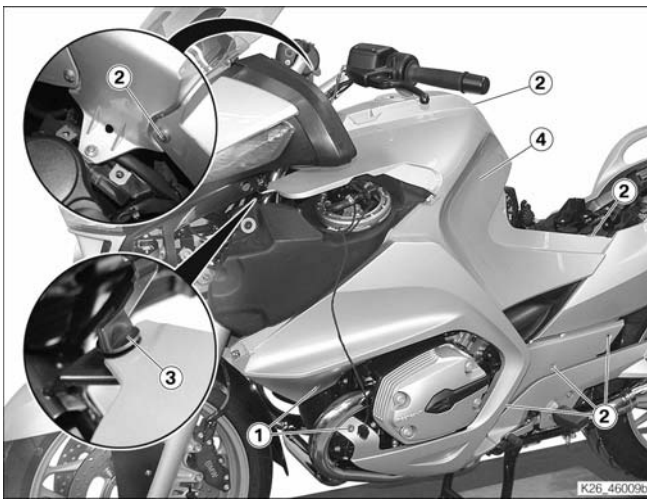
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing entire left side tank cover

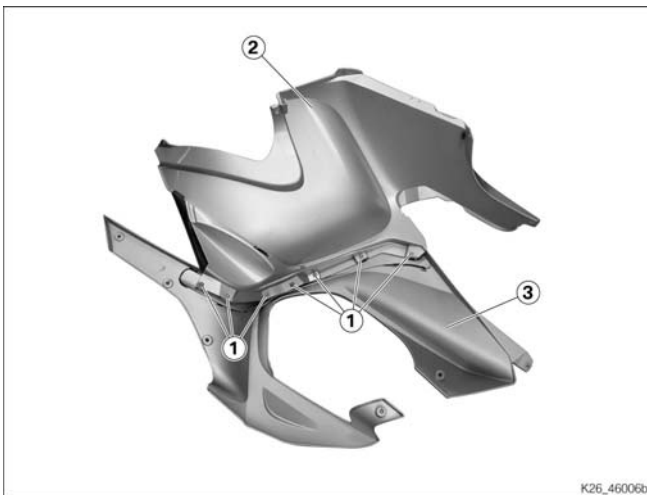
- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



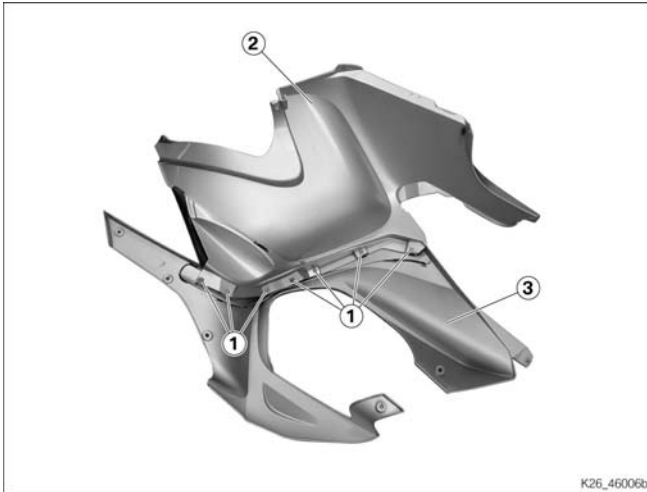
(-) Replacing left fairing bottom panel

► Removing fuel-tank cover from bottom section of fairing

- Remove screws (1).
- Remove fuel-tank cover (2) from bottom section of fairing (3).



- ◄
- Remove reusable small items and install them on the new bottom fairing panel.
- Securing fuel-tank cover to bottom section of

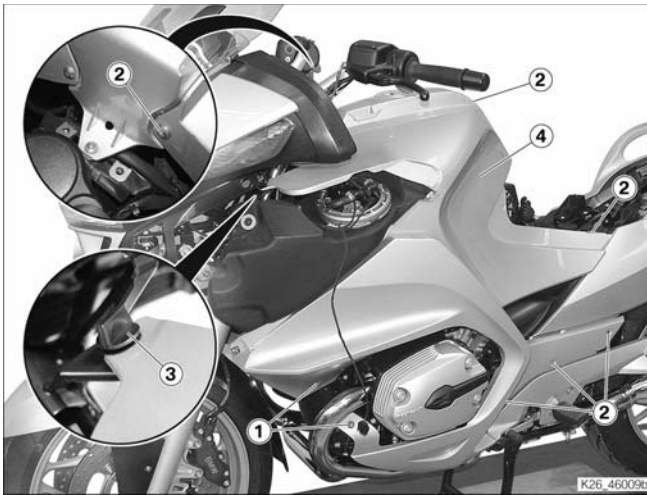


fairing

- Position fuel-tank cover (2) on fairing bottom section (3), noting the cover for the throttle-valve stub.
- Install screws (1).



(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing tank rail

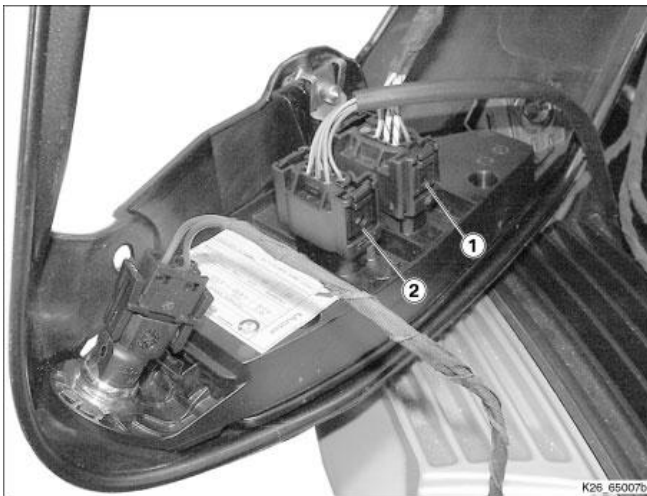


- Fit tank rail.
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



K26_65007b

- Connect plug (1) to the socket.



K26_46017b

- Hold the panel in position.
- Install screws (1).



K26_46013b

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **46 63 250 Replacing right bottom section of fairing**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

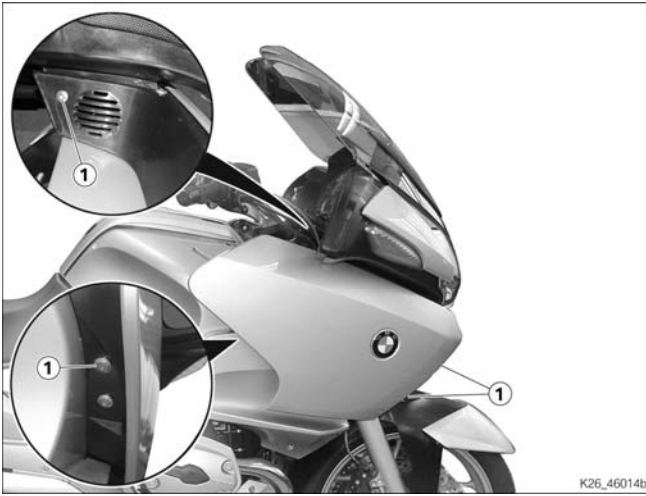


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



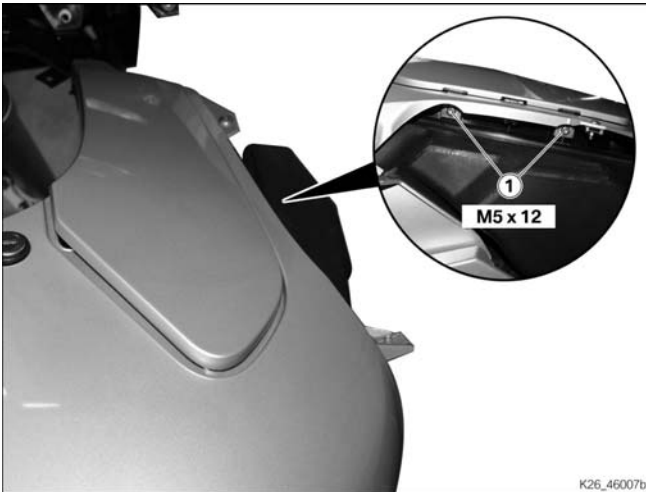
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Replacing right bottom fairing panel

► Removing fuel-tank cover from bottom section of fairing

- Remove screws (1).
- Remove fuel-tank cover (2) from bottom section of fairing (3).



- Remove reusable small items and install them on the new bottom fairing panel.

► Securing fuel-tank cover to bottom section of fairing

- Position fuel-tank cover (2) on fairing bottom section (3), noting the cover for the throttle-valve stub.
- Install screws (1).



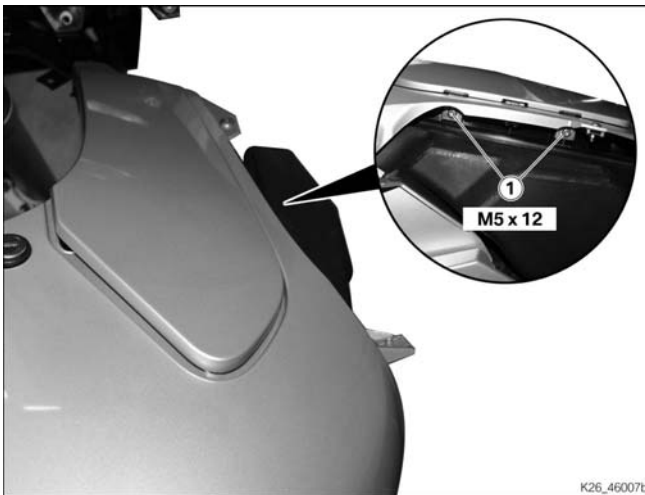


(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing tank rail



- Fit tank rail.
- Install screws (1).

(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **46 63 261 Replacing drive unit for electrically adjustable windscreen**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing left-hand trim panel

- Remove screws (1).

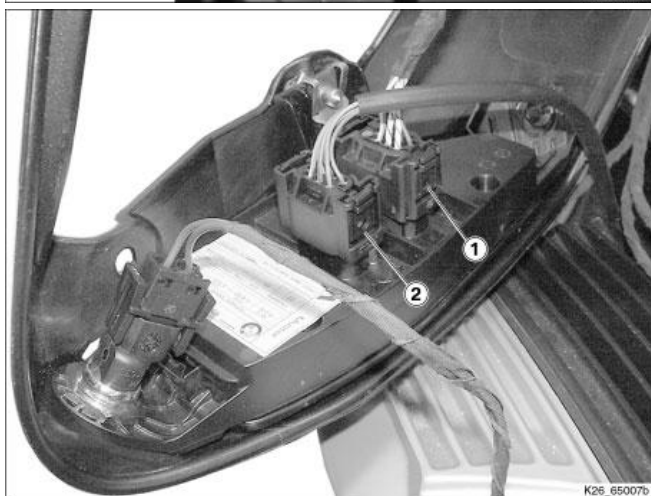


- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

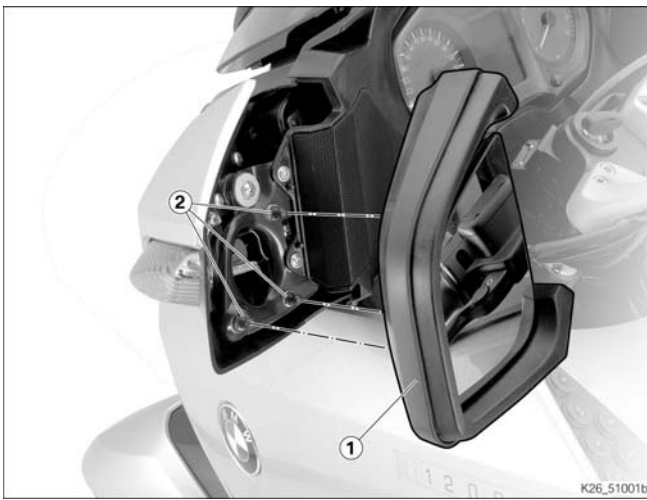
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing mirror

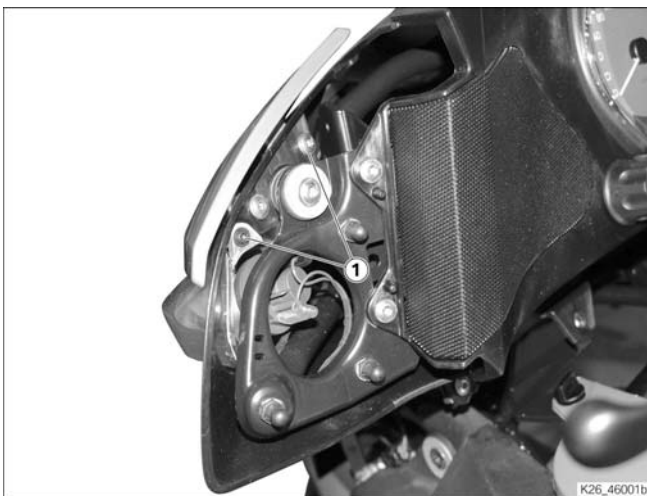
- Detach mirror (1).



Variant, not for Radio with CD player

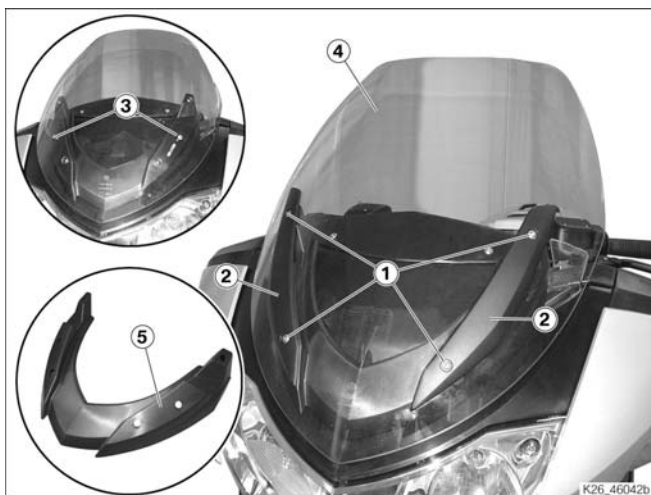
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



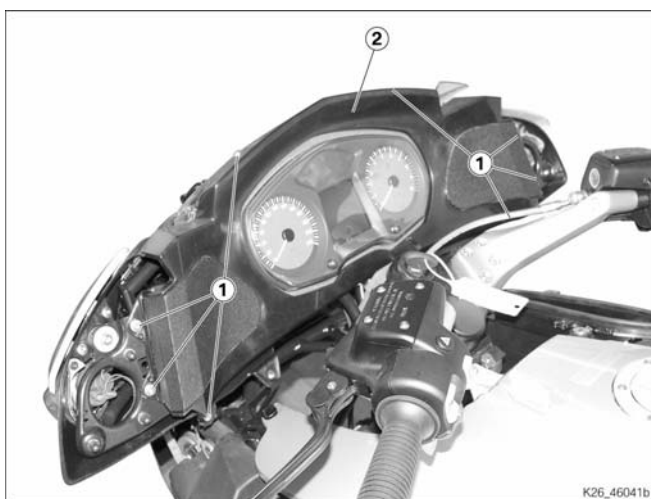
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).



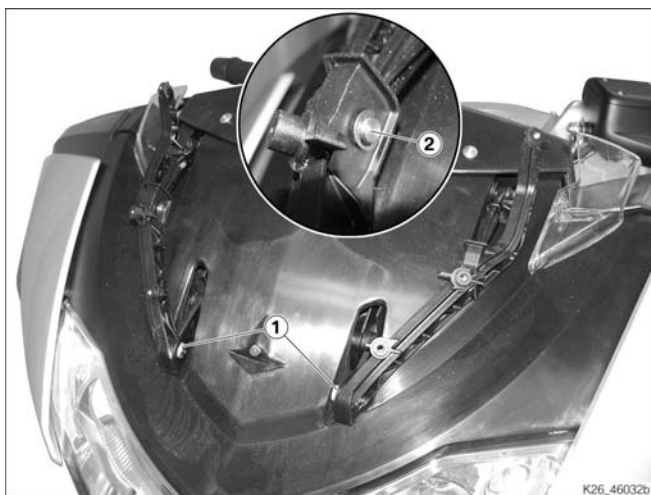
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Removing inner trim for instruments



- Remove screws (1).
- Remove inner trim (2).

(-) Partially removing holder for windscreen



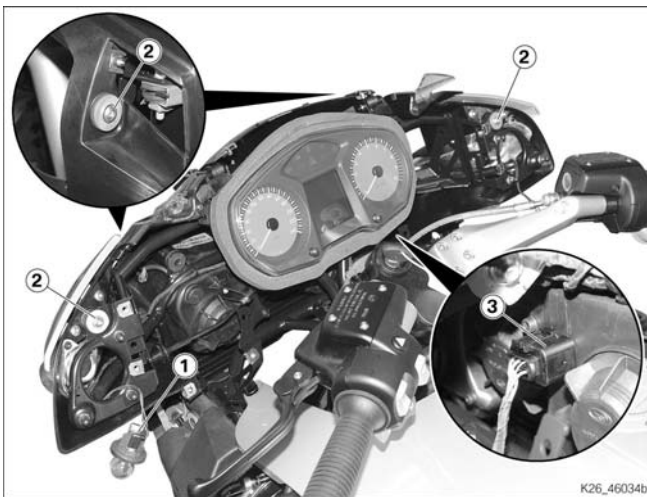
- Remove clips (1).
- Press out pin (2).

- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

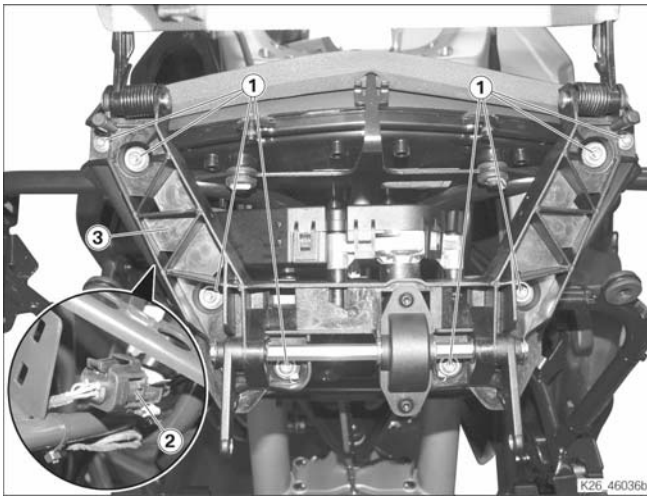
- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

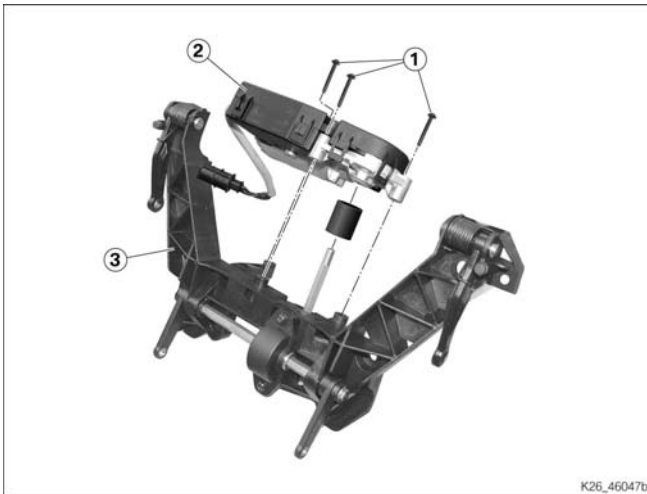
(-) Removing adjustable windscreen holder

- Remove screws (1).
- Disconnect plug (2).
- Remove windscreen holder (3) together with drive unit.



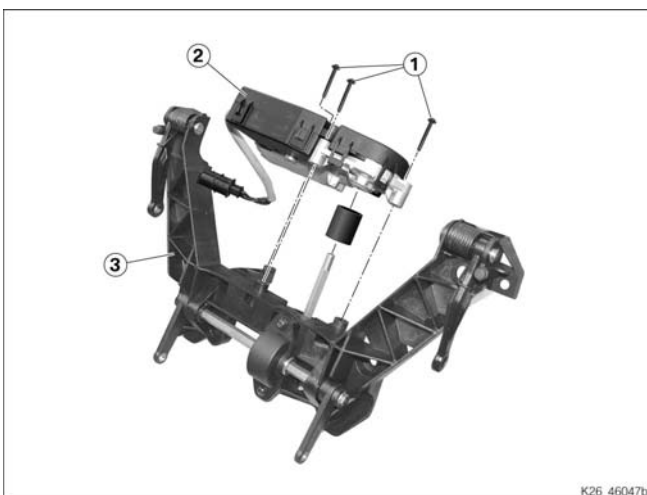
(-) Removing drive for electrically adjustable windscreen


- Remove screws (1).
- Remove drive unit (2) together with drive shaft from windscreen holder (3).



(-) Installing drive for electrically adjustable windscreen

- Lubricate drive worm.

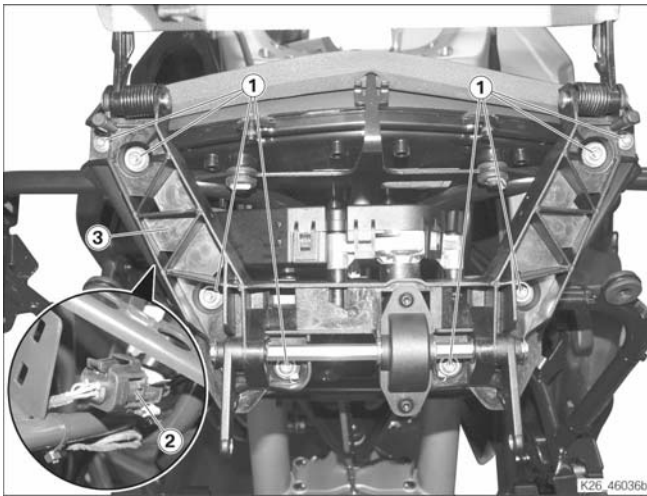


 Consumables/lubricants		
Optimoly MP 3	High-performance lubricating grease	07 55 9 062 476

- Install drive unit (2) together with drive shaft in windscreen holder (3).
- Install drive unit (2) and secure with screws (1).

(-) Installing adjustable windscreen holder

- Place windscreen holder (3) together with drive unit in position.
- Connect plug (2).



- Install screws (1).


(-) Installing entire top section of fairing

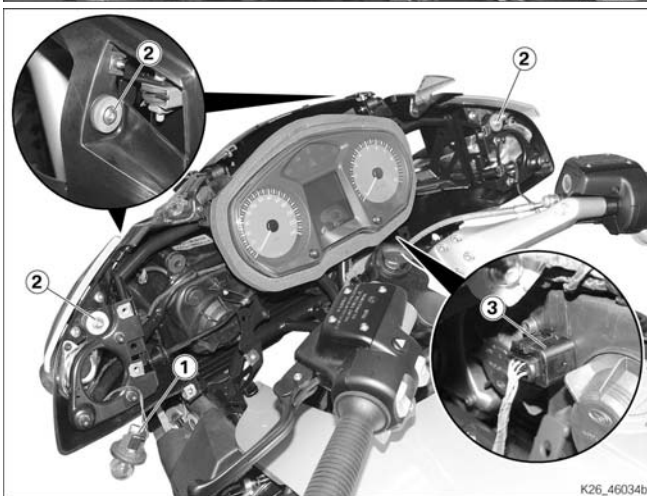
- Carefully place upper section of fairing in position.

Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	



- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.

(-) Preparing the motorcycle for CIP (coding, individualisation and programming)

Precondition

- Engine switched off.
- Prop the motorcycle in such a way that it cannot move while programming/coding is in progress.

- Motorcycle's battery is fully charged.



Note

Do not attempt to perform work of any other kind on the motorcycle while programming/coding are in progress.

- Switch off all electrical consumers.



Attention

Nature: Programming/coding is aborted if the voltage in the on-board system drops below 12.6 volts.

Avoidance: Connect the charger to the battery.

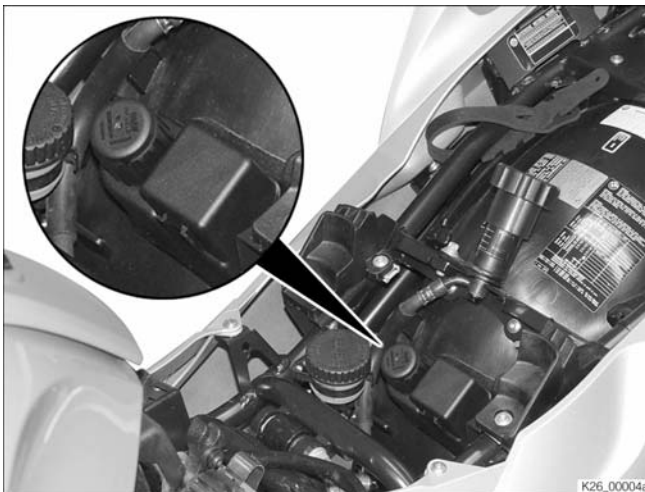
- Connect charger (No. 61 1 581) with cables (No. 61 1 582) to the battery. While programming/coding is in progress, **do not** connect or disconnect the charger.

► Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



- Perform diagnosis. Rectify faults, if found, **before** starting programming/coding.
- Start programming/coding with the CIP program and follow the instructions issued by the BMW Motorrad diagnostic system.

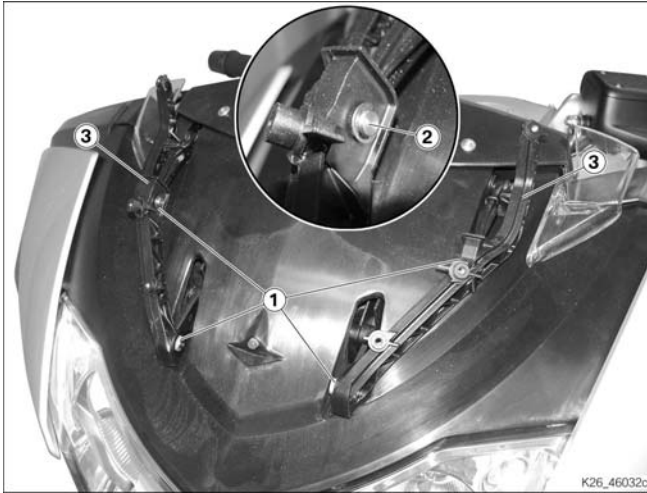
(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw

the cap onto the diagnosis plug.

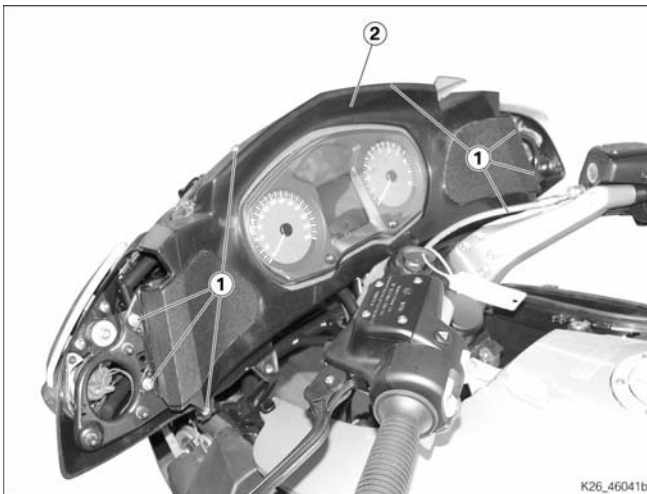
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing bracket for windscreen



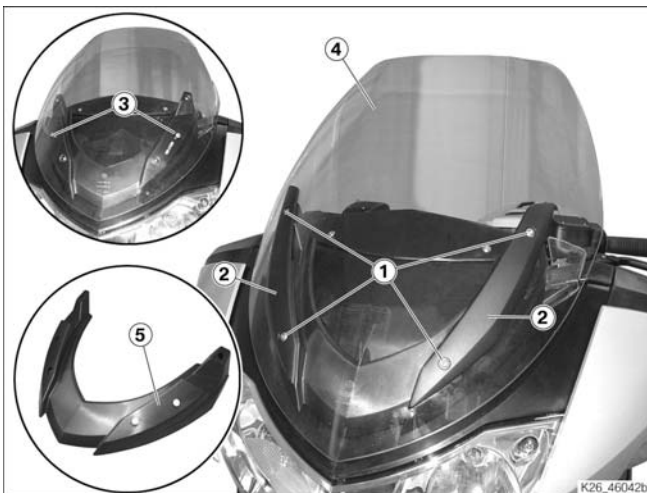
- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).

(-) Installing inner trim for instruments




- Place inner trim (2) in position.
- Install screws (1).

(-) Installing the windscreen



- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.

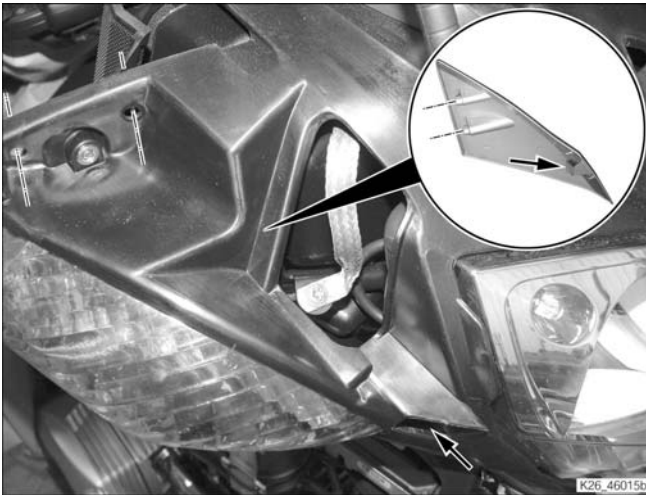
 Tightening torques		
Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	

- Fit left and right trim panels (2) and secure with screws (1).

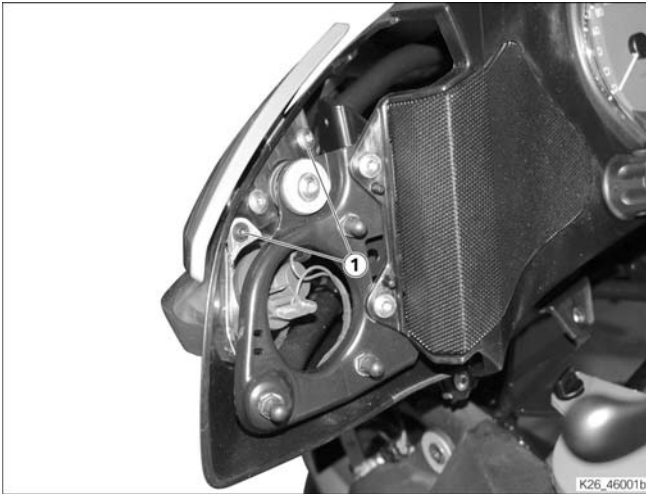
Variant, not for Radio with CD player

(-) Installing both left and right mirror trim panels

- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



- Install screws (1).



(-) Installing mirrors

Attention

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



(-) Installing right-hand trim panel

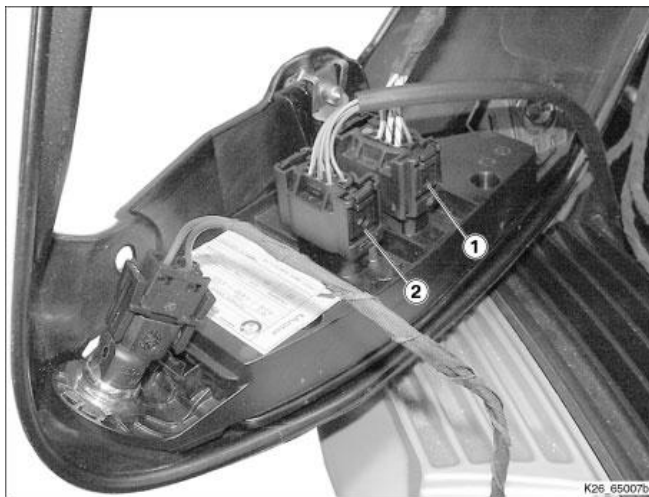
- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



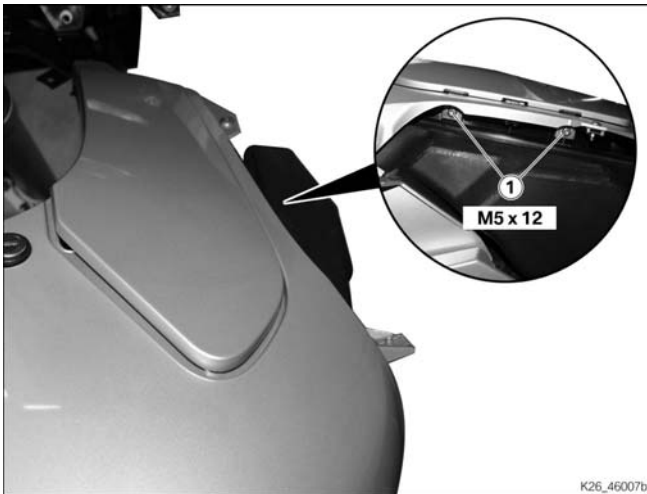
 **46 63 317 Replacing front right storage compartment lid**

(-) Removing right-hand trim panel



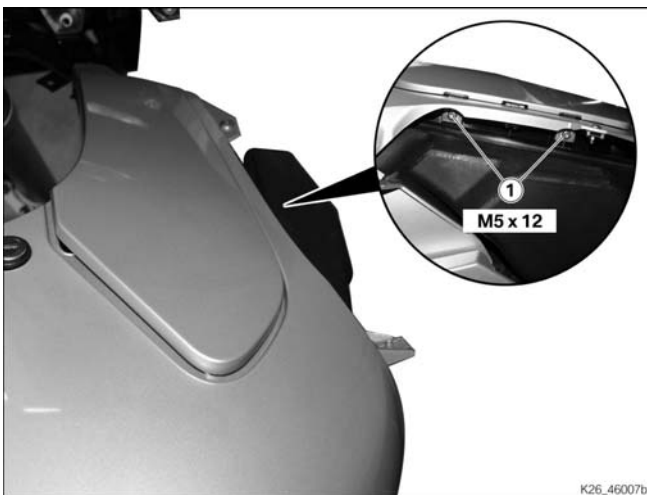
- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid



- Remove screws (1).
- Remove storage compartment lid.

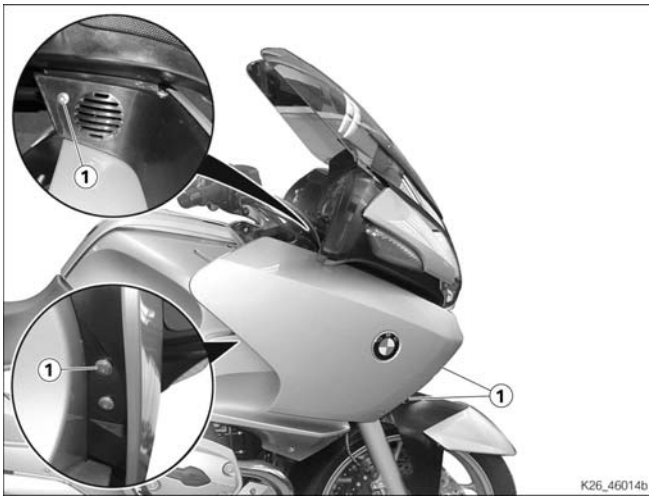
(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel

- Hold the panel in position.



- Install screws (1).

 **46 63 322 Replacing right tail trimmer panel**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

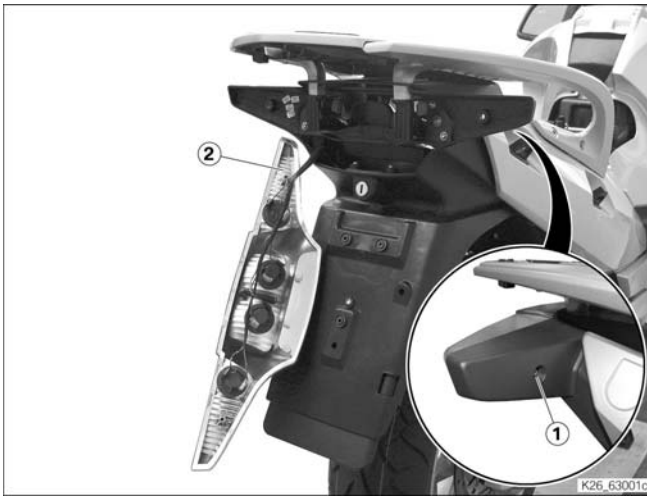


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

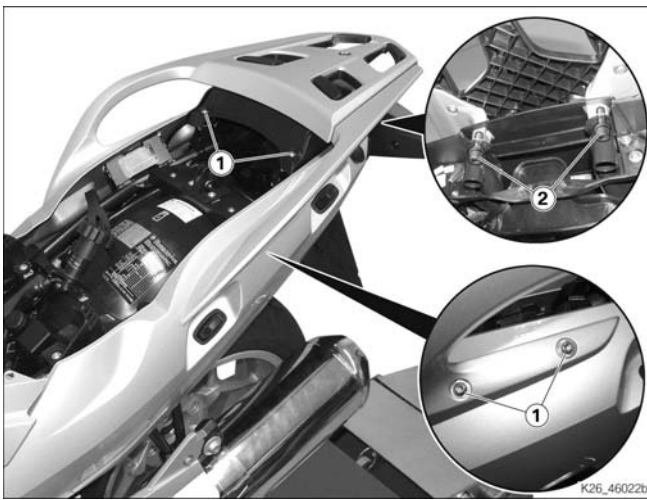
(-) Removing rear light unit

- Remove screws (1).
- Allow rear light unit (2) to dangle from the cable.



(-) Removing luggage carrier

- Remove screws (1).
- Remove screws (2) on rear left and right.
- Remove the luggage carrier.



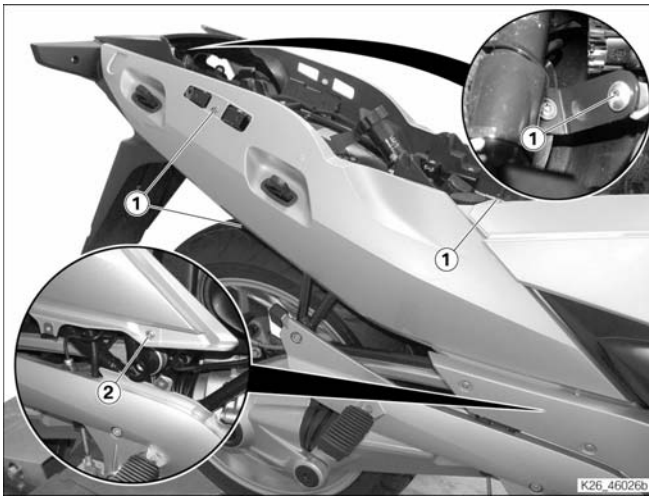
(-) Replacing rear trim panel, right

► Removing rear right trim panel

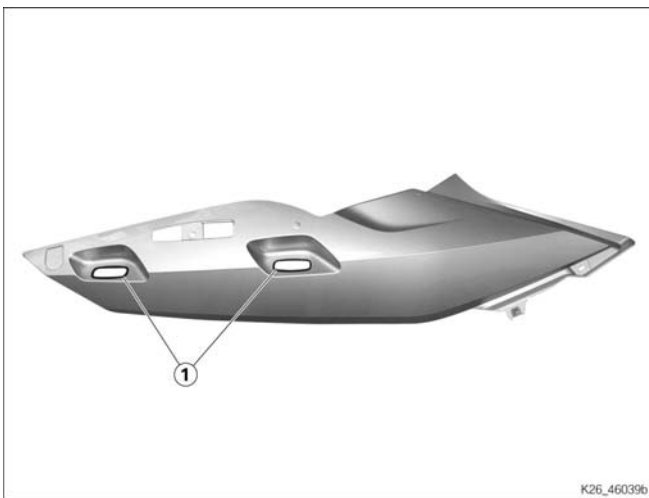
- Undo screws (1) holding bottom section of fairing.
- Remove screw (2).



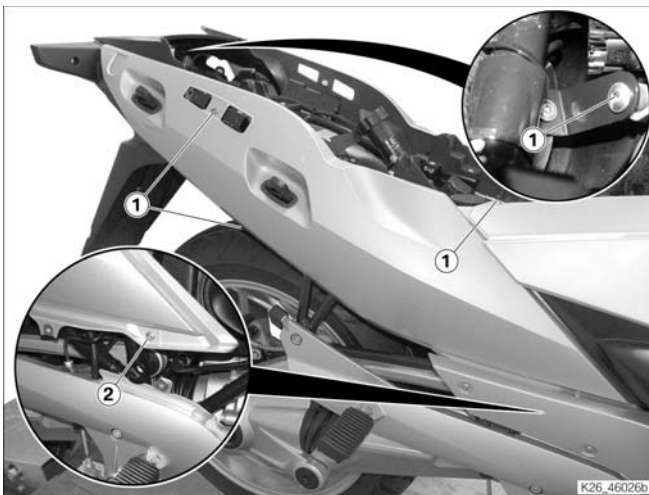
- Carefully bend back the bottom section of the fairing until screw (2) is accessible.
- Remove screw (2).
- Remove screws (1).



- Remove the tail trimmer from the motorcycle.



- Remove rubber grommets (1) for the case carrier.
- Remove reusable small items and install them on the new rear trim panel.
- Install rubber grommets (1) for the case carrier.



► **Installing rear trim panel on right**

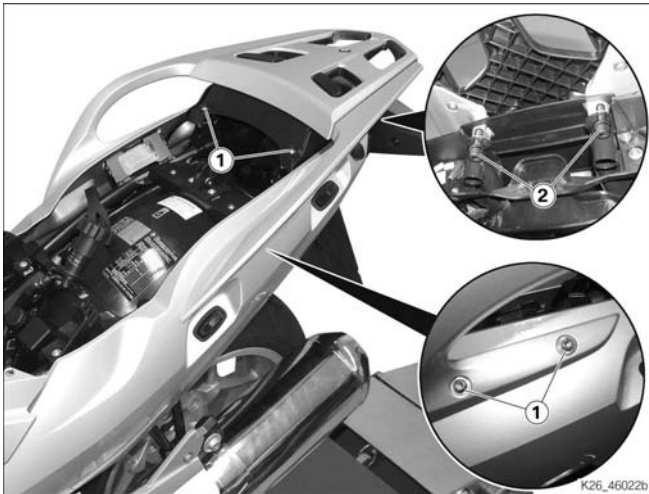
- Carefully bend back the bottom section of the fairing, just far enough to allow screw (2) to be installed.
- Install screw (2).
- Install screws (1).


- Install screw (1).
- Fit screws (2) at bottom section of fairing.




(-) Installing luggage carrier

- Place luggage rack in position.
- Install new screws (1).



 Tightening torques		
Luggage rack, centre to rear section of frame, M6 x 35, Replace screws Micro-encapsulated	8 Nm	

- Install new screws (2) at rear left and right.

 Tightening torques		
Luggage rack from below to rear section of frame, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

(-) Securing rear light unit

- Hold the rear light unit (2) in position.
- Install screws (1).



(-) Installing seat



- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **46 63 324 Replacing left tail trimmer panel**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

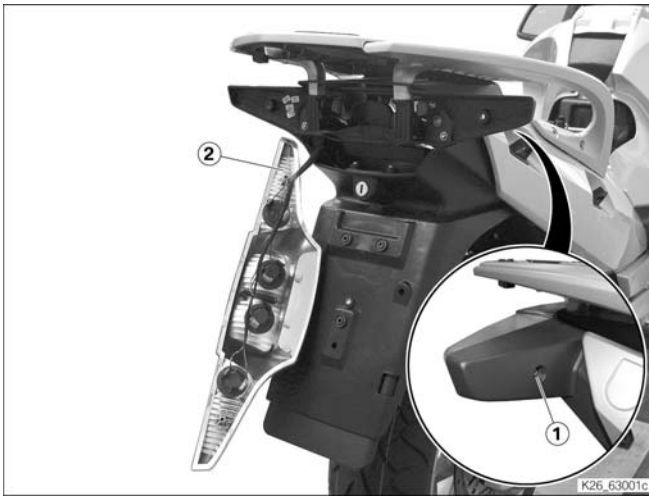


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

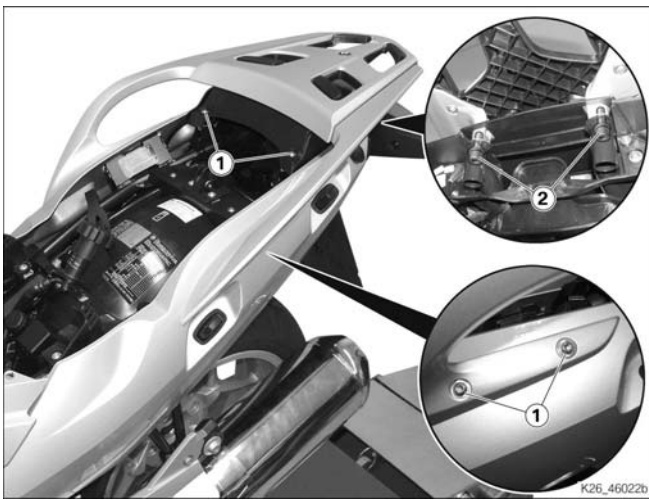
(-) Removing rear light unit

- Remove screws (1).
- Allow rear light unit (2) to dangle from the cable.



(-) Removing luggage carrier

- Remove screws (1).
- Remove screws (2) on rear left and right.
- Remove the luggage carrier.



(-) Replacing rear trim panel, left

► Removing left rear trim panel

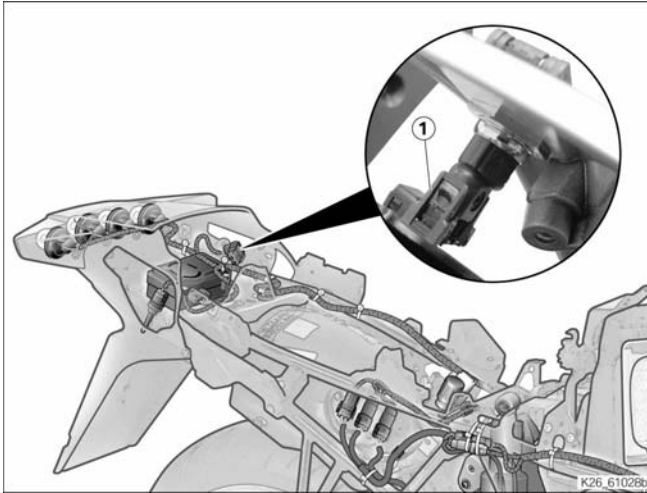
- Undo screws (1) holding bottom section of fairing.
- Remove screw (2).



- Carefully bend back the bottom section of the fairing until screw (3) is accessible.
- Remove screw (3).
- Remove screws (1).



- Remove the tail finisher from the motorcycle, noting the flat nuts.



Variant, 2nd socket outlet

- Disconnect plug (1) from socket.

- Remove the tail trimmer from the motorcycle.



Variant, 2nd socket outlet

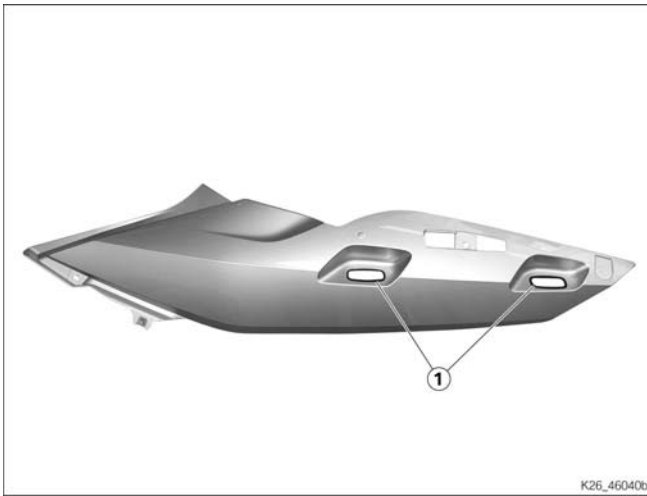
► Removing on-board socket

Variant, 2nd socket outlet

- Remove nut (1).
- Remove on-board socket (2).



- Remove rubber grommets (1) for the case carrier.
- Remove reusable small items and install them on the new rear trim panel.



- Install rubber grommets (1) for the case carrier.

Variant, 2nd socket outlet

► **Installing on-board socket**

Variant, 2nd socket outlet

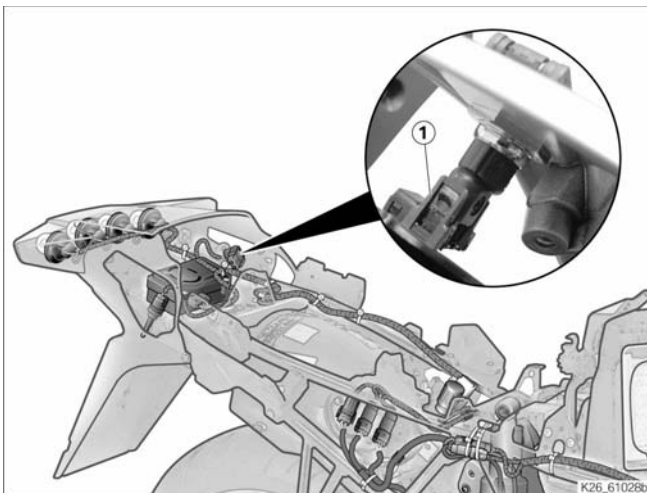
- Install on-board socket (2).
- Install nut (1).



► **Installing rear trim panel on left**

Variant, 2nd socket outlet

- Connect plug (1) to the socket.



- Seat the rear trim panel on the motorcycle.
- Carefully bend back the bottom section of the fairing, just far enough to allow screw (3) to be installed.



- Install screw (3).
- Install screws (1).




- Install screw (2).
- Fit screws (1) at bottom section of fairing.




(-) Installing luggage carrier

- Place luggage rack in position.
- Install new screws (1).

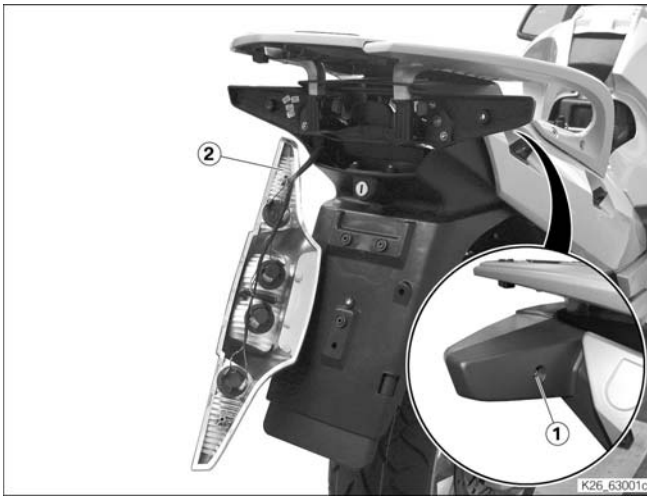
 Tightening torques		
Luggage rack, centre to rear section of frame, M6 x 35, Replace screws Micro-encapsulated	8 Nm	

- Install new screws (2) at rear left and right.

 Tightening torques		
Luggage rack from below to rear section of frame, M6 x 20, Replace screws Micro-encapsulated	8 Nm	

(-) Securing rear light unit

- Hold the rear light unit (2) in position.



- Install screws (1).

(-) Installing seat



- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **46 63 333 Replacing left side panel of fairing**

(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

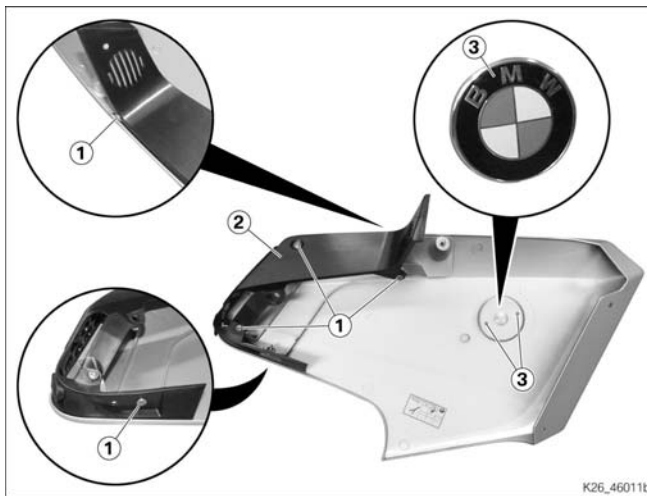


- Remove trim panel.

(-) Replacing left fairing panel

► Disassembling left fairing panel

- Remove screws (1).



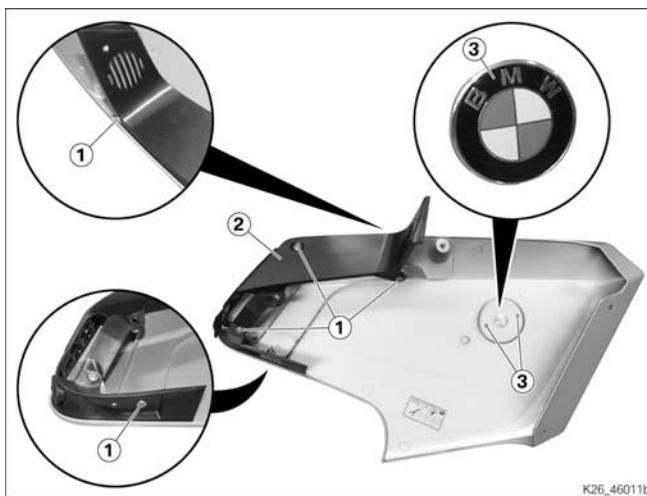
- Remove inner side panel (2).

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Working from the inside of the fairing, press out BMW badge (3) at the pins; if necessary, pry the badge out from the outside with a suitable tool.
- Remove BMW badge (3).



- Remove reusable small items and install them on the new fairing panel.

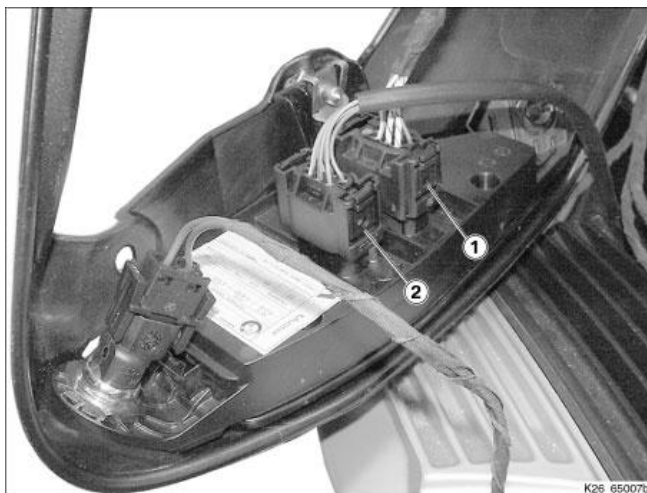
▶ Assembling left fairing panel

- Remove all traces of adhesive from the original BMW badge.
- Affix BMW badge (3) with double-sided adhesive tape; if necessary, use a new BMW badge. Make sure the badge is installed in the correct position.
- Hold inner side panel (2) in position.
- Install screws (1).

◀ (-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



K26_46017b



K26_46013b

- Hold the panel in position.
- Install screws (1).

46 63 334 Replacing right side panel of fairing



(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.

(-) Replacing right fairing panel

► Disassembling right fairing panel

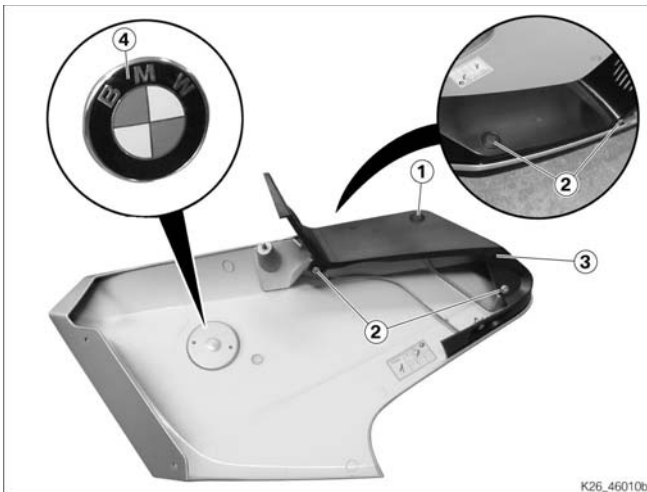
- Remove rubber cap (1).
- Remove screws (2).
- Remove inner side panel (3).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.



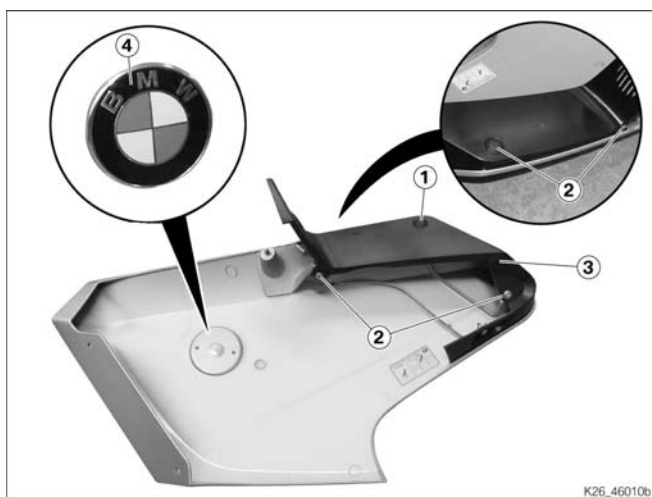
- Working from the inside of the fairing, press out BMW badge (4) at the pins; if necessary, pry the badge out from the outside with a suitable tool.
- Remove BMW badge (4).



- Remove reusable small items and install them on the new fairing panel.

► Assembling right fairing panel

- Remove all traces of adhesive from the original BMW badge.
- Affix BMW badge (4) with double-sided adhesive tape; if necessary, use a new BMW badge. Make sure the badge is installed in the correct position.
- Hold inner side panel (3) in position.
- Install screws (2).
- Install rubber cap (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



 **46 63 343 Replacing inner trim for instruments**

(-) Removing left-hand trim panel

- Remove screws (1).

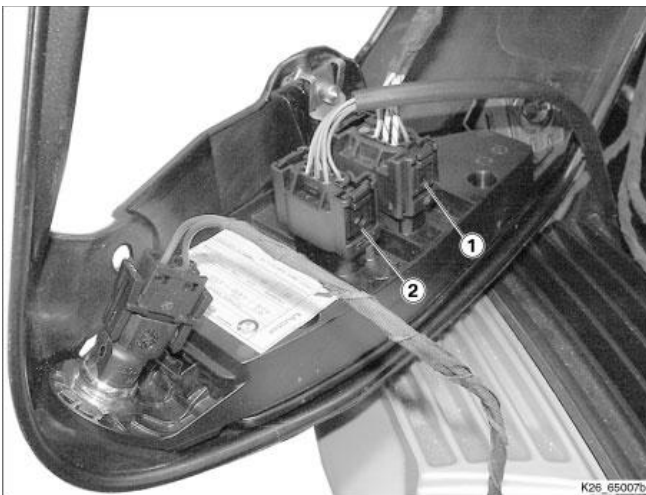


- Disconnect plug (1) from socket.



Variant, Radio with CD player

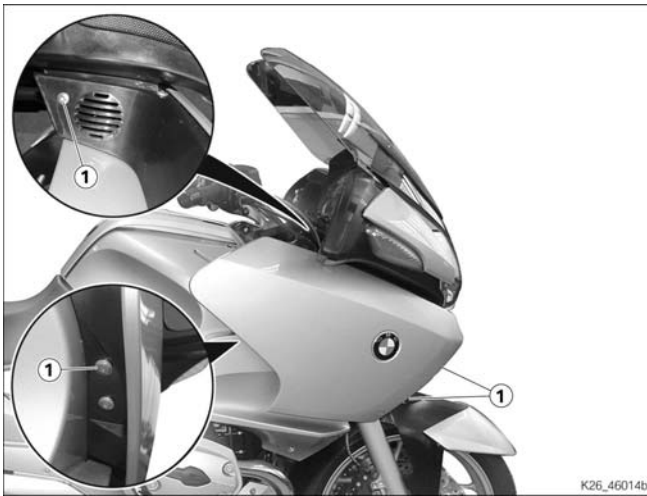
- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

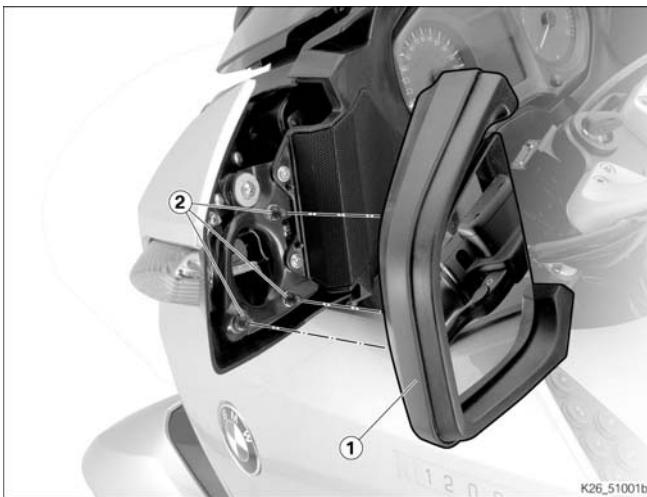
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



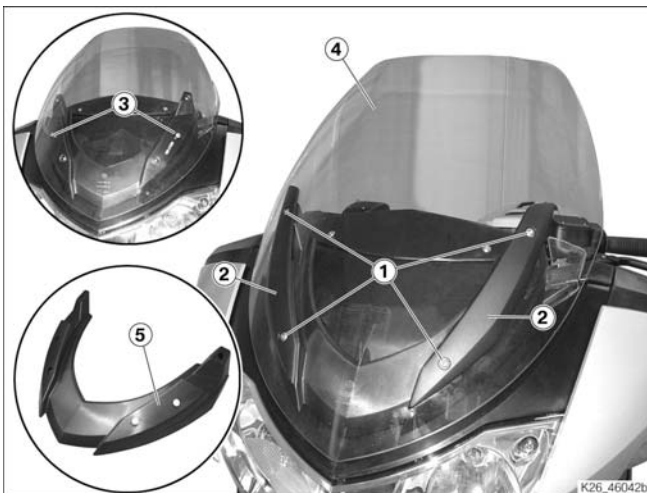
(-) Removing mirror

- Detach mirror (1).



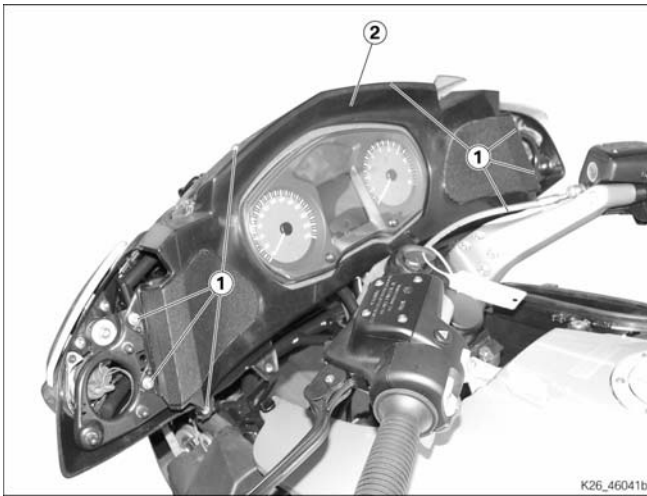
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).



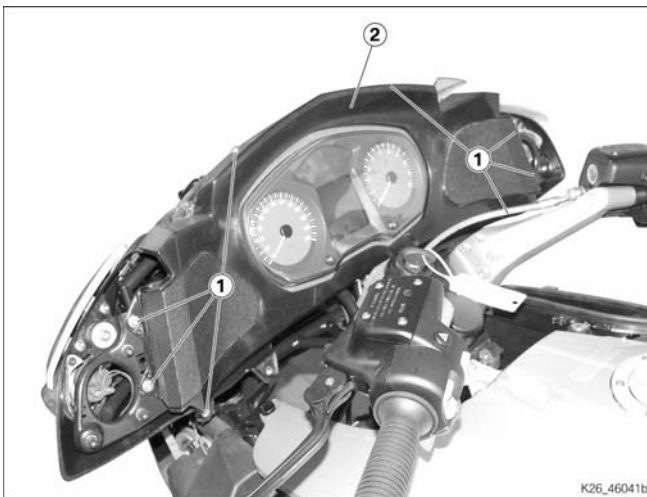
(-) Removing inner trim for instruments

- Remove screws (1).
- Remove inner trim (2).



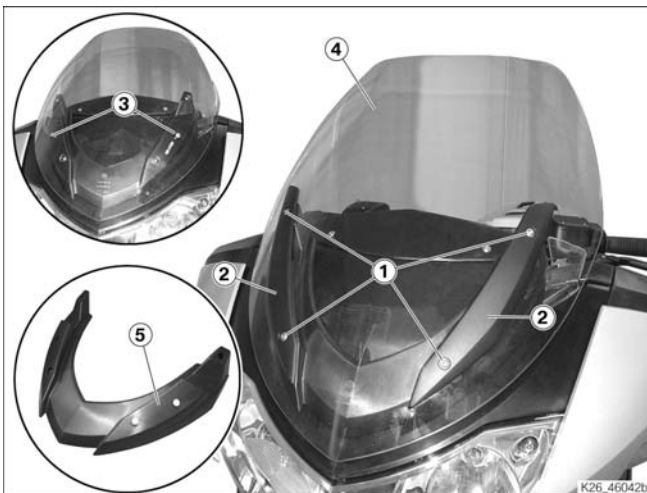
(-) Installing inner trim for instruments


- Place inner trim (2) in position.
- Install screws (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.



 Tightening torques		
Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	

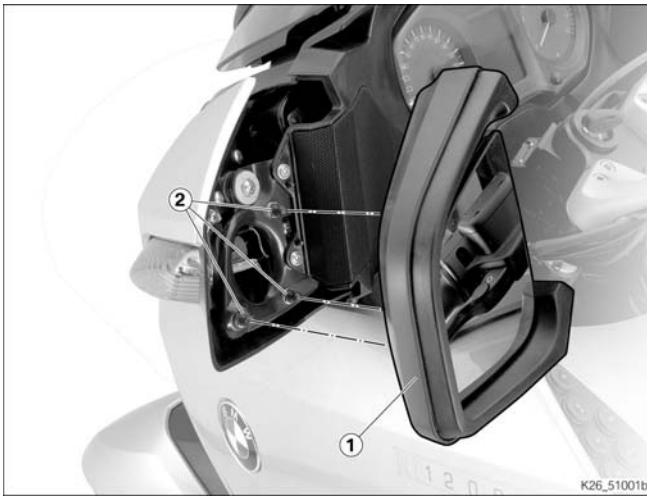
- Fit left and right trim panels (2) and secure with screws (1).

(-) Installing mirrors



Attention

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.



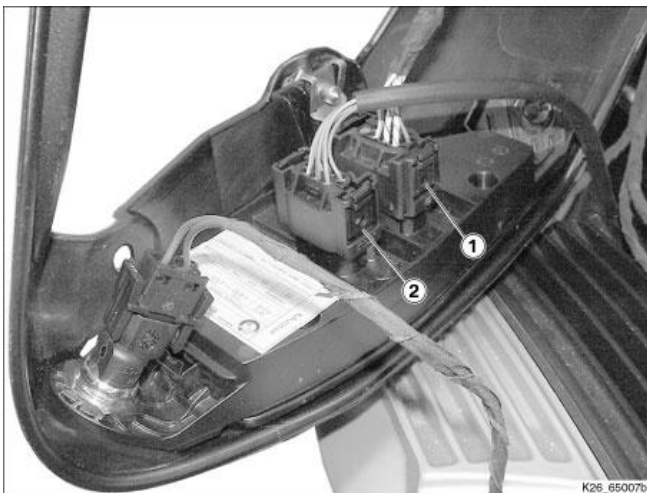
Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



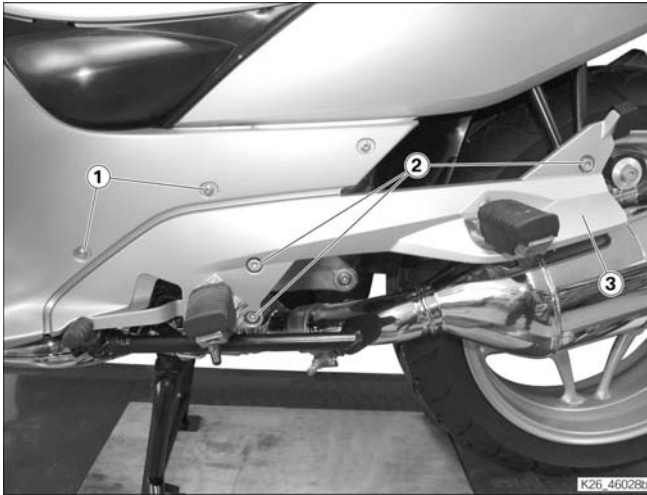
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K26_46013b

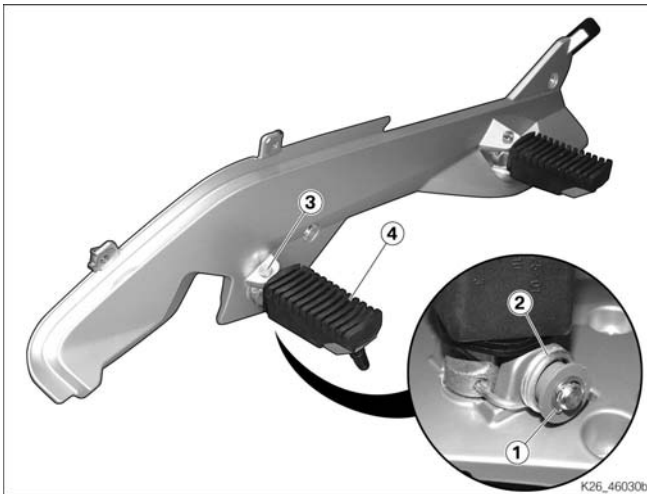
- Hold the panel in position.
- Install screws (1).

 **46 71 299 Replacing left footrest plate**



(-) Removing left footrest plate

- Remove screws (1).
- Remove screws (2).
- Remove footrest plate (3) while paying attention to the speed nuts on the footrest plate.



(-) Removing front footrests

- Remove retaining clip (1).

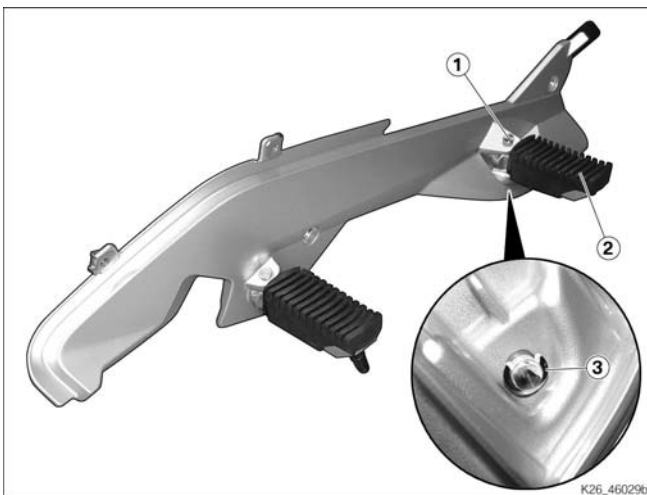


Warning

Nature: Components are spring-loaded. Risk of injury caused by flying parts.

Avoidance: Carefully relieve the spring.

- Remove pin (3).
- Remove footrest (4) with spring (2).
- Repeat this procedure with the second footrest.

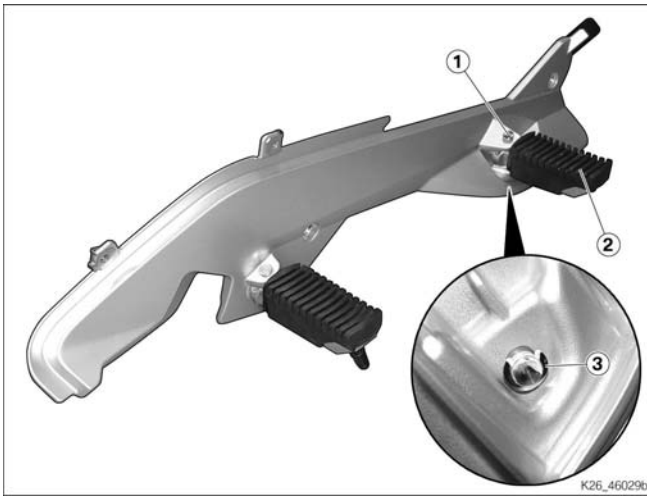


(-) Removing rear footrests

- Remove retaining clip (3).
- Remove pin (1).
- Remove footrest (2).
- Repeat this procedure with the second footrest.

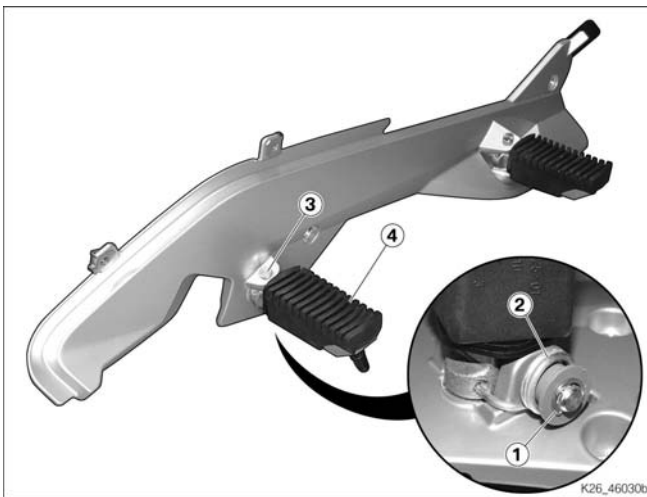
(-) Installing rear footrest

- Hold footrest (2) in position.



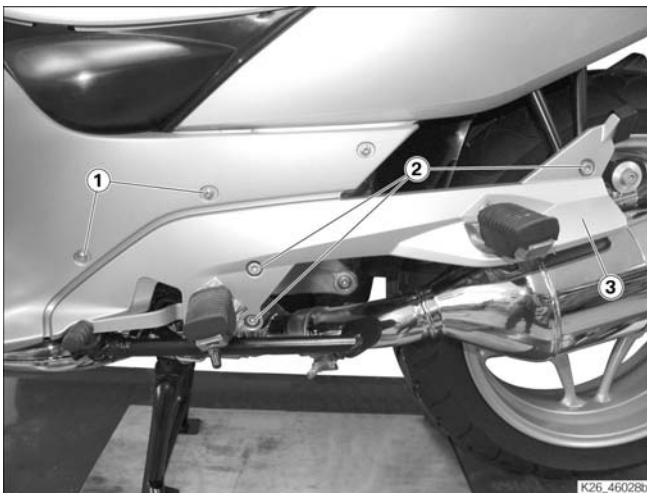
- Install pin (1).
- Install retaining clip (3).
- Repeat this procedure with the second footrest.

(-) Installing front footrests




- Hold footrest (4) with spring (2) in position and install pin (3).
- Install retaining clip (1).
- Repeat this procedure with the second footrest.

(-) Installing left footrest plate



- Install footrest plate (3).
- Install screws (2).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	

- Install screws (1).

 **46 71 312 Replacing right footrest plate**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

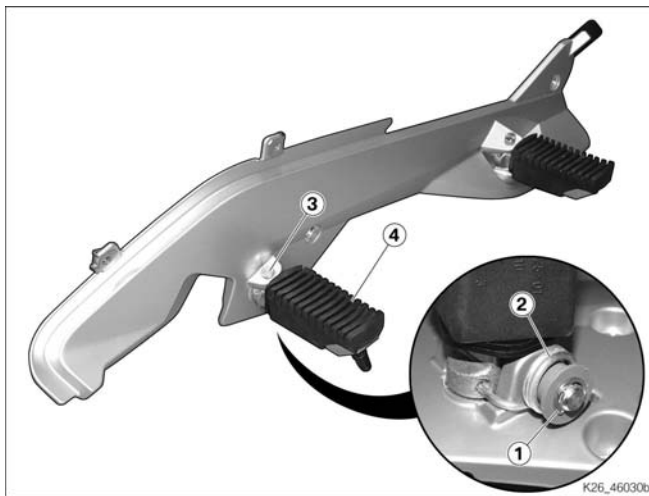
(-) Removing front footrests

- Remove retaining clip (1).



Warning

Nature: Components are spring-loaded. Risk of



injury caused by flying parts.

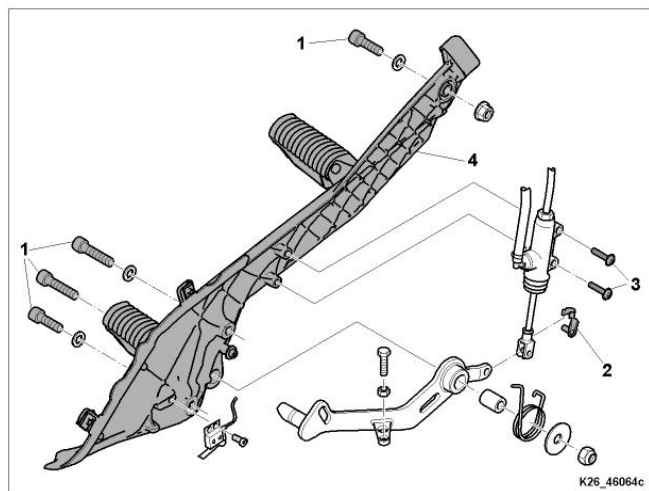
Avoidance: Carefully relieve the spring.

- Remove pin (3).
- Remove footrest (4) with spring (2).
- Repeat this procedure with the second footrest.


(-) Removing right footrest plate



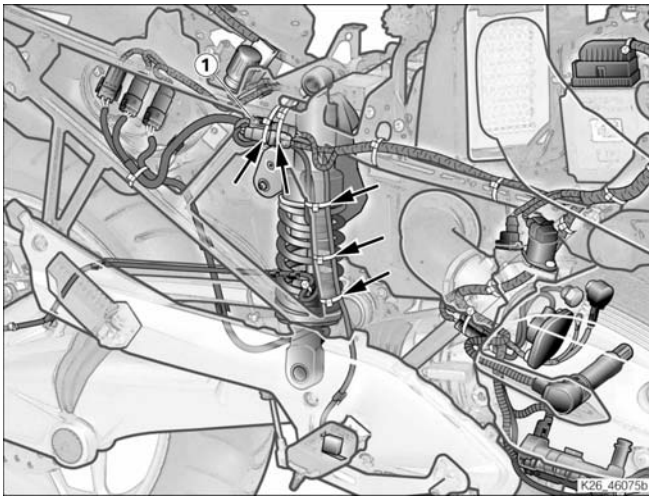
- Undo screws (1) holding bottom section of fairing.



- Remove screws (1).
- Remove pin (2).
- Heat up footrest plate from outside in area of mounting screws for master brake cylinder.

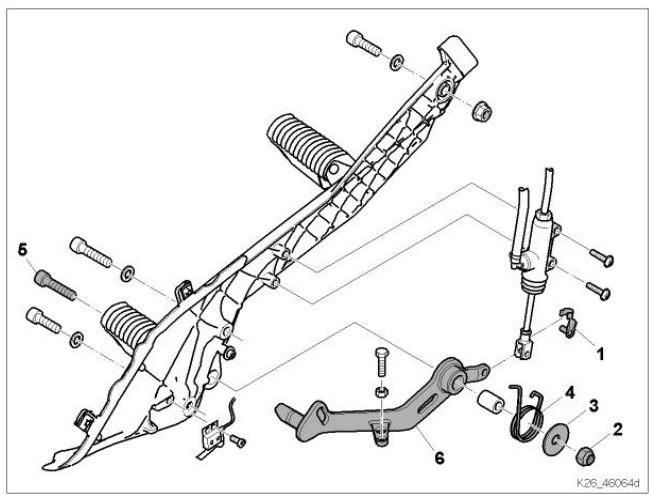
 Technical data			
Release temperature, screws for rear brake master cylinder		100 °C	

- Remove screws (3) from master brake cylinder.
- Remove footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove the footrest plate.



(-) Removing footbrake lever

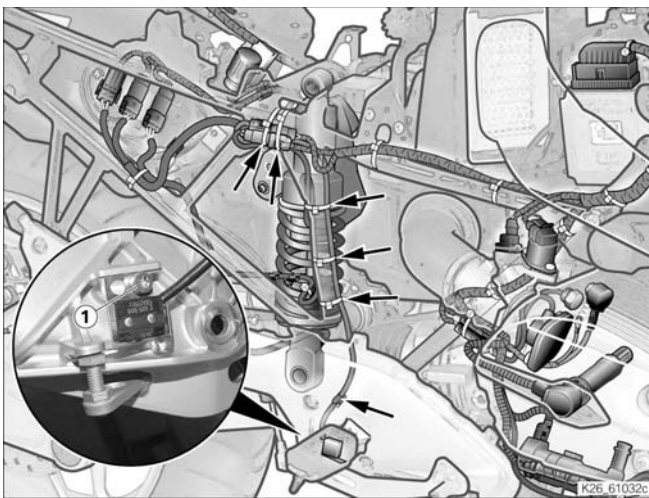
- Remove nut (2).
- Remove washer (3) and spring (4).
- Remove screw (5) with footbrake lever (6).



(-) Replacing right footrest plate

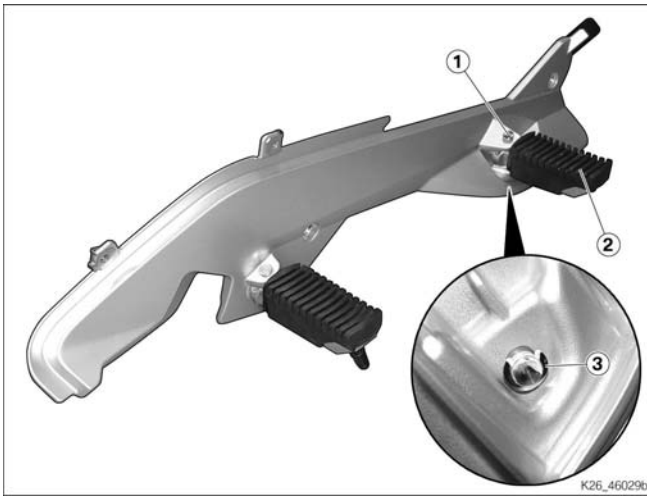
► Removing brake-light switch

- Remove screw (1).
- Remove the brake-light switch.



► Removing rear footrests

- Remove retaining clip (3).
- Remove pin (1).



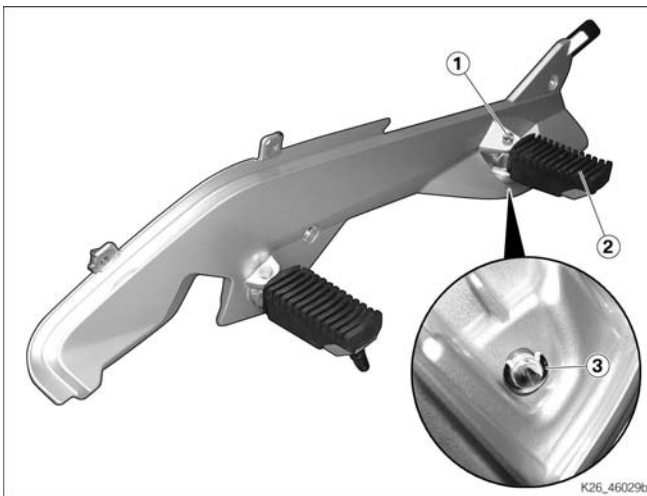
- Remove footrest (2).
- Repeat this procedure with the second footrest.



- Remove reusable small items and install them on the new footrest plate.

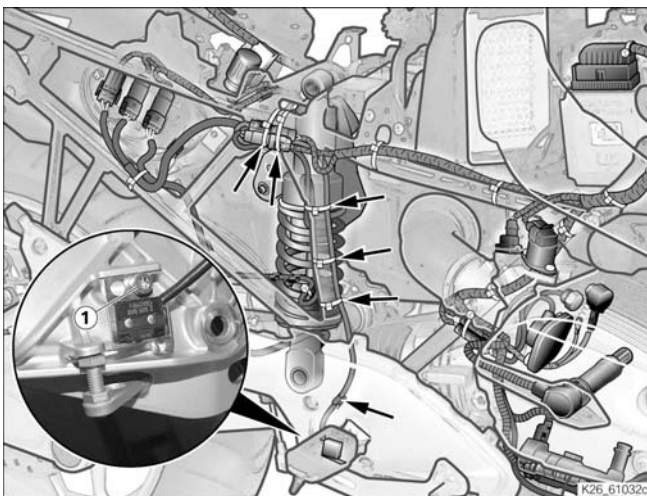
► **Installing rear footrest**


- Hold footrest (2) in position.
- Install pin (1).
- Install retaining clip (3).
- Repeat this procedure with the second footrest.



► **Installing brake-light switch**

- Hold the brake-light switch in position.
- Install screw (1).

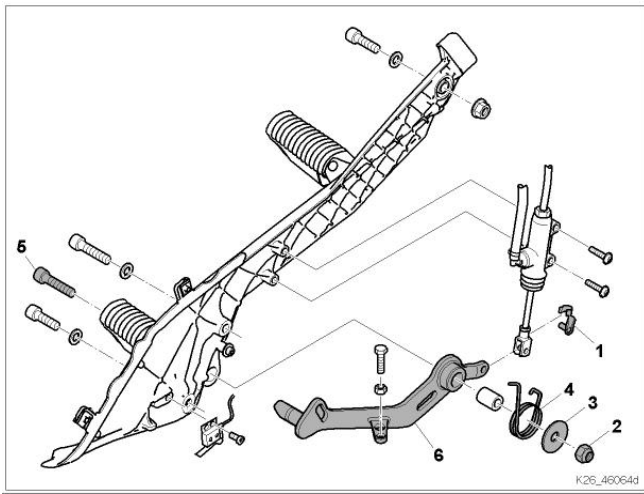


 Tightening torques		
Brake light switch, footbrake, to footrest support, M5 x 8	5 Nm	




(-) **Installing footbrake lever**

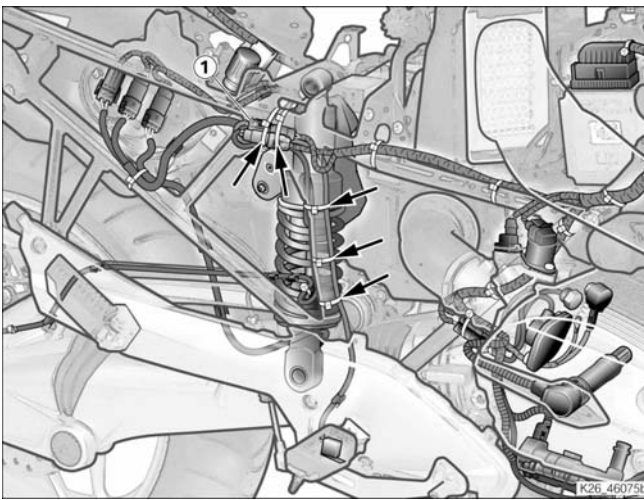
- Install footbrake lever (6) with screw (5).



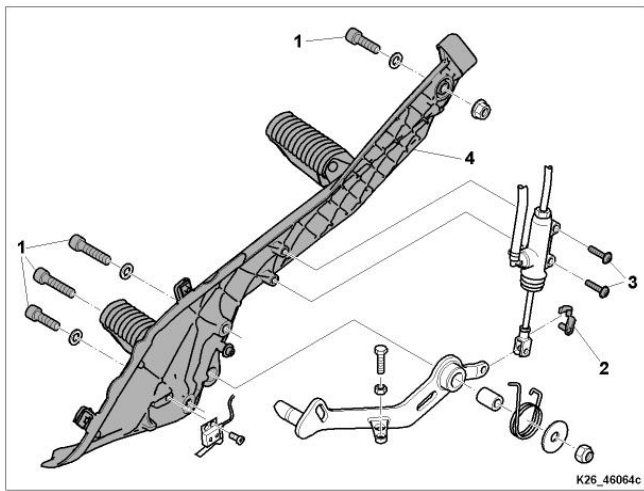
- Install spring (4) and washer (3).
- Install nut (2).

 Tightening torques		
Foot brake lever to footrest plate, M10	38 Nm	


(-) Installing right footrest plate




- Thread through cable at frame and secure with cable ties (arrows). Connect plug (1).



- Clean the threads.
- Install footrest plate (4) while paying attention to the speed nuts on the footrest plate.
- Install master brake cylinder with new screws (3).

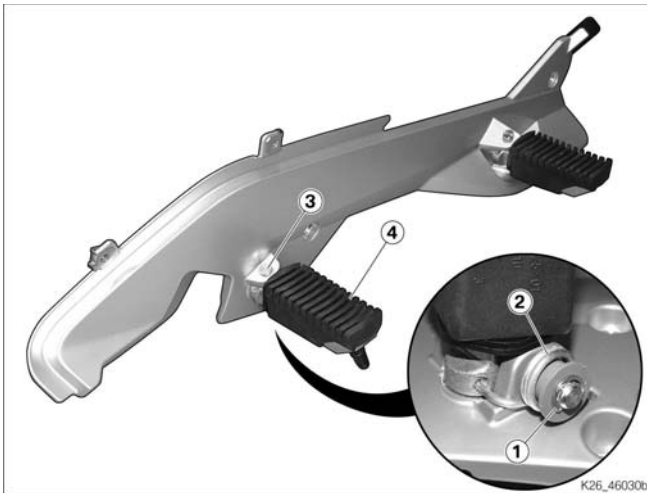
 Tightening torques		
Master brake cylinder to foot rest plate, M6 x 20, Replace screws Micro-encapsulated	6 Nm	

- Install pin (2).
- Install screws (1).

 Tightening torques		
Footrest plate to rear frame, bottom front/rear, M8 x 25	19 Nm	
Footrest plate to rear frame, top front, M8 x 35	19 Nm	



- Install screws (1) holding bottom section of fairing.




(-) Installing front footrests

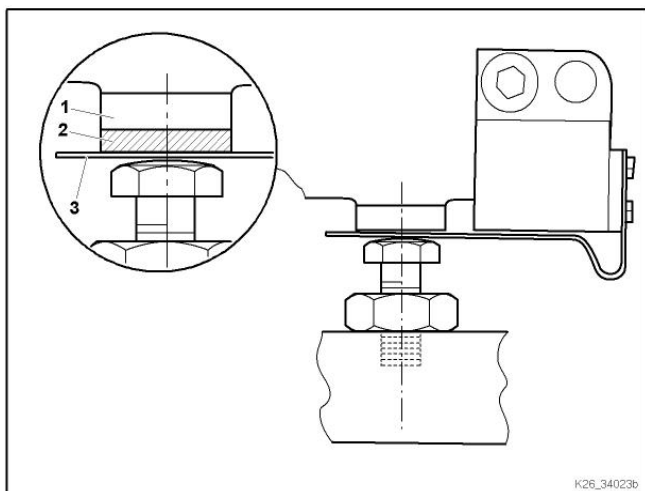
- Hold footrest (4) with spring (2) in position and install pin (3).
- Install retaining clip (1).
- Repeat this procedure with the second footrest.

(-) Checking blow-by clearance at piston rod

Test

- Check the play of the piston rod between brake-light switch tab (3) and stop of adjusting screw (1) with feeler gauge (2).

 Technical data			
Play of piston pushrod, rear brake master cylinder	Measured between brake-light	2 ⁺¹ mm	



	switch tongue and stop of adjusting screw		
--	--	--	--

Result: Measured value is not to specification.

Measure:

► **Adjusting blow-by clearance at piston rod**


Precondition

- The blade of the feeler gauge must be placed transversely with respect to forward direction between the plate of the brake light switch and stop of the adjusting screw.



- Slacken nut (1) on pushrod (2).
- Turn push rod (2) to relieve the pressure until it has play.
- Turn pushrod (2) until all play **at the pushrod** is taken up.
- Lock nut (1).



 Tightening torques		
Lock nut, pushrod, rear brake master cylinder, M6 Sealing lacquer	8 Nm	

- When work is completed, apply coloured sealing lacquer across nut (1) and the adjacent component.



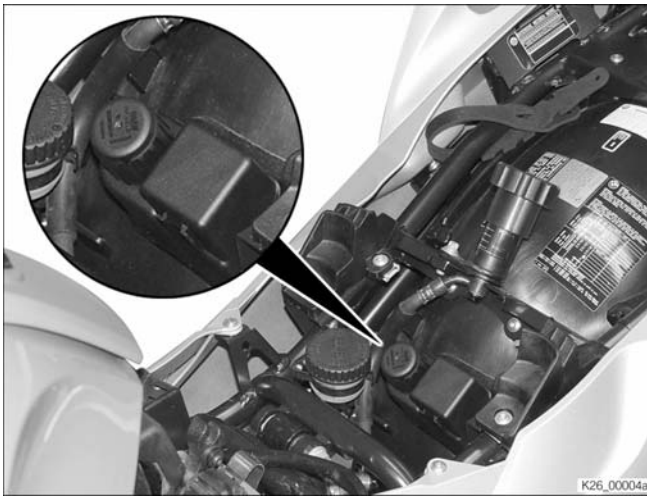
(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.



- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Function test, rear brake-light switch

Test

- Test the brake-switch setting with the BMW Motorrad diagnostic system.


Result: If test result is not OK

Measure:


► **Adjusting blow-by clearance at piston rod**

- Slacken nut (1) on pushrod (2) at the brake master cylinder.



 Technical data			
Play of piston pushrod, rear brake master cylinder	Measured between brake-light switch tongue and stop of adjusting screw	2 ⁺¹ mm	

- Increase play in small steps to the maximum value.
- Lock nut (1).

 Tightening torques		
Lock nut, pushrod, rear brake master cylinder, M6	8 Nm	
Sealing lacquer		

- When work is completed, apply coloured sealing lacquer across nut (1) and the adjacent component.

◀ **(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle**

- Terminate the diagnosis session correctly and switch

off the ignition.

- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

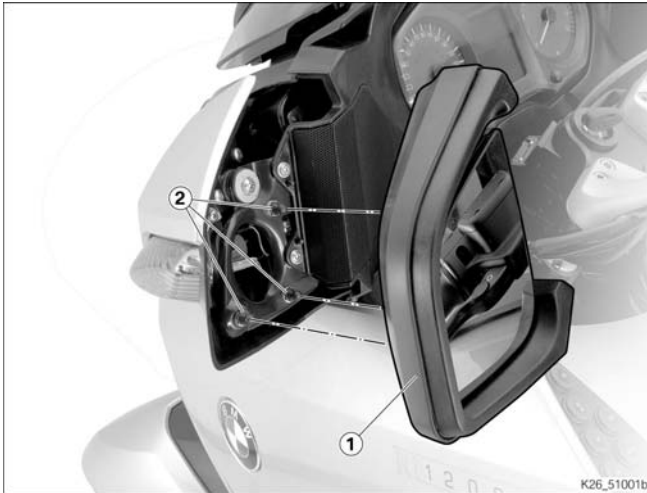
- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **51 16 041 Replacing mirror glass**



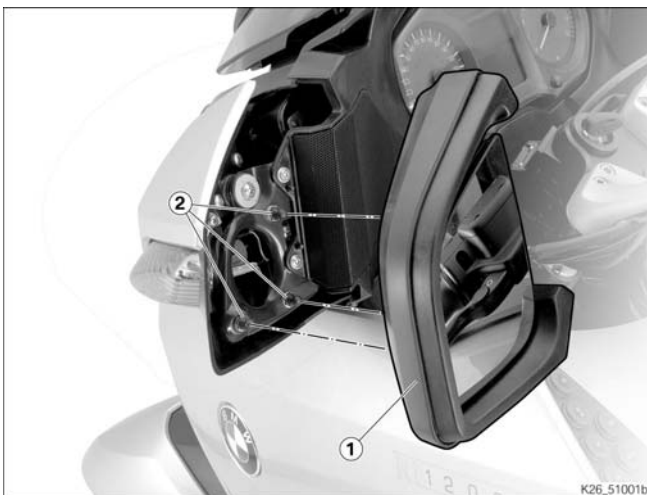
(-) Removing mirror

- Detach mirror (1).



(-) Replacing mirror glass

- Press back several mirror glass retaining clips (arrows).
- Detach mirror glass.
- Carefully press in new mirror glass until all retaining clips lock in position.



(-) Installing mirrors

 **Attention**

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

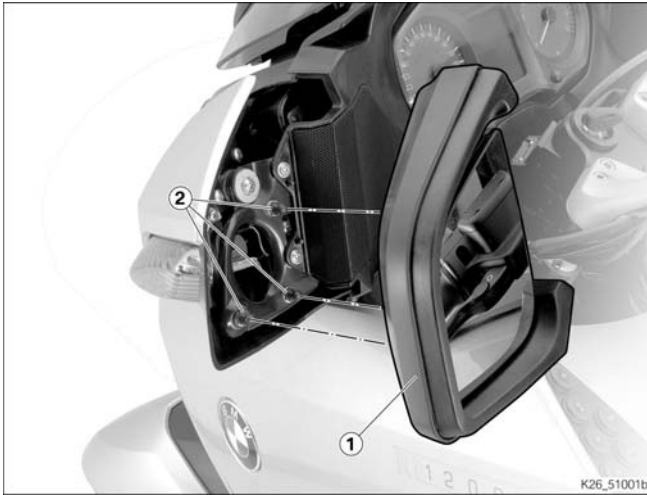
Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).

 **51 16 043 Removing and installing or replacing both mirrors**

(-) Removing mirror

- Detach mirror (1).



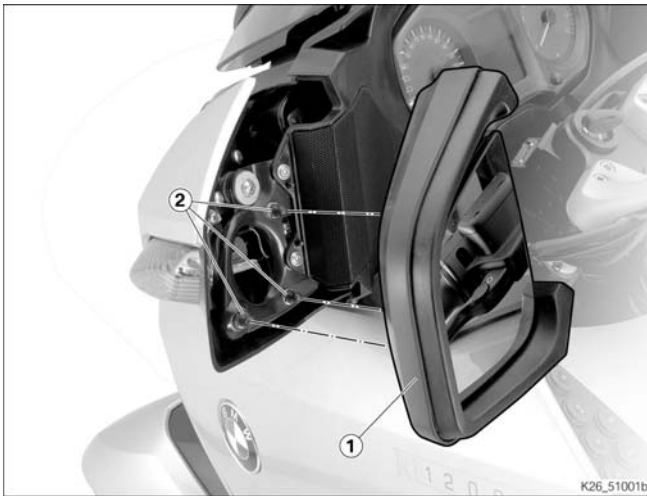
(-) Installing mirrors

 **Attention**

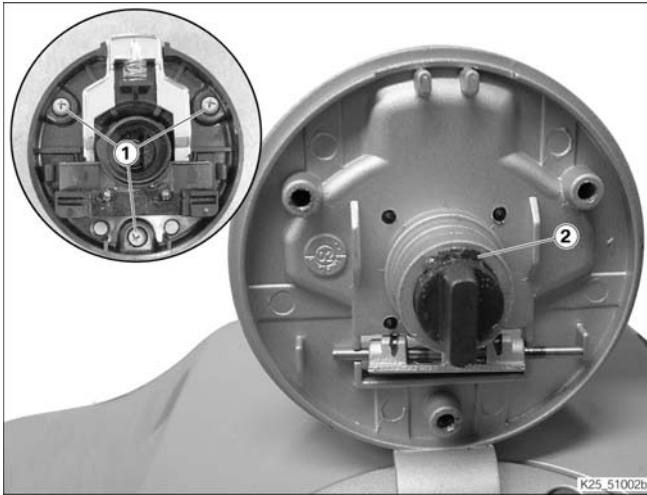
Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).

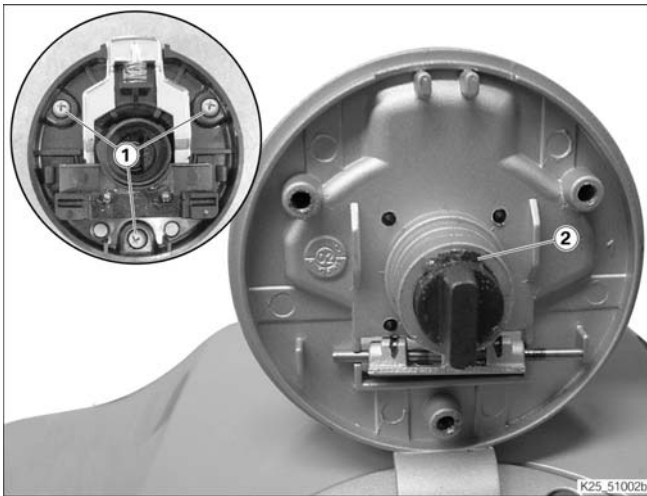


 **51 25 020 Replacing lock barrel for fuel tank**



(-) Removing lock barrel for fuel filler cap

- Open the fuel filler cap.
- Lay a protective cover over the fuel tank filler opening.
- Remove 3 screws (1).
- Remove the bottom part of the fuel-tank cap.
- Push the key into the lock barrel.
- Press down retainer (2) and pull out the lock barrel with the key.



(-) Installing lock barrel for fuel filler cap

- Grease the lock barrel.



Consumables/lubricants

Grease for lock cylinders	Lubricating grease	81 22 9 407 421
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- Insert the lock barrel with the key into the lock until retainer (2) engages.
- Slip the bottom part of the fuel-tank cap into position and install screws (1).
- Remove the cover from the fuel-tank filler neck and close the tank cap.

 **51 25 038 Replacing lock barrel in ignition/steering lock**



Note

Always check the relevant personal details (vehicle registration papers, ID card/passport) before ordering and delivering components that are associated with the electronic immobiliser (e.g. ignition key).

Add the customer data to all requests for parts associated with the electronic immobiliser and file these requests in records.

When replacement ignition keys arrive, try them out immediately on the motorcycle in question.

Use the BMW Motorrad diagnostic system to bar ignitions keys reported lost by customers. Bear in mind that the customer must bring in all the remaining ignition keys for this process.


(-) Removing lock barrel from ignition lock

- Insert the ignition key and turn it to the ON position.
- Insert a length of wire or similar into the hole (arrow) and push in the retainer.
- Pull the lock barrel out with the ignition key.



(-) Installing lock barrel for ignition lock

- Grease the lock barrel.

 Consumables/lubricants		
Grease for lock cylinders	Lubricating grease	81 22 9 407 421

- Insert the ignition key in the lock barrel and turn it to the ON position.



Note

The lock barrels of the ignition/steering lock and of the remaining locks are of a different design (different locking latch).

- Push down on the lock barrel until the retainer engages.



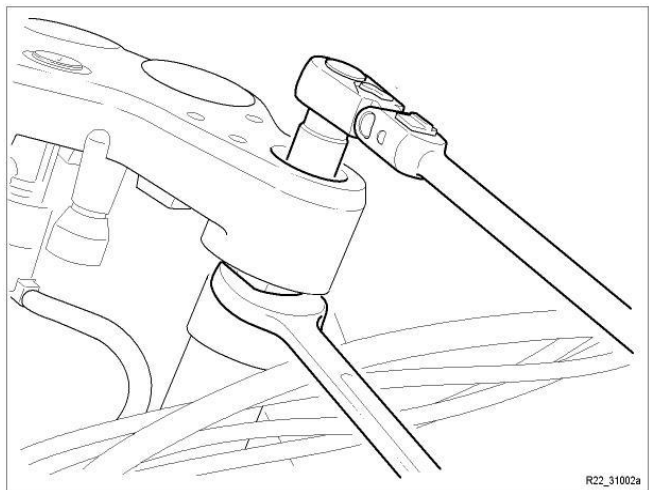
51 25 044 Replacing steering-lock housing



(-) Releasing stub handlebars

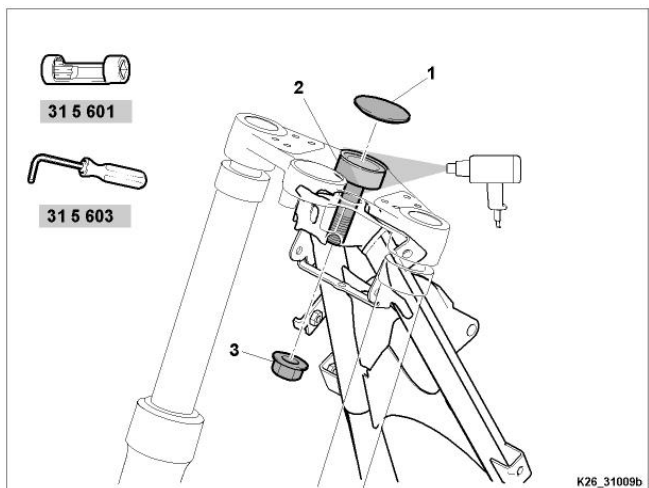
- Cover the fuel tank with fuel-tank protective cloth (No. 16 1 611) .
- Remove screws (1) from the stub handlebars.
- Lay the stub handlebars back out of the way.

(-) Removing upper fork bridge




► Releasing fixed fork tubes

- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



- Remove cap (1).
- Heat threaded fastener (2) of the fork bridge from above.

 Technical data			
Release temperature, top fork bridge		120 °C	

- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, remove nut (3) with socket wrench insert (No. 31 5 601) .

⚠ Attention

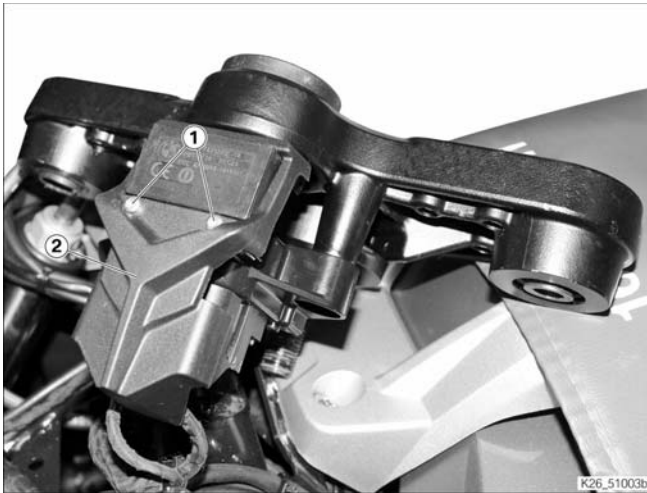
Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

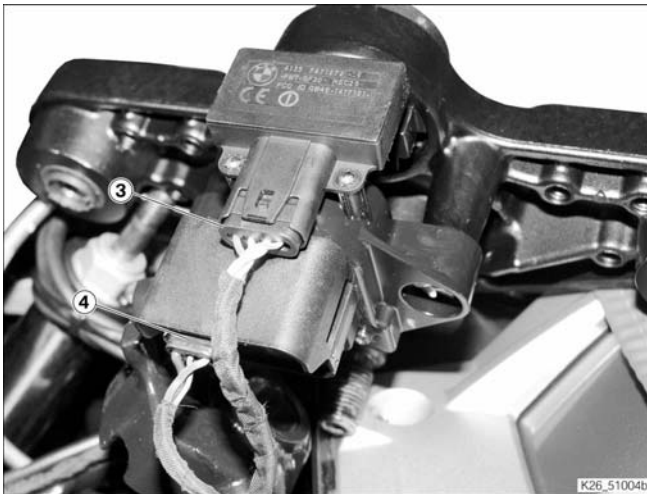
- Turn the fork bridge all the way to the left and carefully remove the steering head bearing from the frame front section.
- Carefully lay the fork bridge back out of the way.

► **Disconnecting plug for ignition switch/ring aerial**

- Remove screws (1).
- Remove cover (2).



- Disconnect plugs (3) and (4).



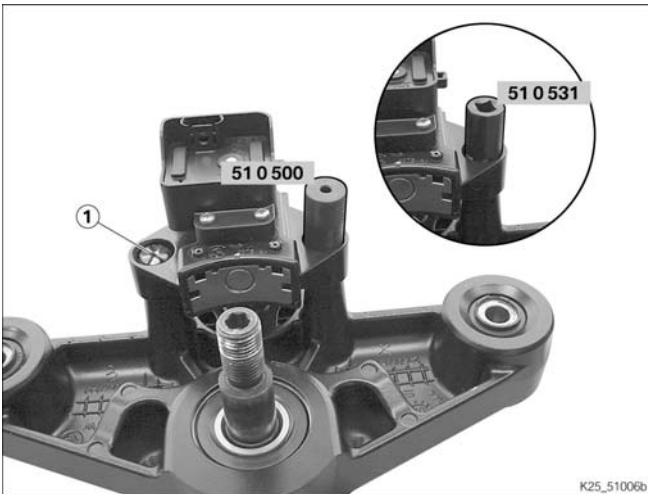
◄ **(-) Removing lock barrel from ignition lock**


- Insert the ignition key and turn it to the ON position.
- Insert a length of wire or similar into the hole (arrow) and push in the retainer.
- Pull the lock barrel out with the ignition key.



(-) Removing ring aerial and ignition/steering lock housing

- Drill pilot holes into non-removable screws (1) with drill bit (No. 51 0 500) and then continue drilling out the holes until the screw heads come off.




 Technical data			
Ignition/steering lock - depth for drilling out the non-removable screws	Bore diameter	min. 5 mm	
	4 mm	5 mm	
	Bore diameter		
	8 mm		

- Removing and disassembling ring aerial with ignition/steering lock housing
- Use a stud remover to remove the shanks of the non-removable screws.

(-) Installing ring aerial and ignition/steering lock housing

- Clean the threads.
- Assemble the ring aerial with ignition/steering lock housing, using a new O-ring.
- Install the ring aerial with ignition/steering lock housing in the fork bridge.
- Install non-removable screws (1) with socket wrench insert (No. 51 0 531) .




 Tightening torques		
Ignition/steering lock to fork bridge, M8 non-removable screw, Replace screws	20 Nm	
Micro-encapsulated		

(-) Installing lock barrel for ignition lock

-



Grease the lock barrel.

 Consumables/lubricants		
Grease for lock cylinders	Lubricating grease	81 22 9 407 421

- Insert the ignition key in the lock barrel and turn it to the ON position.



Note

The lock barrels of the ignition/steering lock and of the remaining locks are of a different design (different locking latch).

- Push down on the lock barrel until the retainer engages.

(-) Installing upper fork bridge

- Clean the threads.

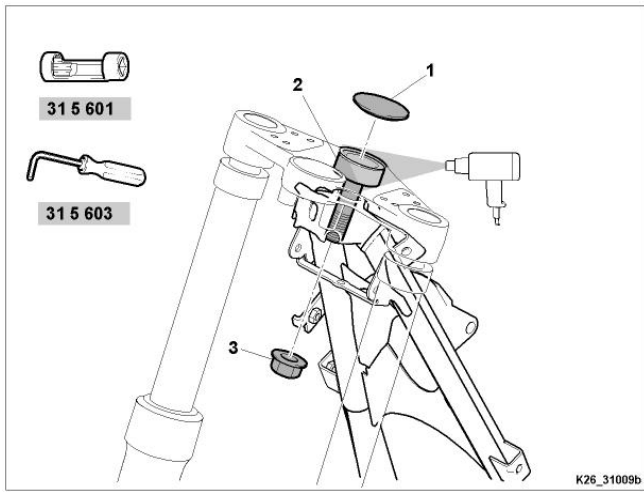
► Connecting plug for ignition switch/ring aerial

- Connect plugs (3) and (4).



- Install cover (2) and secure with screws (1).





⚠ Attention

- Nature:** Excessive mechanical strain can damage the hoses of the brake and clutch system.
- Avoidance:** Do not overstretch brake or clutch hoses.

- Turn the fork bridge all the way to the left and carefully introduce the steering head bearing into the frame front section.
- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, install new nut (3) with socket wrench insert (No. 31 5 601) .

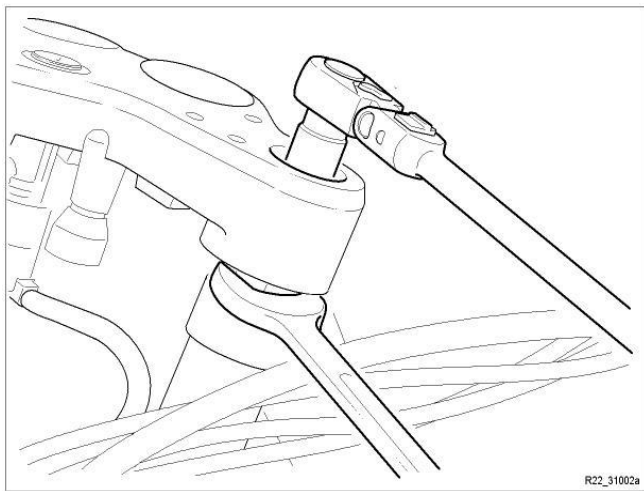
🔧 Tightening torques		
Fork bridge to front frame, M14 x 1.5, Replace nut Micro-encapsulated	130 Nm	

- Install cap (1).

▶ **Installing fixed fork tubes**

- Introduce the fixed fork tube into the fork bridge.
- Secure the fixed fork tube in the top fork bridge with a new nut, while holding the fixed fork tube at the hexagon underneath the fork bridge.

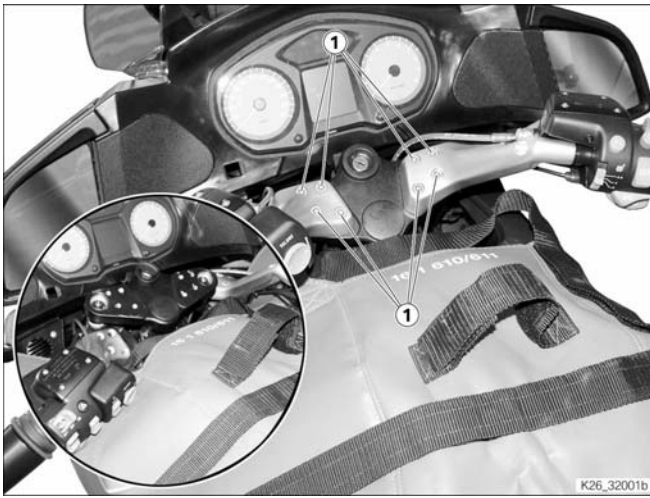
🔧 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	



◀ **(-) Securing stub handlebars**

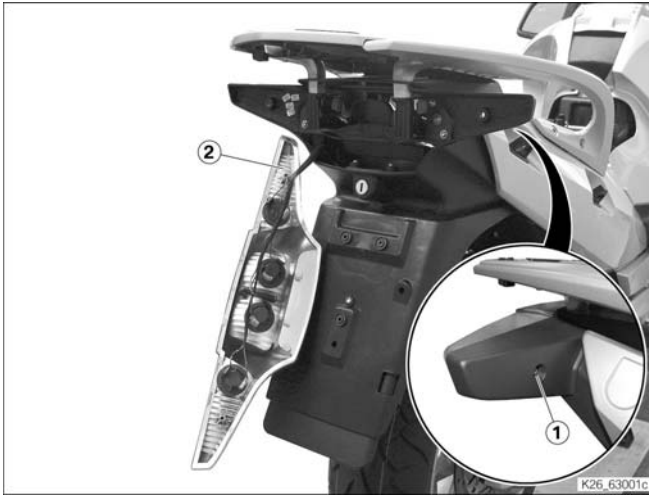
- Position the stub handlebars on the top fork bridge, noting the seals.
- Install screws (1).

🔧 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	



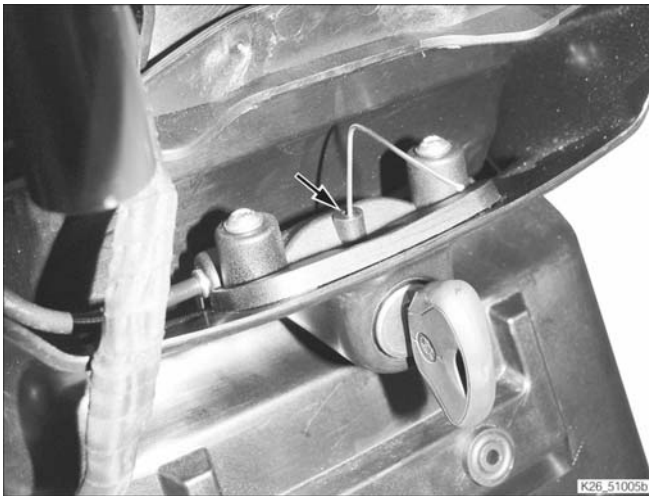
 **51 25 060 Replacing lock barrel for seat lock**

(-) Removing rear light unit



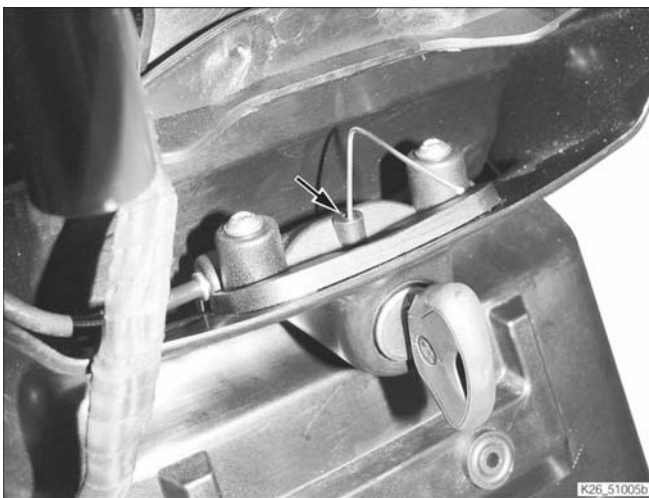
- Remove screws (1).
- Allow rear light unit (2) to dangle from the cable.

(-) Removing lock barrel from seat lock




- Press in catch (arrow) with suitable tool, e.g. piece of wire, and pull out lock barrel with key.

(-) Installing lock barrel for seat lock



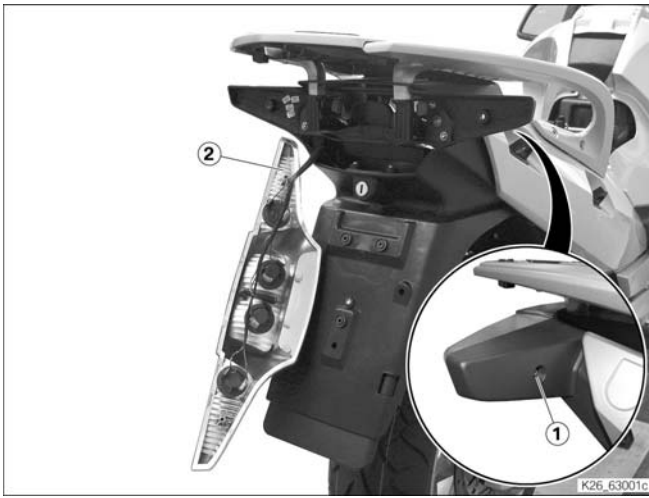
- Grease the lock barrel.

 <p>Consumables/lubricants</p>		
Grease for lock cylinders	Lubricating grease	81 22 9 407 421

- Insert the lock barrel with the key into the lock until retainer engages.

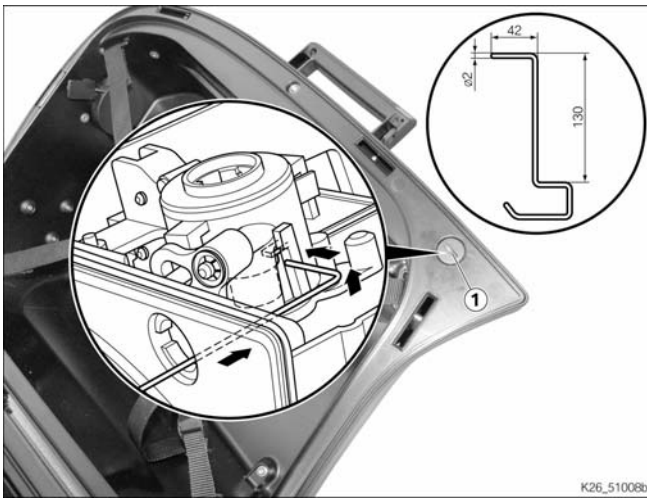
(-) Securing rear light unit

- Hold the rear light unit (2) in position.



- Install screws (1).

 **51 25 090 Replacing lock barrel for integral case**




(-) Removing lock barrel from case

- Open the case.
- Remove cap (1).
- Bend a piece of wire to form a hook as shown in the illustration above.
- Slip the hook into the opening until it is seated. Then push it over to the stop and push in slightly until the latch opens, and use the key to withdraw the lock barrel.
- Install cap (1).

(-) Installing lock barrel in case

- Grease the lock barrel.



 Consumables/lubricants		
Grease for lock cylinders	Lubricating grease	81 22 9 407 421

- Insert the lock barrel with the key into the lock until retainer engages.

 **51 25 120 Replacing lock barrel for storage compartment lid**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



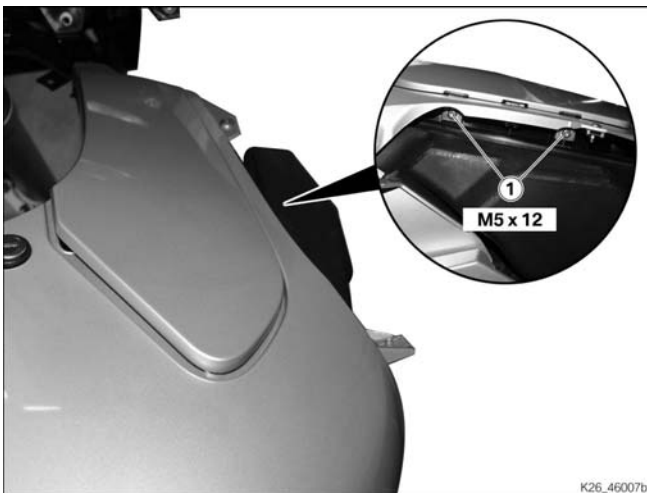
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



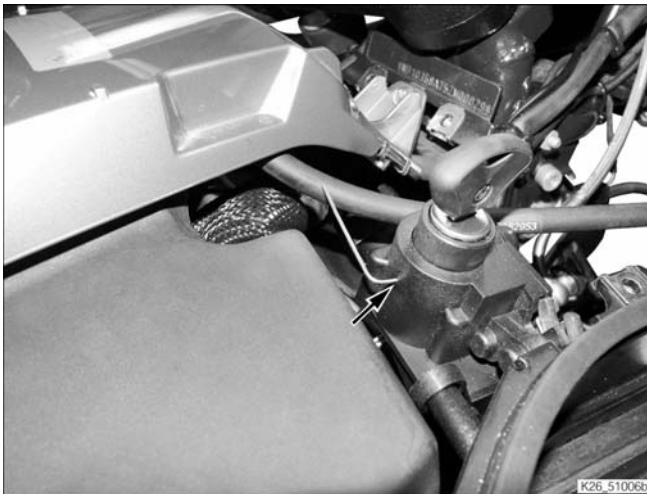
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing lock barrel for storage compartment lid

- Press in catch (arrow) with suitable tool, e.g. piece of wire, and pull out lock barrel with key.



(-) Installing lock barrel for storage compartment lid

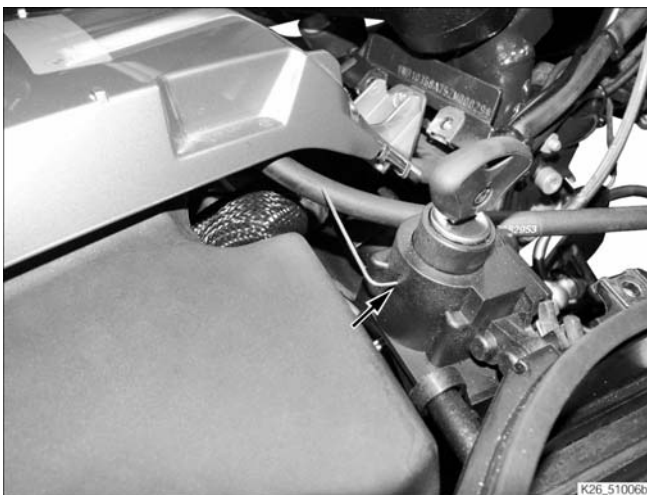
- Grease the lock barrel.



Consumables/lubricants

Grease for lock cylinders	Lubricating grease	81 22 9 407 421
---------------------------	--------------------	--------------------

- Insert the lock barrel with the key into the lock until retainer engages.



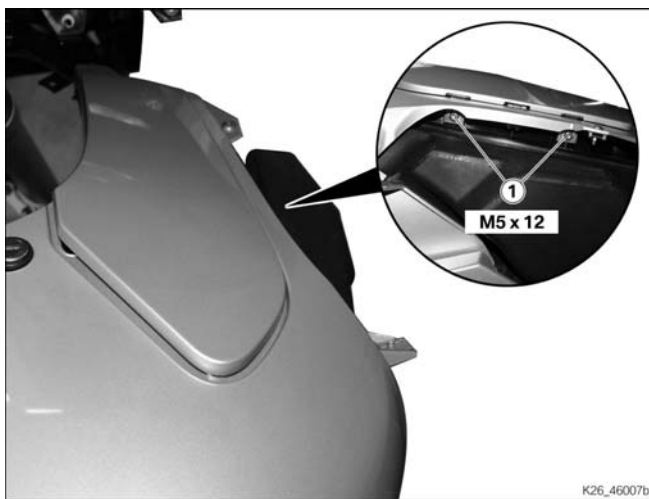
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **61 11 100 Replacing main wiring harness**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

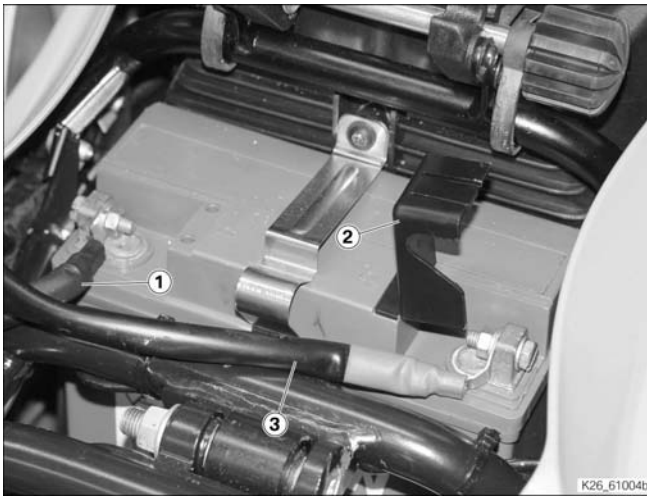
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



- Remove screws (1).

- Disconnect plug (1) from socket.



K26_46017b



K26_65007b

Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



K26_46009b

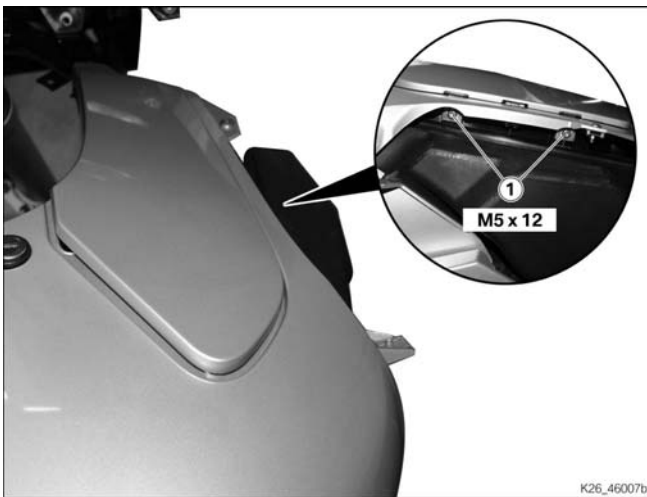
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



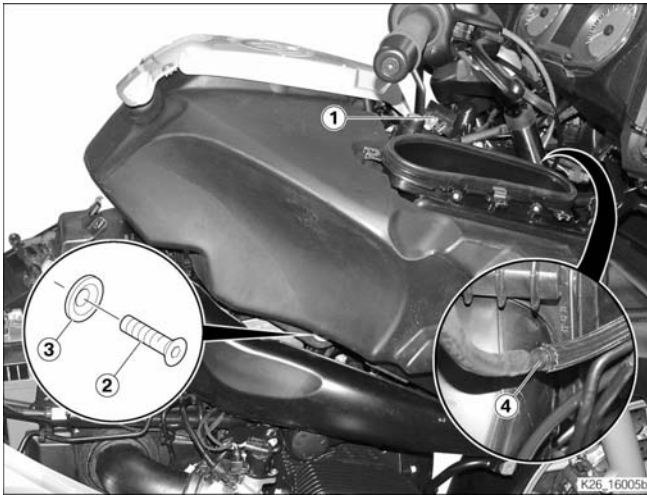
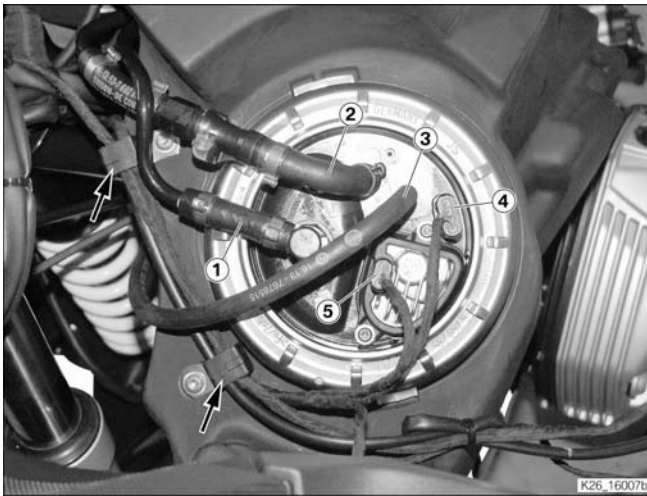
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



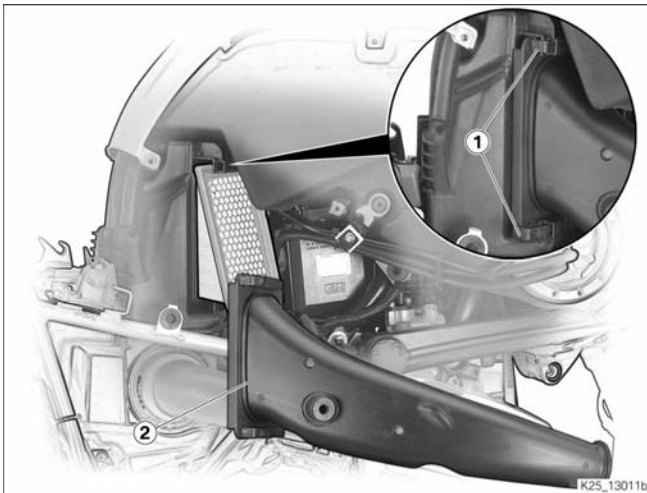
(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).



- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

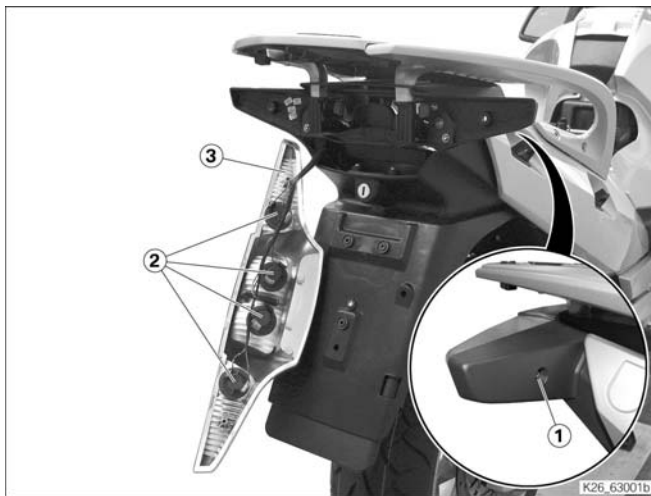
(-) Removing intake air pipe



- Disengage two retaining hoops (1) by pressing at rear and remove.
- Pull intake air pipe (2) to the side and remove.

(-) Removing rear-light unit

- Remove screws (1).
- Disconnect connectors from bulb sockets (2).
- Remove rear-light unit (3).



(-) Removing rear wiring harness

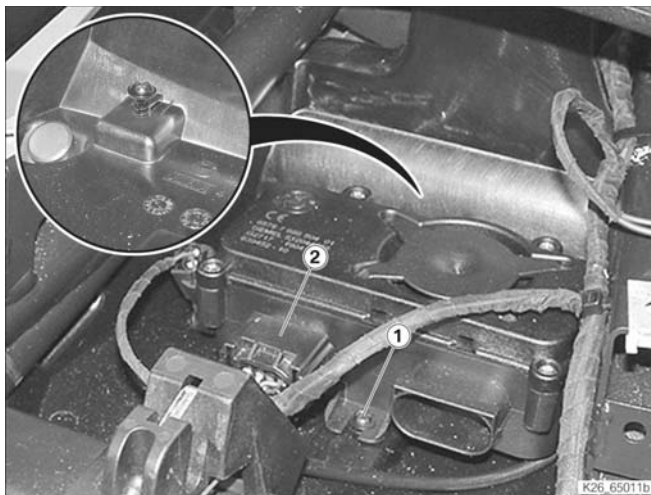
Variant, On-board computer

- Disconnect plug (1) of the temperature sensor.



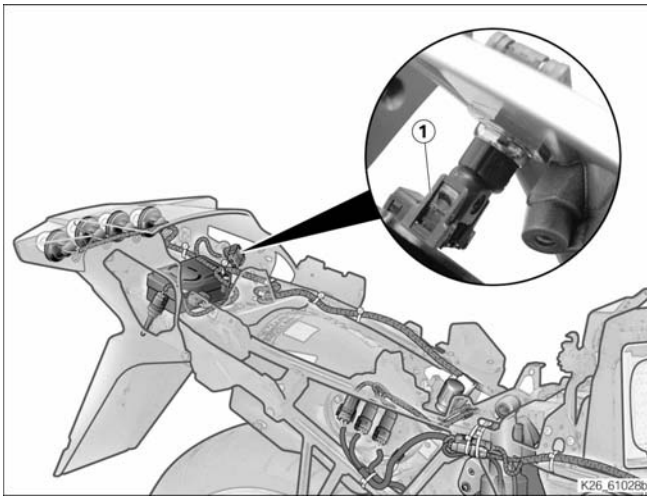
Variant, Anti-theft alarm

- Disconnect plug (2) of the anti-theft alarm.

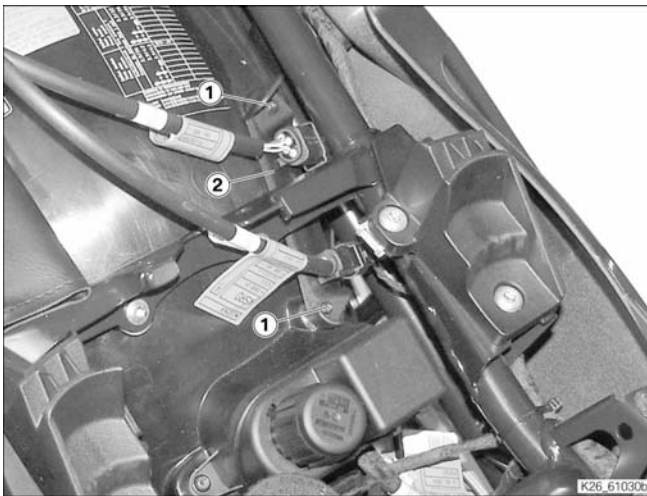
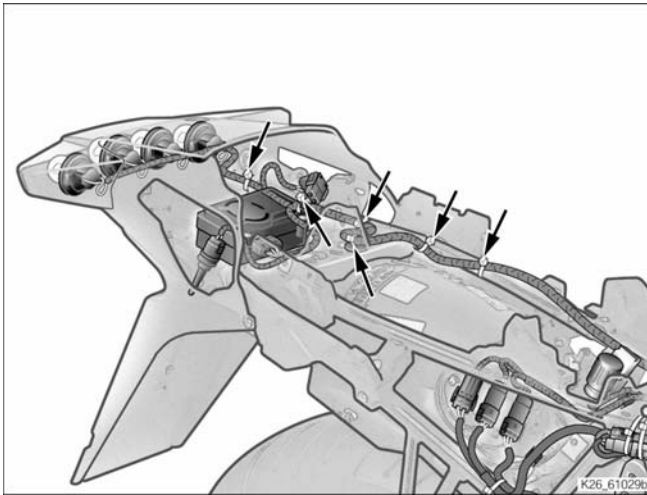


Variant, 2nd socket outlet

- Disconnect plug (1) of the on-board socket.



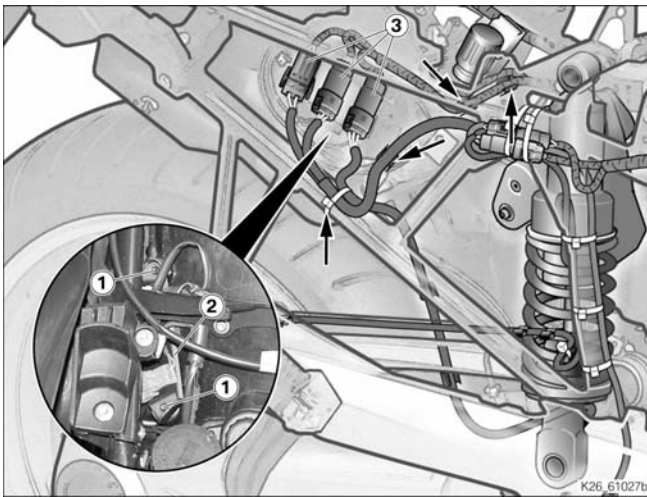
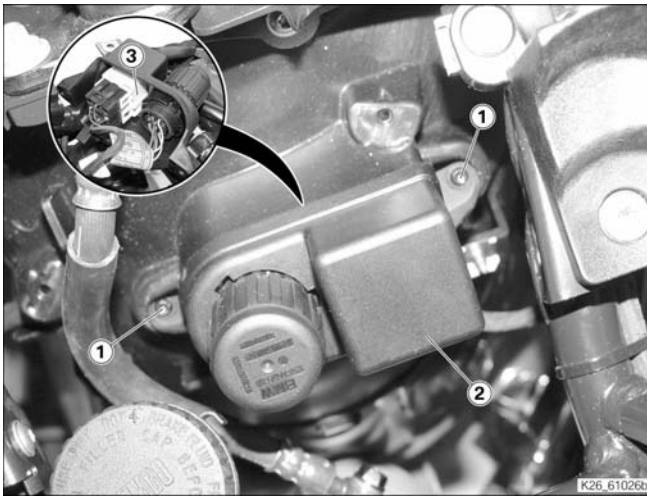
- Cut through the cable ties (arrows) on the rear frame.
- Thread the wiring harness forward out of the way.



Variant, Seat heating

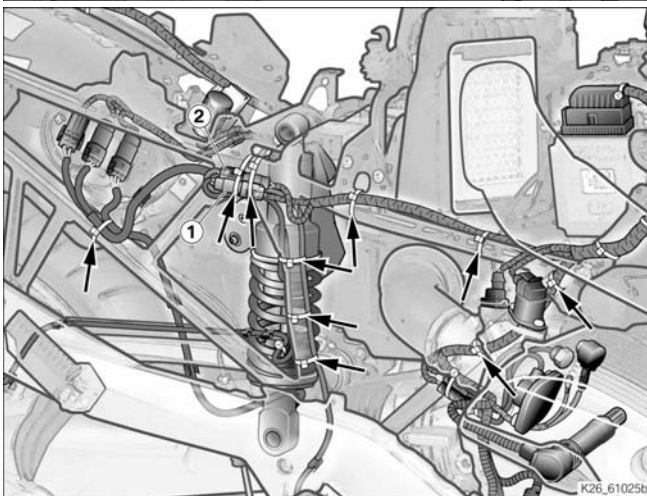
- Remove screws (1).
- Pass holder (2) forward with the cables.

- Remove screws (1) and remove housing (2).
- Unclip starter relay (3) from the housing.
- Remove diagnosis plug (4) from the housing.



Variant, ESA

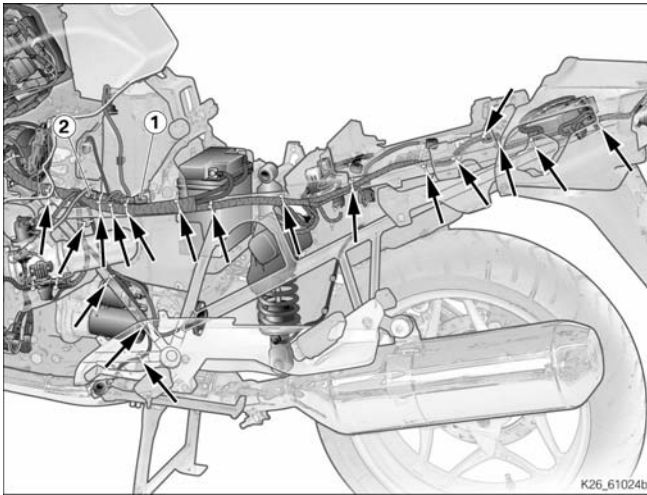
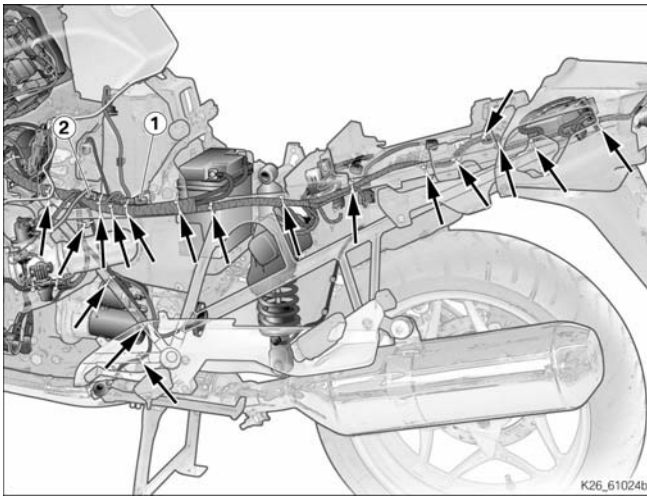
- Remove screws (1).
- Release the cables from the mudguard and frame (arrows).
- Pass holder (2) forward with the cables.
- Disconnect plug (3).



- Disconnect plug (1) of the speed sensor.
- Disconnect plug (2) of the brake-light switch.
- Cut through all cable ties (arrows) on the rear frame at the right-hand side.

Variant, cruise control

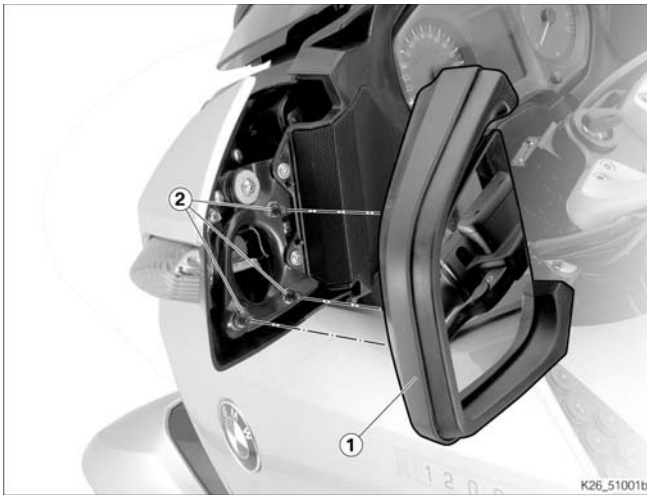
- Disconnect plug (1) of the microswitch at the cable divider.



- Disconnect plug (2) of the side-stand switch.
- Cut through all cable ties (arrows) on the rear frame at the left-hand side.
- Carefully remove the wiring harness.

(-) Removing mirror

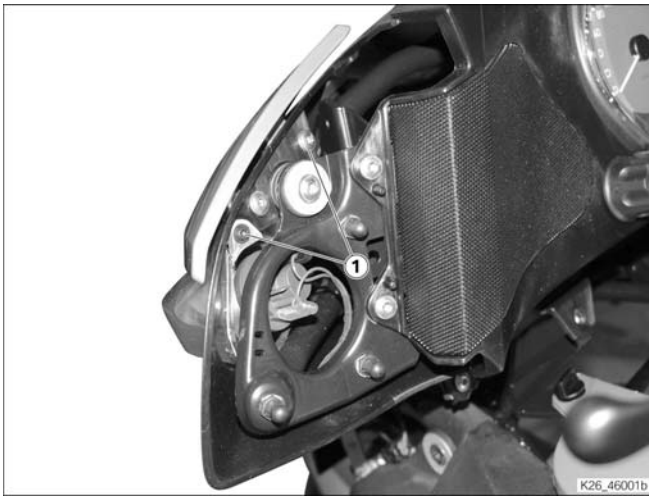
- Detach mirror (1).



Variant, Radio with CD player

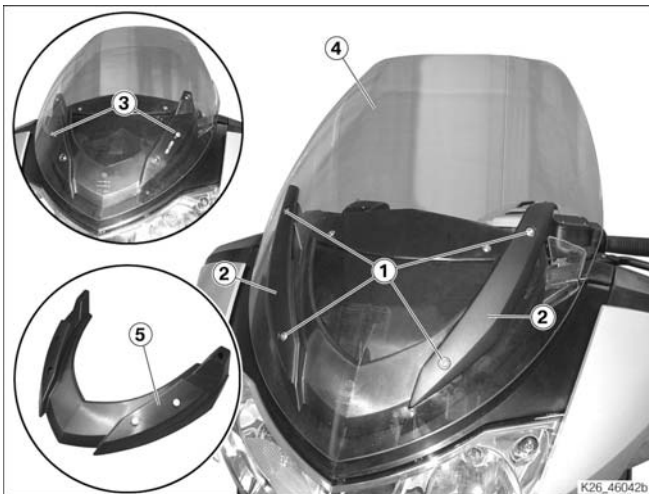
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



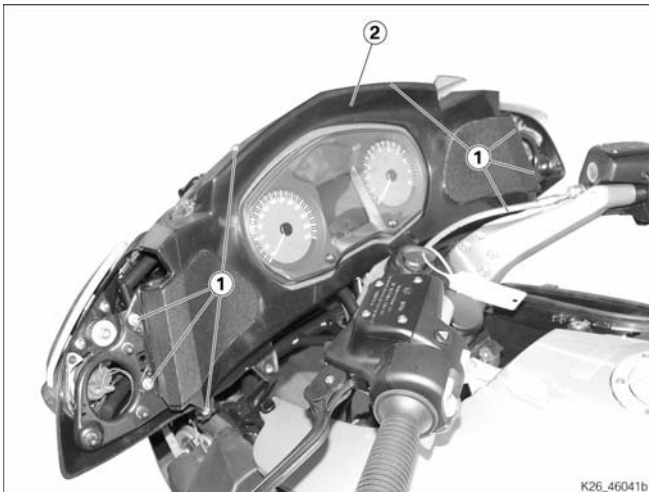
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).



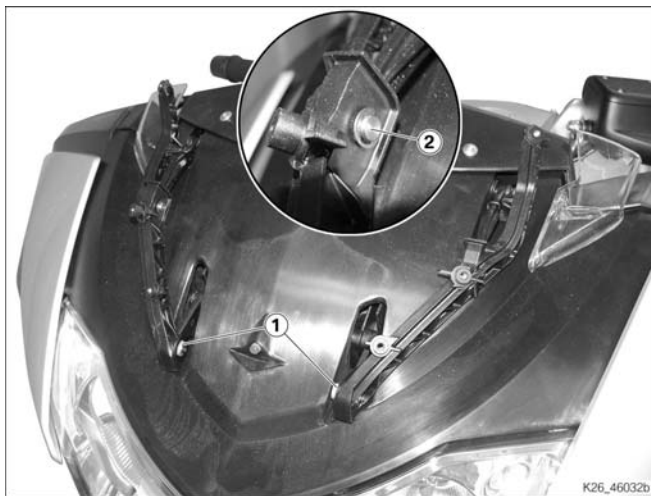
(-) Removing inner trim for instruments

- Remove screws (1).
- Remove inner trim (2).



(-) Partially removing holder for windscreen

- Remove clips (1).
- Press out pin (2).

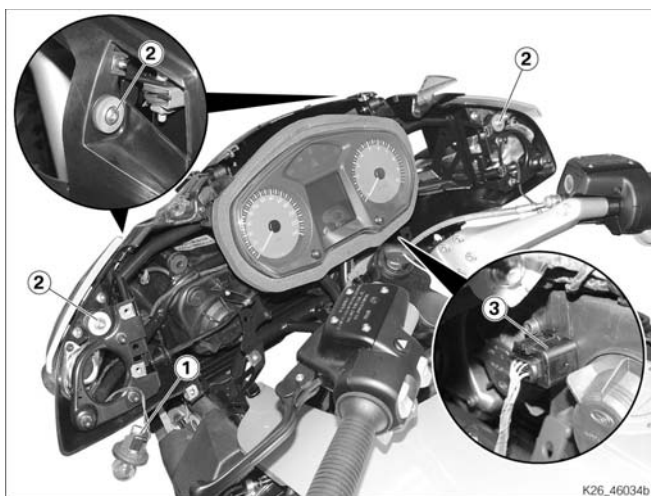


- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

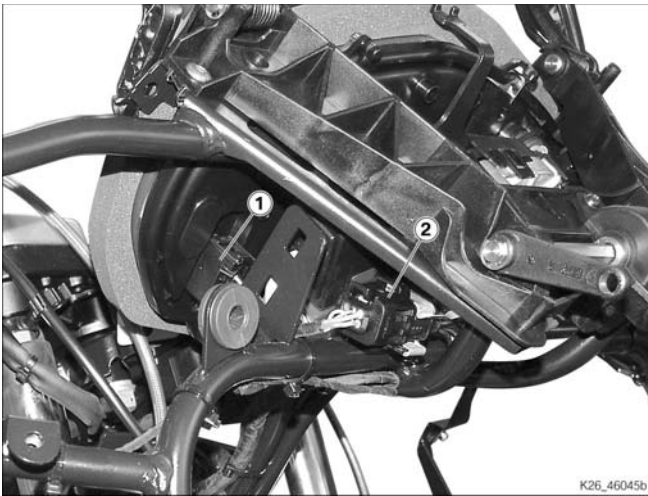
- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

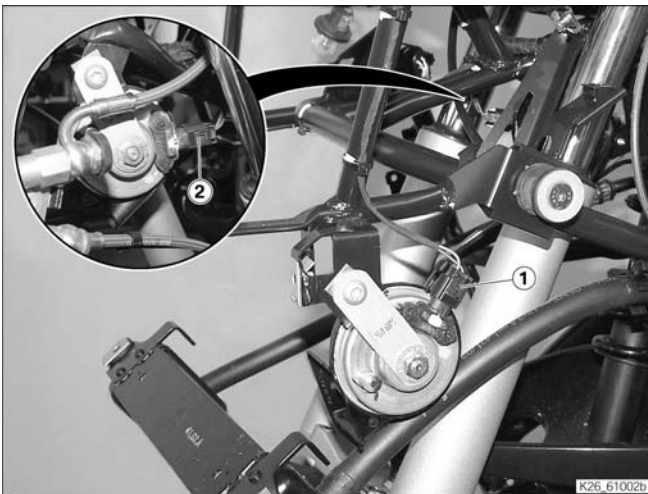
(-) Removing front wiring harness

- Disconnect plugs (1) and (2).



► Removing horn

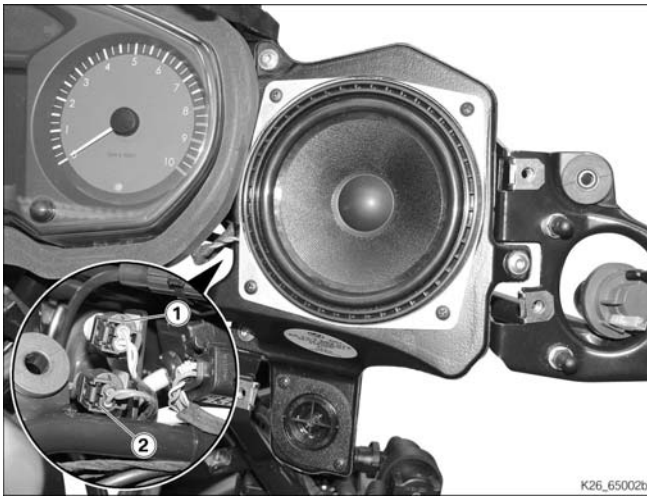
- Disconnect plugs (1) and (2).



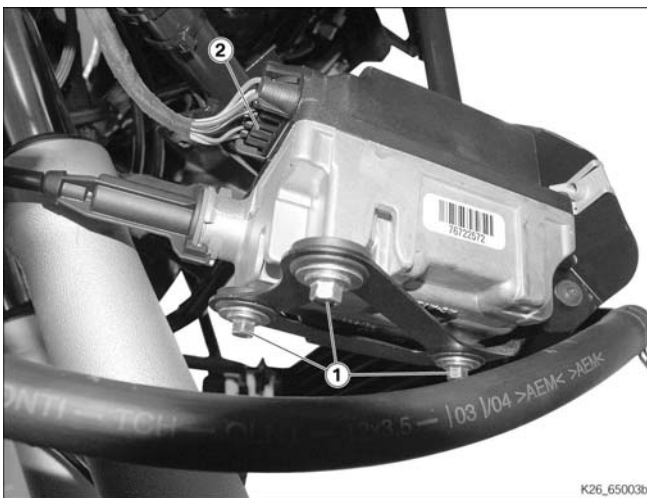
◀ Variant, Radio with CD player

► Removing left and right speakers

- Disconnect plug (1).

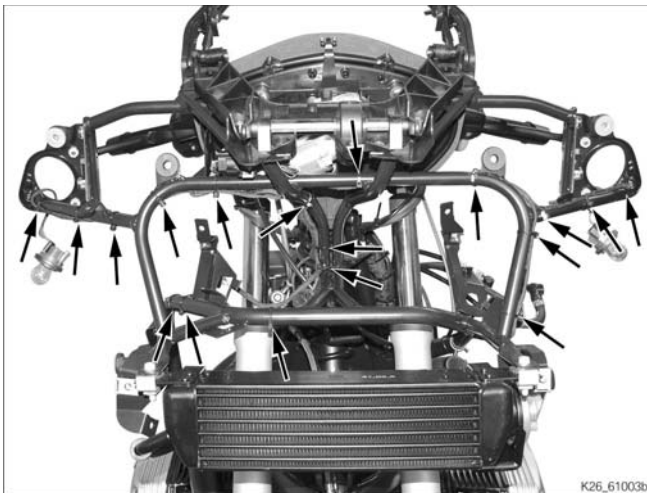


- Disconnect plug (2).



◀ **Variant, cruise control**

- Disconnect plug (2).

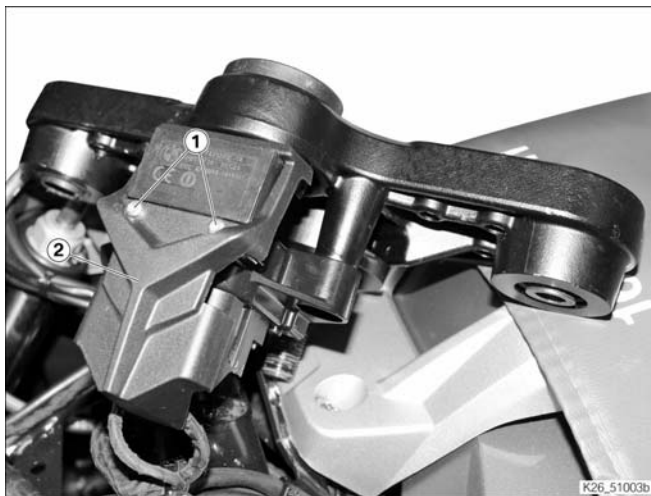


- Cut through all cable ties (arrows) on the fairing bracket.
- Thread the cable clear of the fairing bracket.

(-) Removing wiring harness from engine

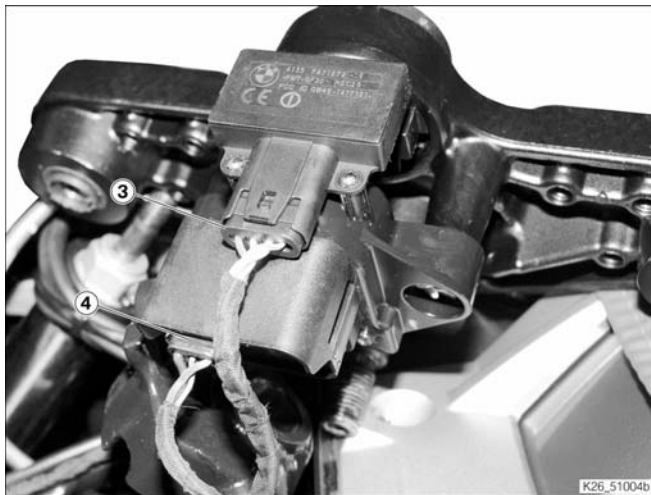
▶ **Disconnecting plug for ignition switch/ring aerial**

- Remove screws (1).
- Remove cover (2).



K26_51003b

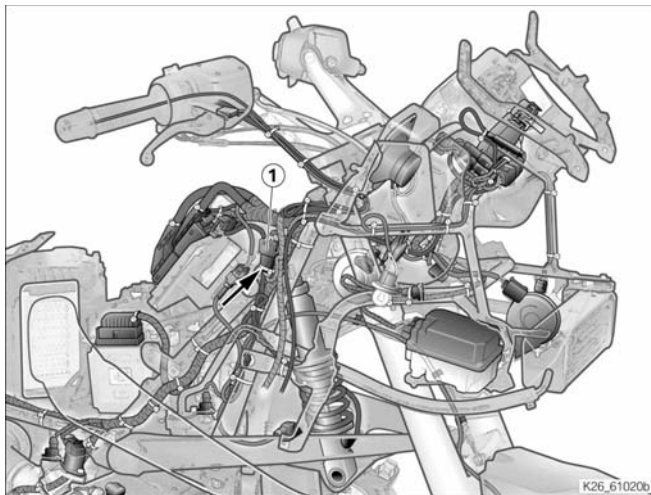
- Disconnect plugs (3) and (4).



K26_51004b

◀ **Variant, Radio with CD player**

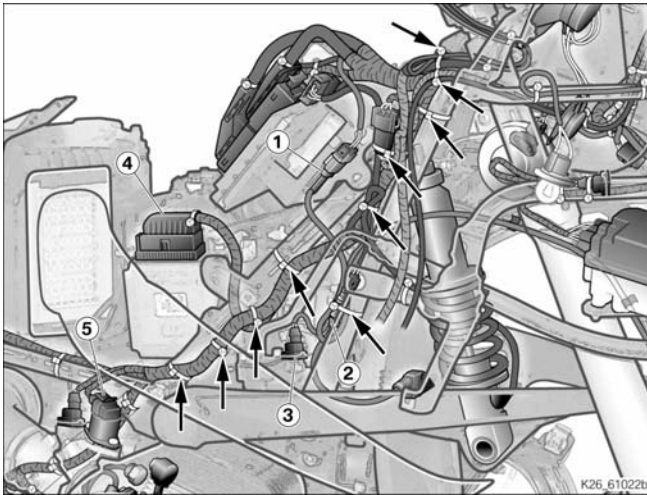
- Open the cable tie (arrow).
- Disconnect plug (1) from the radio wiring harness.



K26_61020b

Variant, ESA

- Disconnect plug (7) of the ESA spring strut.



- Disconnect plug (1) of the ABS sensor.
- Open cable ties (arrows).
- Disconnect plug (2) of the crankshaft sensor.
- Disconnect plug (3) of the temperature sensor.
- Disconnect plug (4) of the pressure modulator.
- Disconnect plug (5) of the idle actuator.



► **Disconnecting plugs of engine sensors, right**

- Disconnect earth lead (1) from the cylinder head.
- Disconnect knock sensor (2).
- Disconnect temperature sensor (3).
- Disconnect speed sensor for camshaft (4).

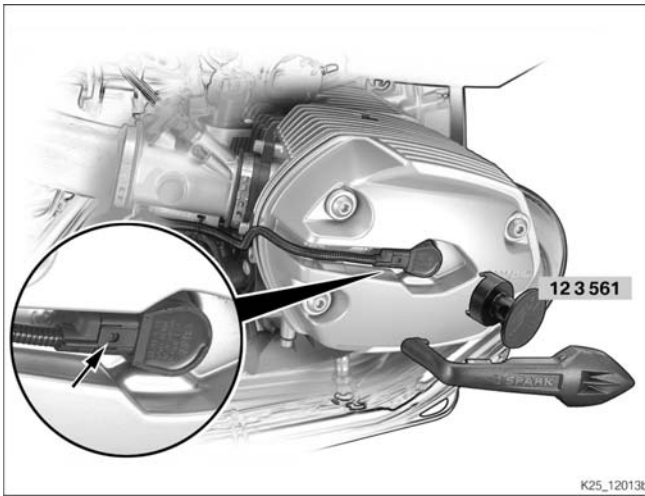


► **Removing both primary spark plug ignition coils**

Precondition

- Ignition is switched OFF





- Remove primary spark plug covers.

⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

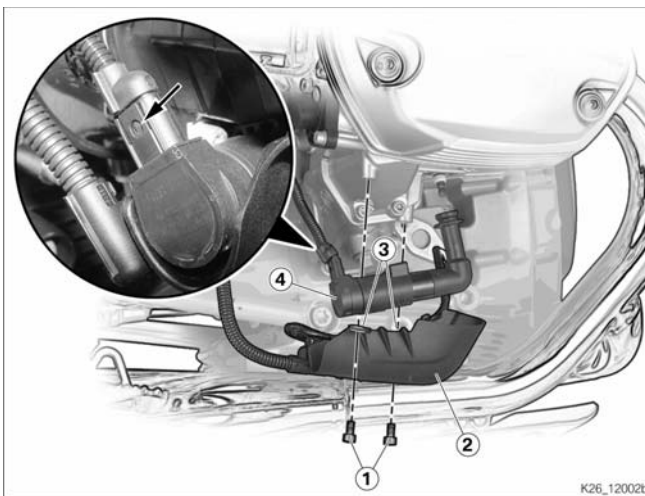
- Push plug (arrow) away from the latching tabs and carefully pull the cable to disconnect the plug.
- Use the puller for direct ignition coils (No. 12 3 561) to remove the primary spark plug direct ignition coils.

▶ Removing secondary spark plug ignition coils

Precondition

- Ignition is switched OFF

- ▶ **▶** Slacken screws (1) and remove cover (2) with sleeves (3).



⚠ Attention

Nature: The locking tab can be broken off if the correct procedure is not adopted for disconnecting the plug.

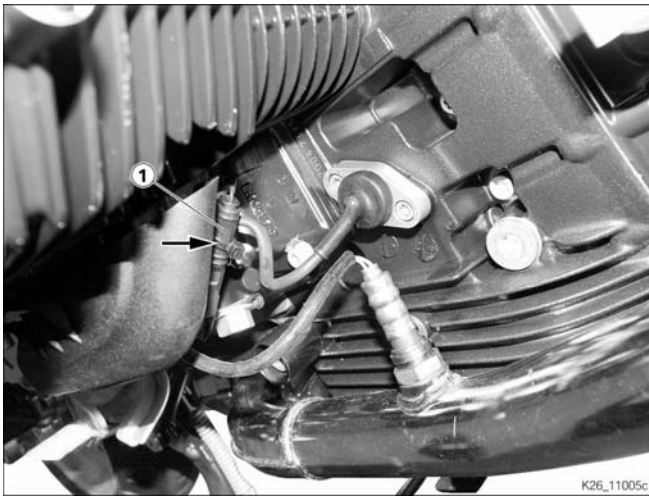
Avoidance: Push the plug away from the locking tab; do not attempt to raise or bend the locking tab.

- Push the plug away from the latching tab (arrow) and carefully pull the cable to disconnect the plug.
- Remove secondary spark plug ignition coils (4).

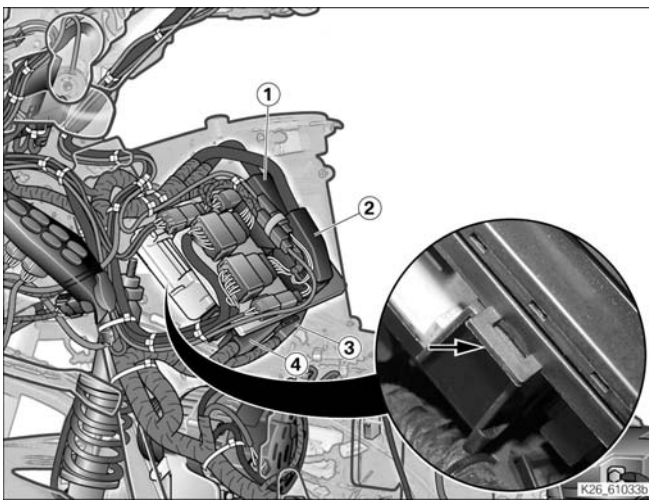
▶ Disconnecting plug for oil-level sensor

Variant, Oil level warner (only in connection with SA 0519 on-board computer)

- Open the cable tie (arrow).
- Disconnect plug (1) of the oil-level sensor.

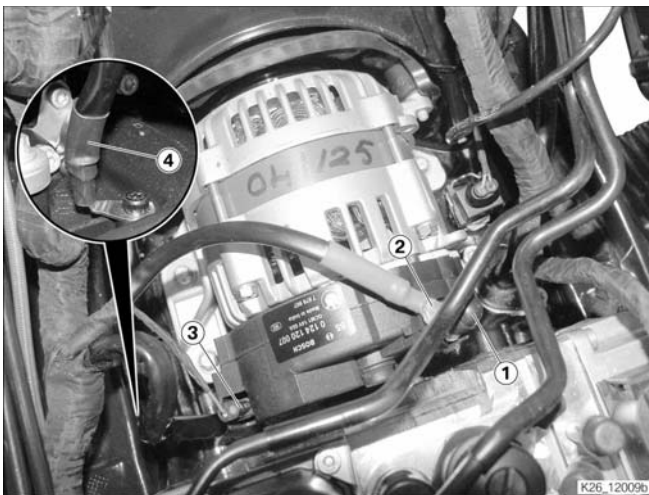


K26_11005c



K26_61033b

- ◀ Disconnect plugs (1) and (2) of the ZFE.
- Open the clip (arrow) and swing the cover up.
- Disconnect plugs (3) and (4) for the control unit.



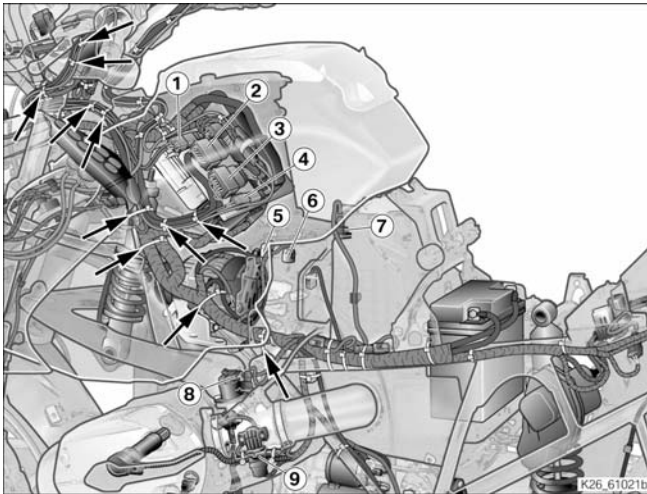
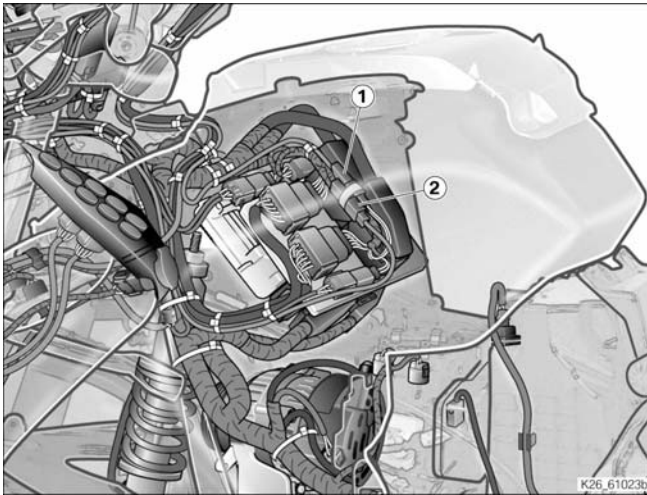
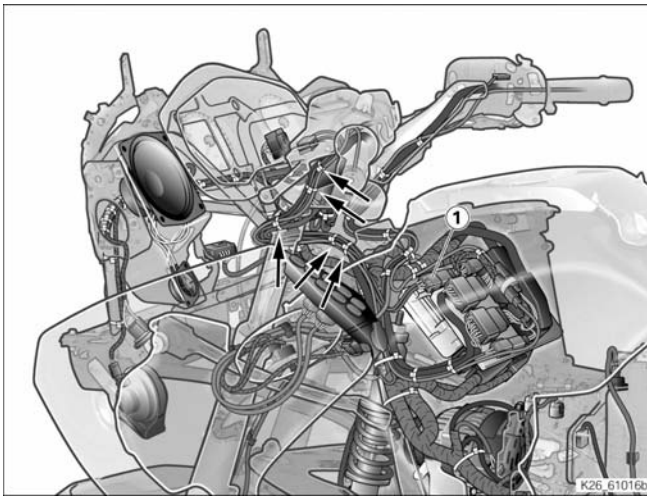
K26_12009b

▶ **Disconnecting cables of alternator**

- Remove cap (1).
- Disconnect "alternator positive" cable (2).
- Disconnect plug (3).
- Disconnect the earth lead from engine block (4).

◀ **Variant, ESA**

- Open cable ties (arrows).
- Disconnect plug (1).



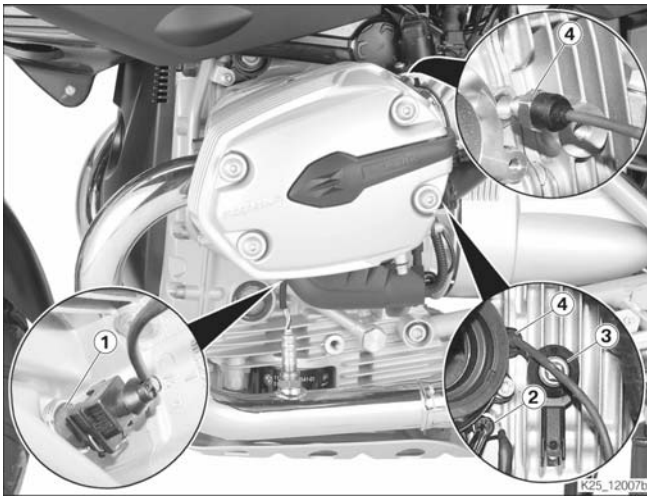
Variant, Heated handlebar grips

- Disconnect plugs (1) and (2).

- Open cable ties (arrows).
- Disconnect plug (1) of clutch switch.
- Disconnect plugs (2) and (3) of the multifunction switches.
- Disconnect plug (4) of the brake-light switch.
- Disconnect plugs (5) and (6) for the pressure modulator.
- Disconnect plug (7) of the intake-air temperature sensor and disengage the cable from the intake air silencer.
- Disconnect plug (8) of the idle actuator.
- Disconnect plug (9) of the of throttle-valve potentiometer.

► Disconnecting plugs of engine sensors and switches, left

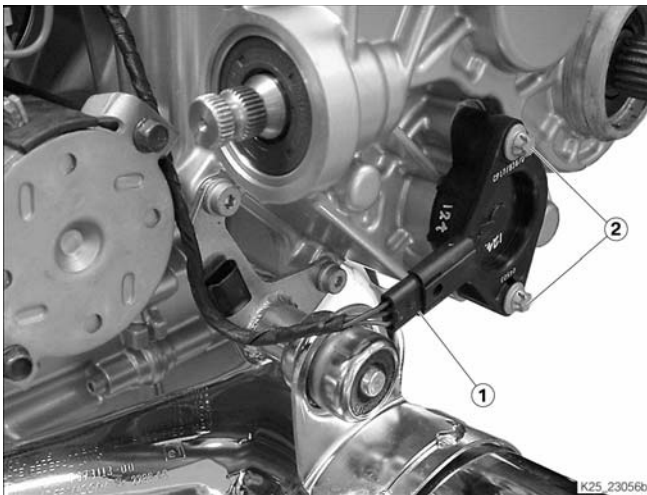
- Disconnect oil-pressure switch (1).
- Disconnect earth lead (2) from the cylinder head.
- Disconnect knock sensor (3).
- Disconnect temperature sensor (4).



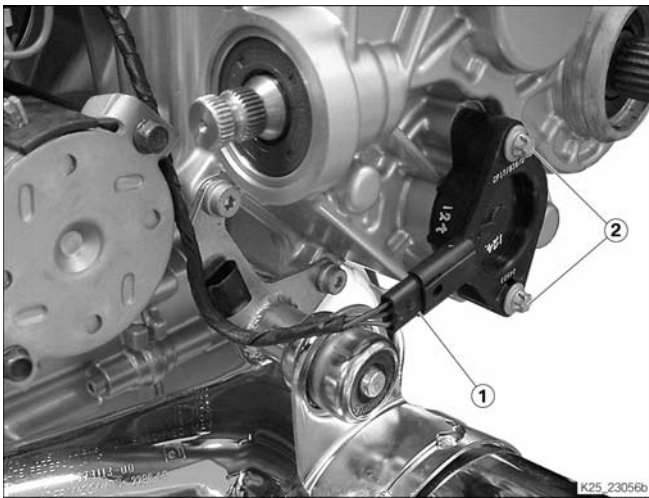
- Remove cable (1).
- Disconnect plug (2).



- Disconnect plug (1) of the gearbox potentiometer.




- Remove the wiring harness from the motorcycle.
- (-) Installing wiring harness for engine**
- Position the wiring harness on the motorcycle and align it.
 - Connect plug (1) to the gearbox potentiometer.
 - Clip the cable into the cable clips.

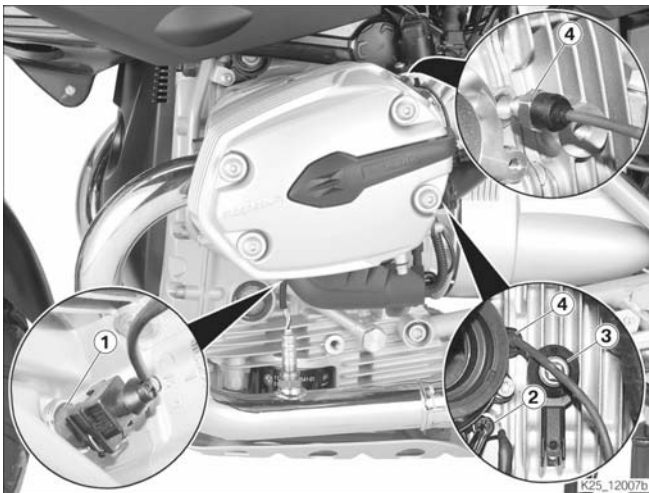


- Connect "starter positive" cable (1) (terminal 30).




 Tightening torques		
Hex nut, M8	10 Nm	

- Connect "starter start signal" plug (2) (terminal 50).



► **Connecting plugs of engine sensors and switches, left**

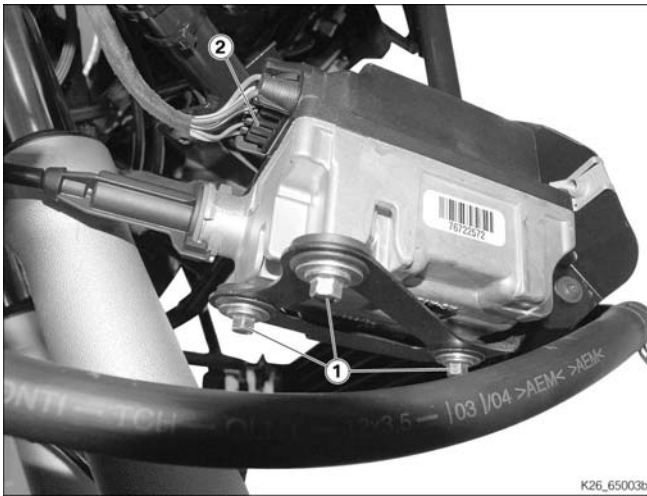
- Connect oil-pressure switch (1).
- Secure earth lead (2) to the cylinder head.

 Tightening torques		
left and right, M6 x 10	8 Nm	

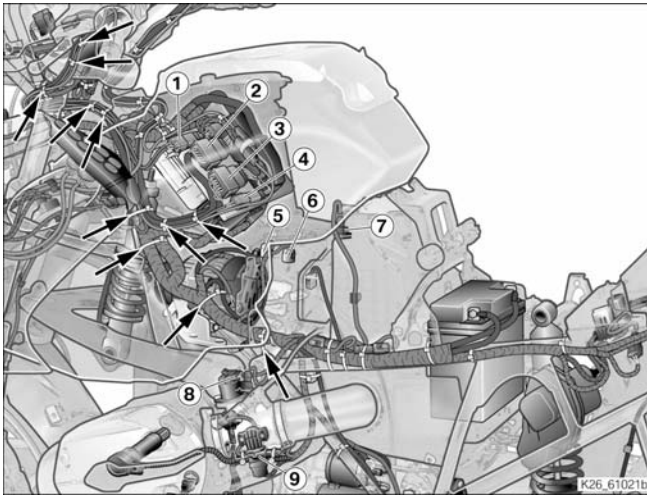
- Connect knock sensor (3).
- Connect temperature sensor (4).

◀ **Variant, cruise control**

- Connect plug (2).



K26_65003b

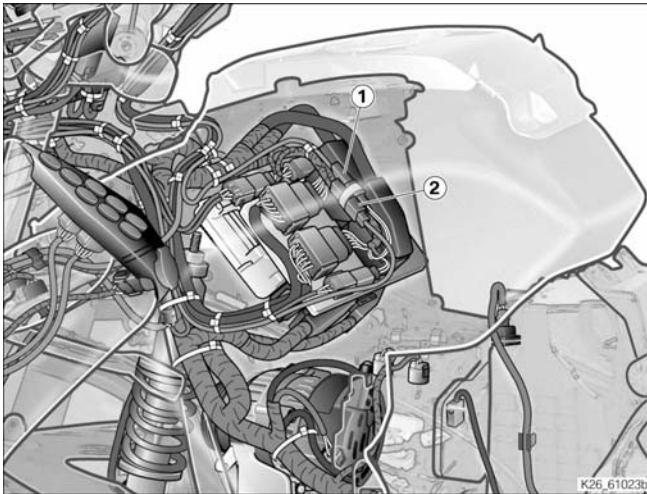


K26_61021b

- Connect plug (9) for the throttle-valve potentiometer.
- Connect plug (8) for the idle actuator.
- Connect plug (7) of the intake-air temperature sensor and secure the cable to the intake air silencer.
- Connect plugs (5) and (6) for the pressure modulator.
- Connect plug (4) of the brake-light switch.
- Connect plugs (2) and (3) of the multifunction switches.
- Connect plug (1) of the clutch switch.
- Close cable ties (arrows).

Variant, Heated handlebar grips

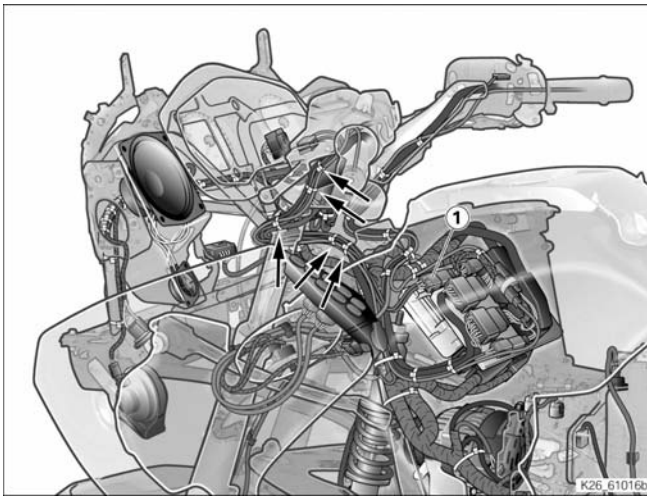
- Connect plugs (1) and (2).



K26_61023b

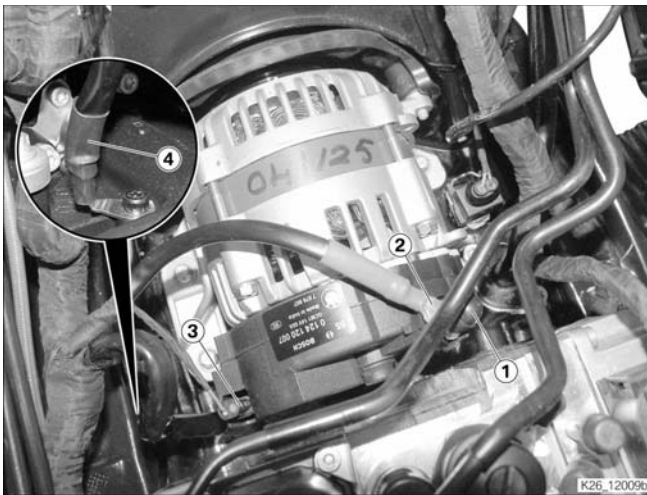
Variant, ESA

- Connect plug (1).
- Close cable ties (arrows).



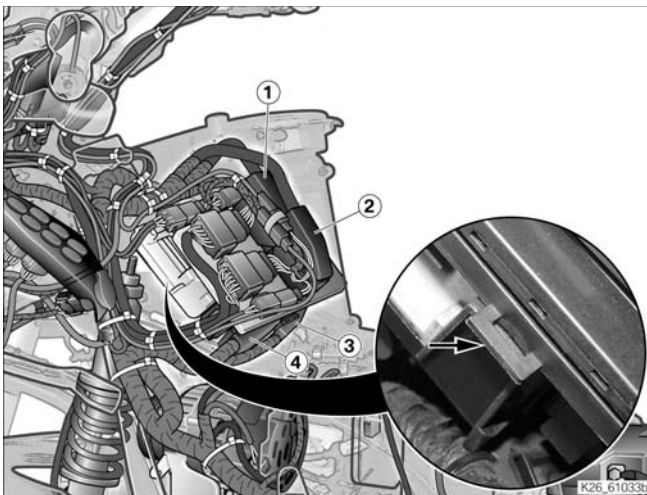
► **Connecting cables of alternator**

- Connect "alternator positive" cable (2).



Tightening torques		
Flange nut, M6	6 Nm	

- Install cap (1).
- Connect plug (3).
- Connect the earth lead to engine block (4).

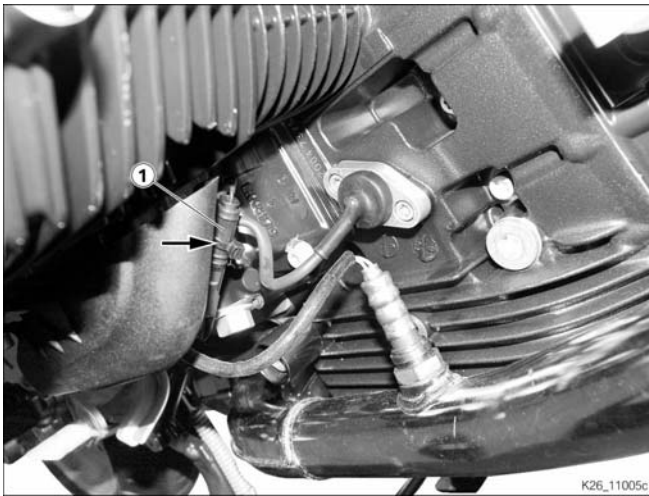


- Open the clips (arrows) and swing the cover up.
- Connect plugs (3) and (4) for the control unit.
- Close the cover, making sure the clips are correctly seated.
- Connect plugs (1) and (2) of the ZFE.

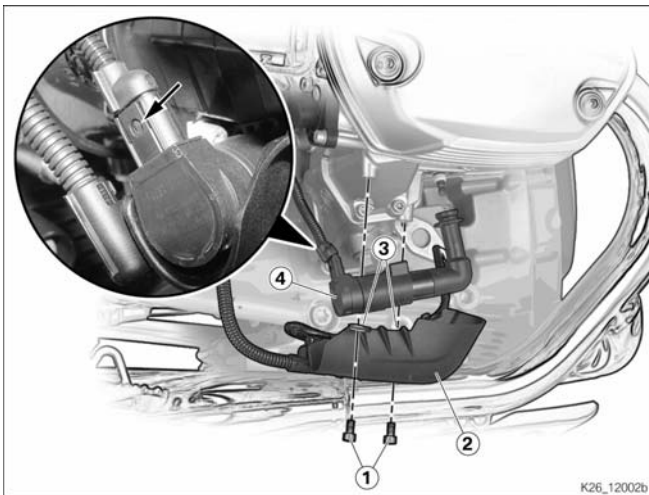
► **Securing plug for oil-level sensor**

Variant, Oil level warner (only in connection with SA 0519 on-board computer)

- Connect plug (1) of the oil-level sensor.
- Secure the cable of the oil-level sensor with a cable tie



(arrow).



▶ **Installing secondary spark plug coil**

- Push on secondary spark plug coil (4) until seated and push the rubber cover into position at the spark plug.



Consumables/lubricants

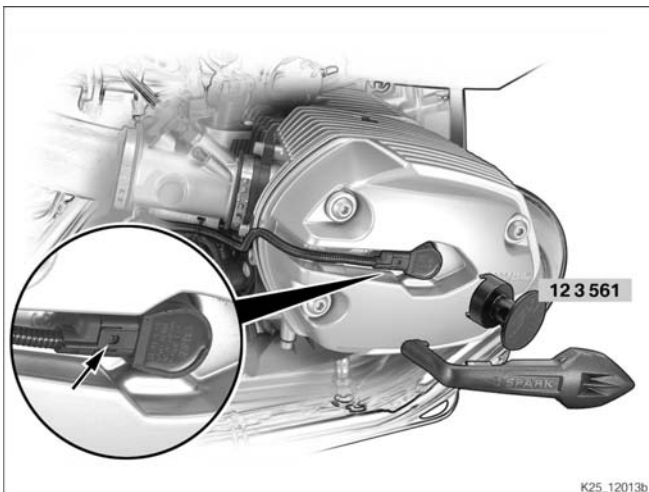
Talcum powder	Assembly aid	
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- Connect the plug to the secondary spark plug ignition coil.
- Place cover (2) in position, noting sleeves (3), and tighten screws (1) to secure.



Tightening torques

Cover, secondary spark plug coil to cylinder head, M6 x 12	8 Nm	
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▶ **Installing direct ignition coil**

- Use special tool for direct ignition coil (No. 12 3 561) to install the direct ignition coil, making sure that the coil is correctly seated.
- Connect the plug to the direct ignition coil.
- Close the spark plug cover.

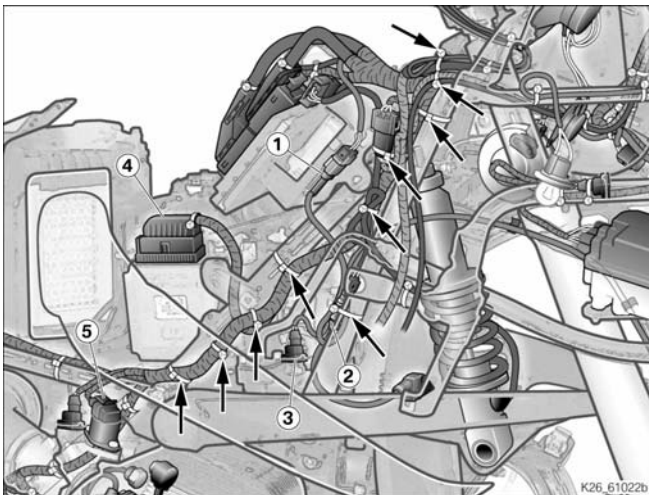


▶ **Connecting plugs of engine sensors, right**

- Secure earth lead (1) to the cylinder head.

Tightening torques		
left and right, M6 x 10	8 Nm	

- Connect knock sensor (2).
- Connect temperature sensor (3).
- Connect speed sensor for camshaft (4).



- Connect plug (5) for the idle actuator.
- Connect plug (4) of the pressure modulator.
- Connect plug (3) of the temperature sensor.
- Connect plug (2) of the crankshaft sensor.
- Close cable ties (arrows).
- Connect plug (1) for the ABS sensor.

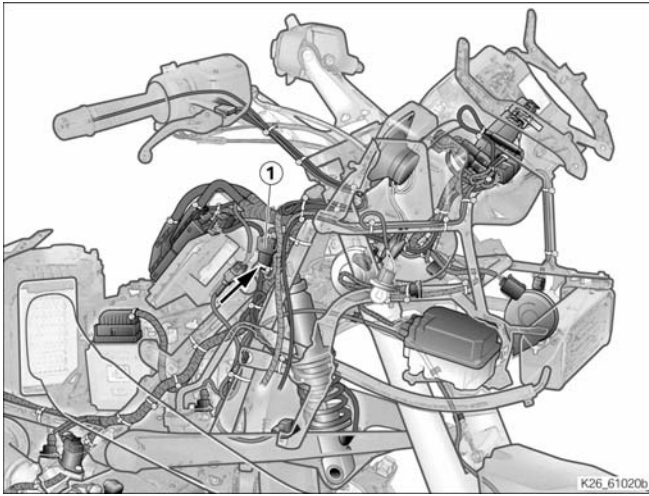


Variant, ESA

- Connect plug (7) of the ESA spring strut.

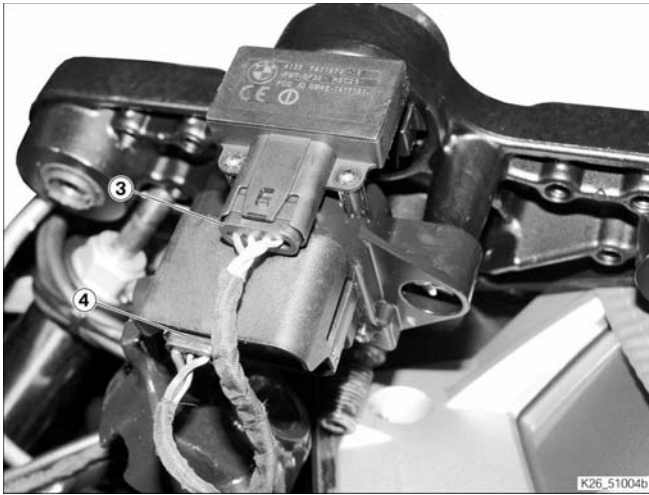
Variant, Radio with CD player

- Connect plug (1) for the radio wiring harness.
- Secure the cable (arrow) with cable ties.



► **Connecting plug for ignition switch/ring aerial**

- Connect plugs (3) and (4).



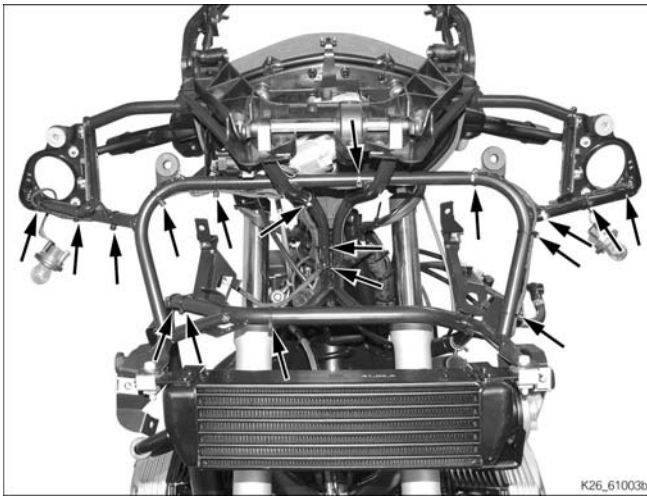
- Install cover (2) and secure with screws (1).



◄ **(-) Installing front wiring harness**

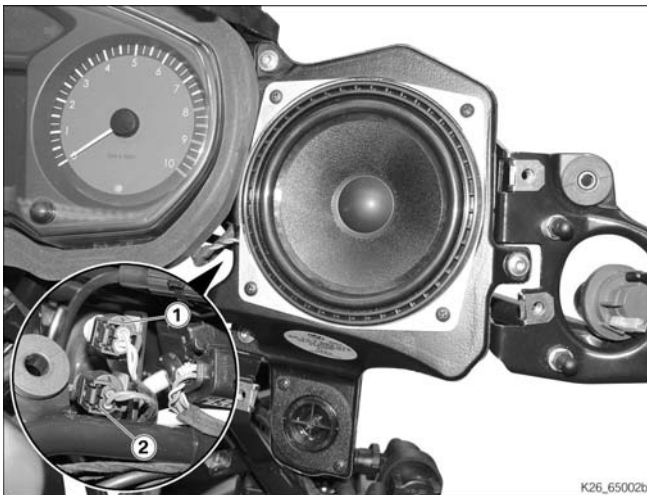
 **Attention**

Nature: Incorrectly routed electrical cables can cause cable breaks/open circuits and chafing.



Avoidance: Always take care to route cables correctly.
Note the number of cable ties, and where the individual ties are installed.

- Thread the cable through the fairing bracket, making sure that cable routing is correct.
- Secure the wiring harness to the fairing bracket with cable ties (arrows).



Variant, Radio with CD player

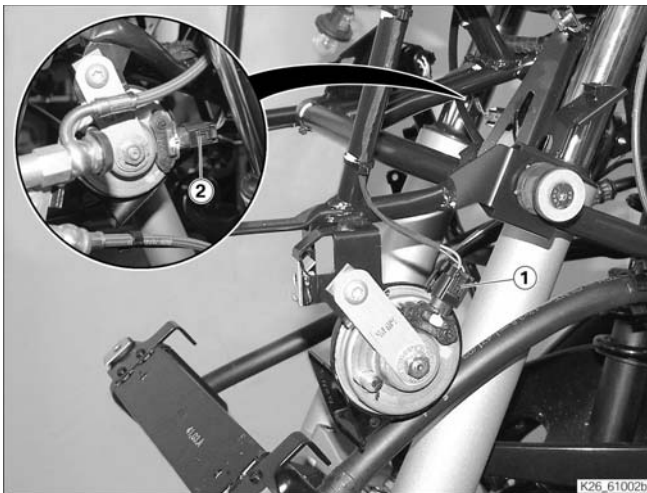
▶ **Securing left and right speakers**

- Secure plug (2).
- Secure plug (1).

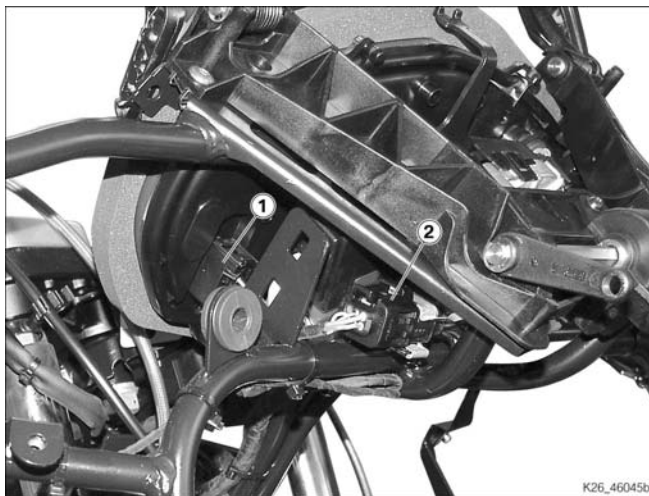


▶ **Securing horn**

- Secure plugs (1) and (2).



- Connect plugs (1) and (2).




(-) Installing entire top section of fairing

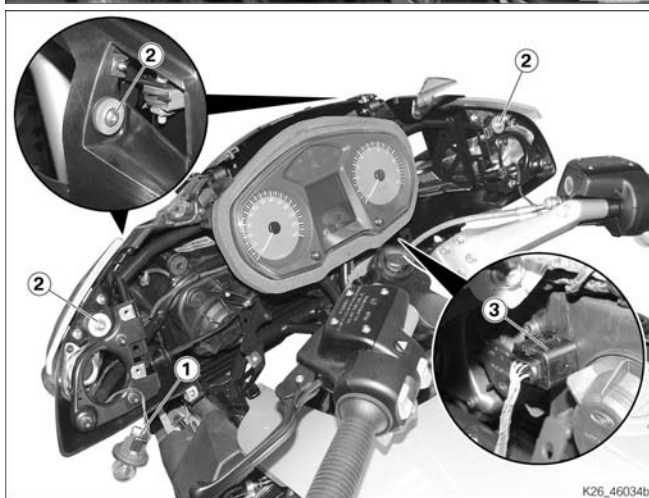
- Carefully place upper section of fairing in position.

Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



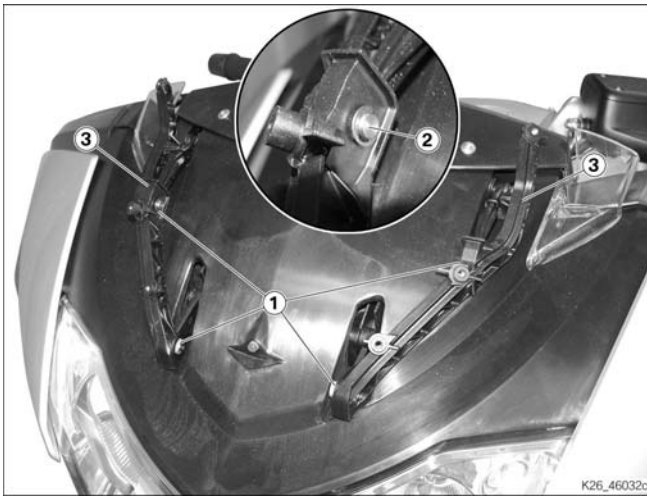
 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	



- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.

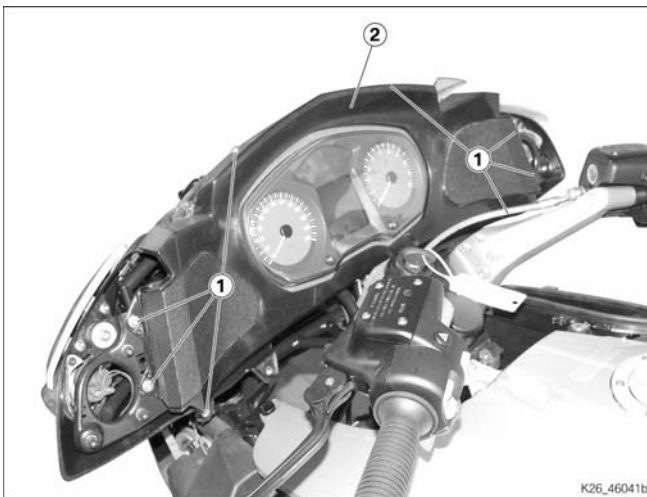
(-) Installing bracket for windscreen

- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).



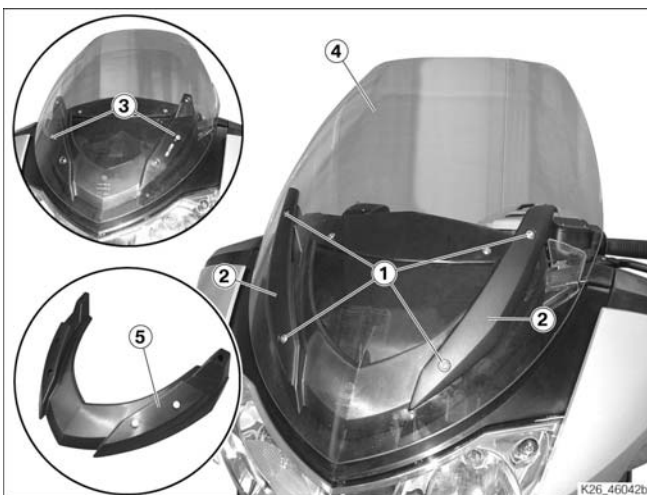
(-) Installing inner trim for instruments


- Place inner trim (2) in position.
- Install screws (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.



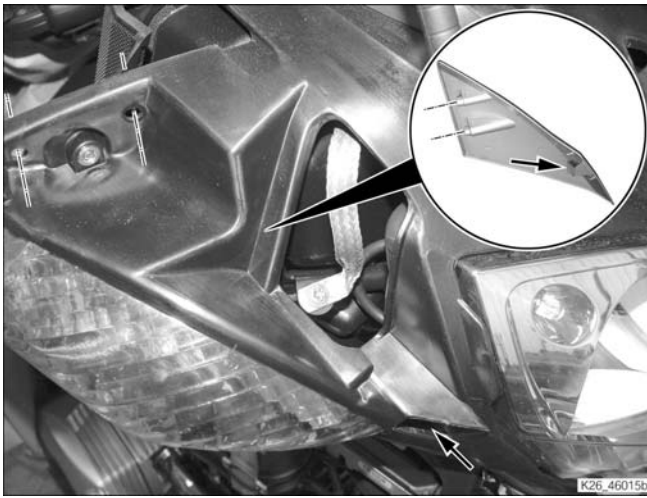
 Tightening torques		
Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	

- Fit left and right trim panels (2) and secure with screws (1).

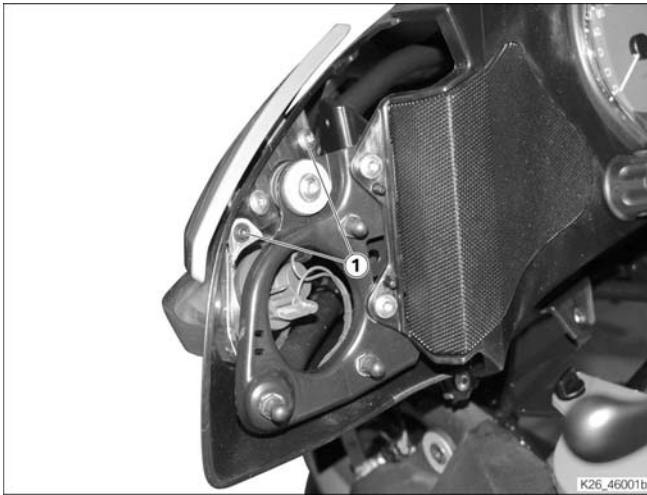
Variant, Radio with CD player

(-) Installing both left and right mirror trim panels

- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



- Install screws (1).

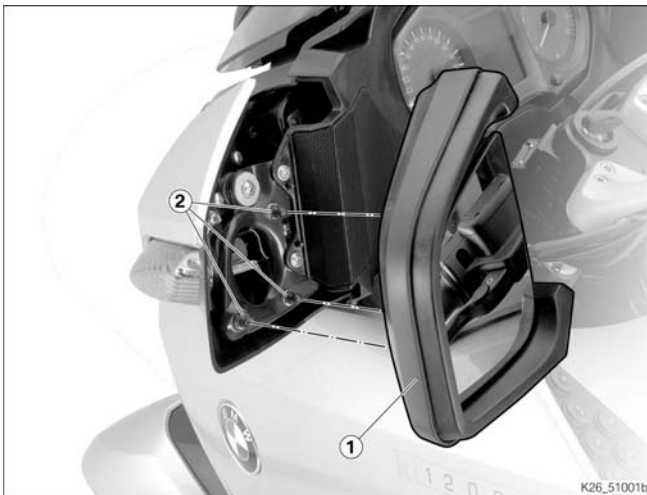


(-) Installing mirrors

Attention

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

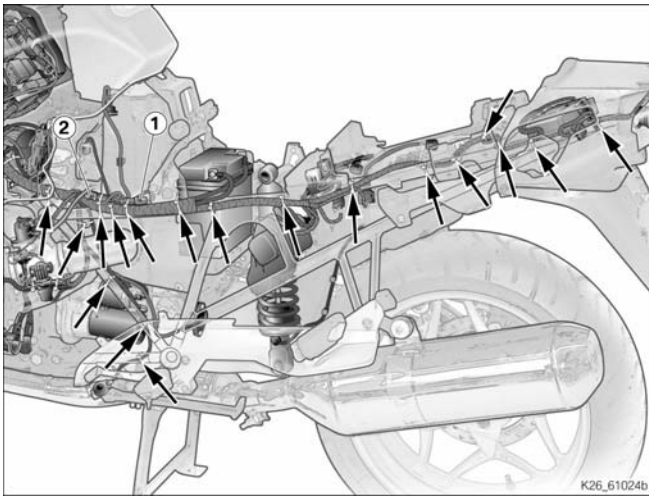
Avoidance: Do not grease the rubber holder or snap-fit stud.



- Press mirror (1) in forward direction on to snap-fit studs (2).

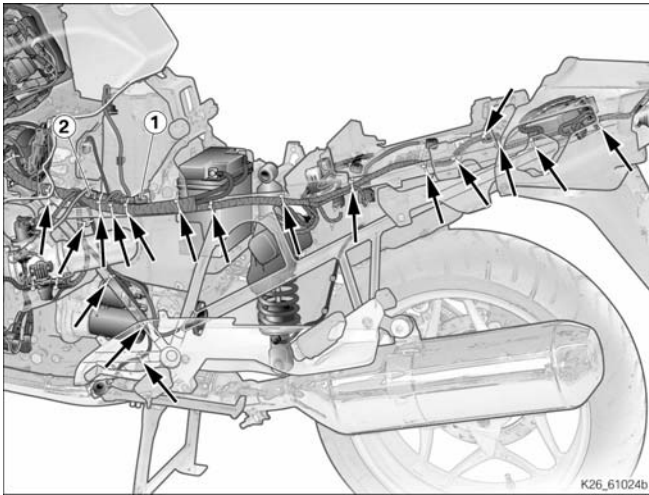
(-) Installing rear wiring harness

- Disengage the wiring harness and thread it through to the rear, making sure that cable routing is correct.
- Connect plug (2) for the side-stand switch.

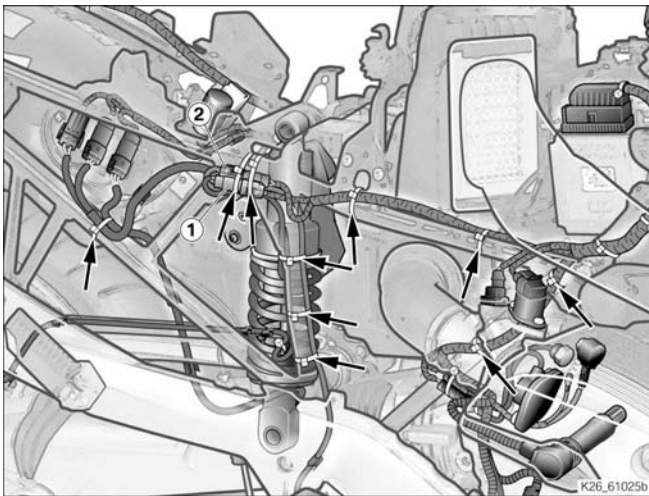


Variant, cruise control

- Connect plug (1) of the microswitch at the cable divider.

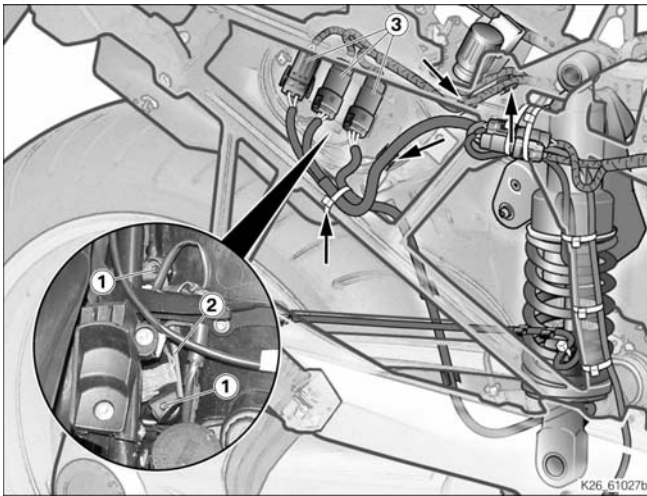


- Connect plug (2) of the brake-light switch.
- Connect plug (1) of the speed sensor.

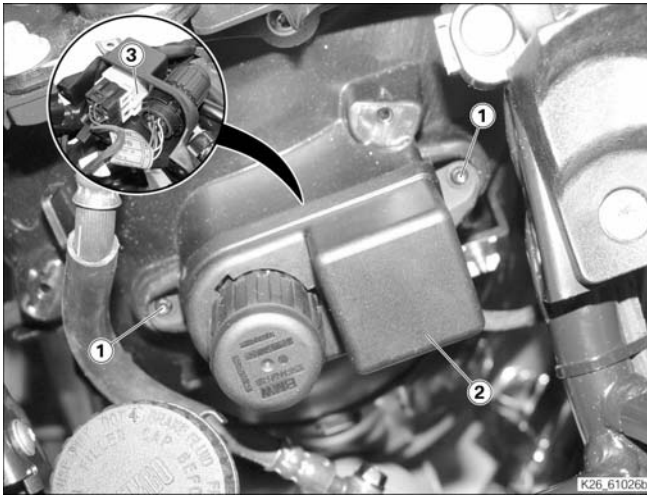


Variant, ESA

- Connect plug (3).
- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Secure the cables to the mudguard and frame (arrows).
- Secure holder (2) with screws (1).

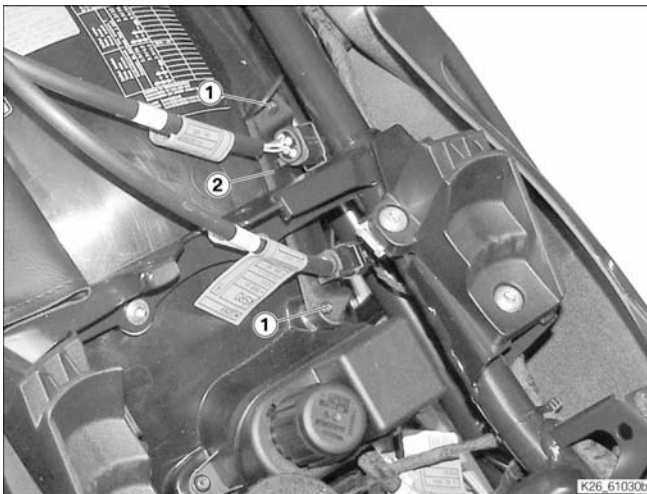


- Clip diagnosis plug (4) and starter relay (3) into housing (2).
- Secure housing (2) with screws (1).

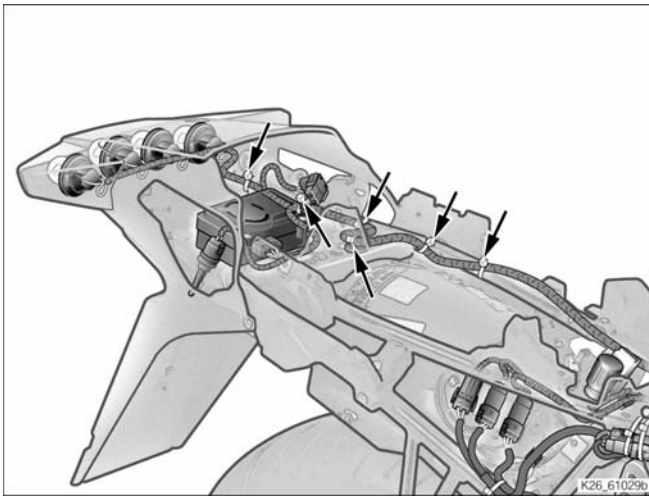


Variant, Seat heating

- Pass holder (2) with the cables through to the rear, making sure that cable routing is correct.
- Install holder (2) with screws (1).

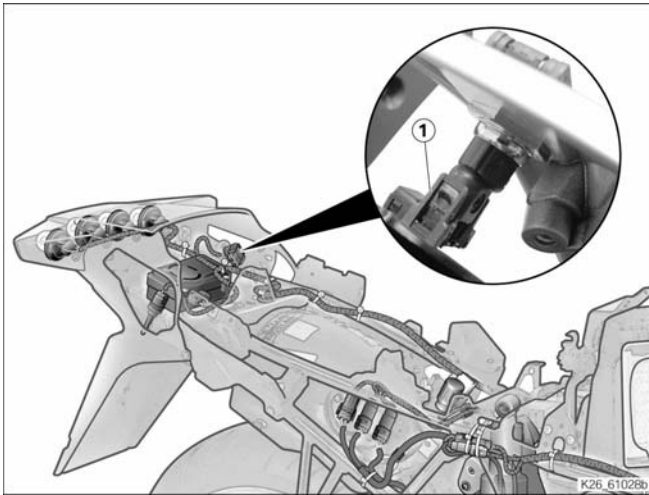


- Secure the wiring harness to the rear frame with cable ties (arrows).



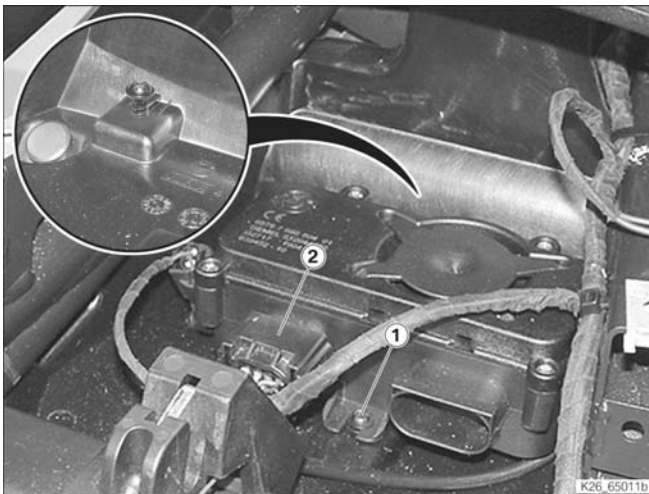
Variant, 2nd socket outlet

- Connect plug (1) of the on-board socket.



Variant, Anti-theft alarm

- Connect plug (2) of the anti-theft alarm.



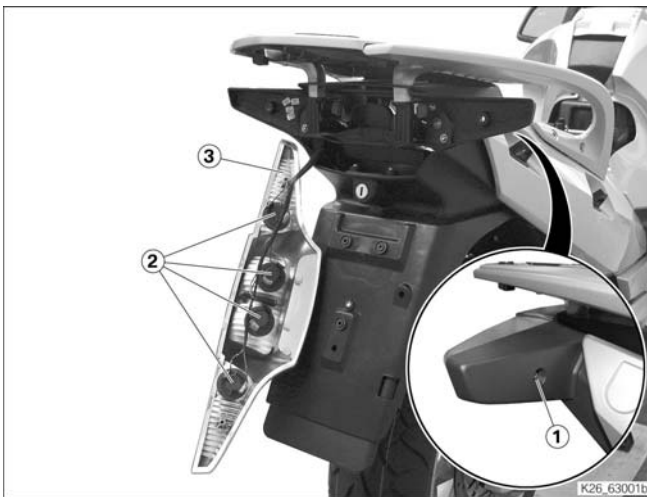
Variant, On-board computer

- Connect plug (1) of the temperature sensor.



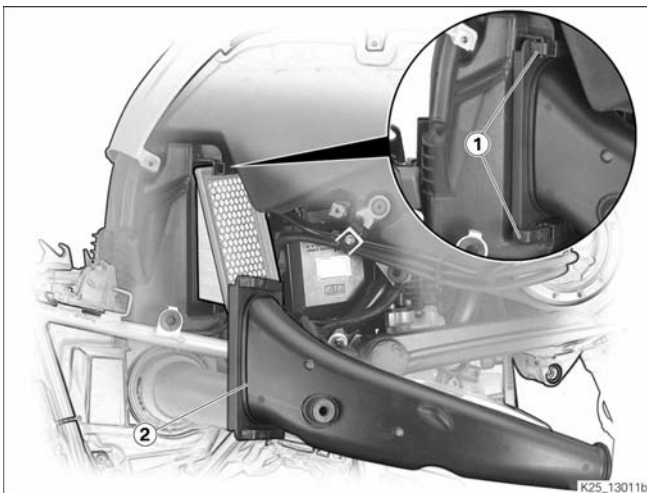
(-) Installing rear-light unit

- Connect plug to bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).

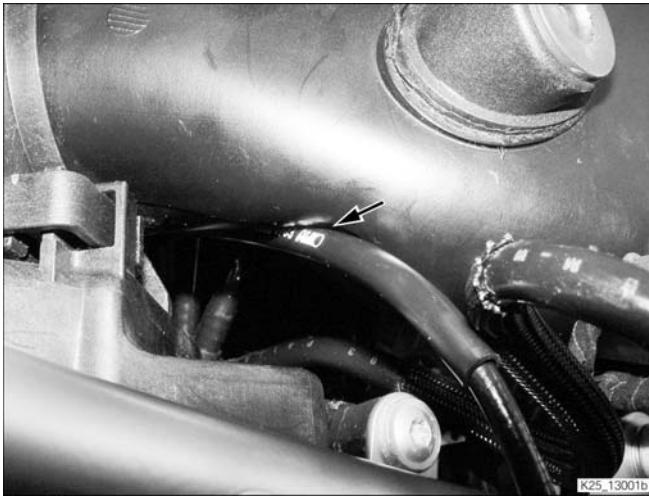


(-) Installing intake air pipe

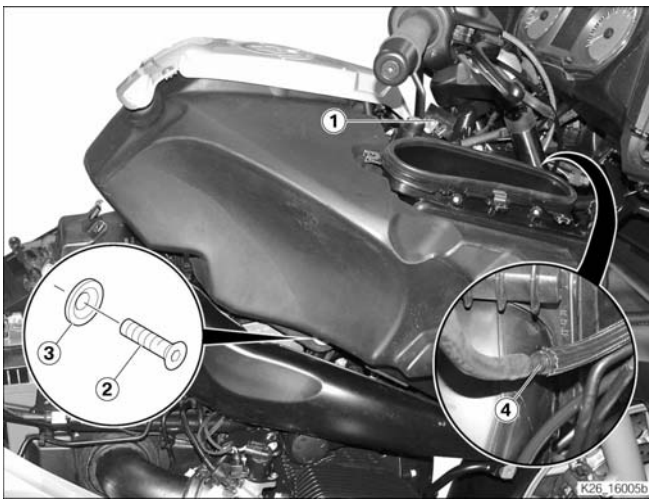
- Hold intake air pipe (2) in position on the air filter housing and push it in until retaining hoops (1) engage with an audible click.
- Make sure that the front guide of the intake air pipe is fully seated in the rubber sleeve.



- Check that the throttle-valve cable is seated in the guide of the intake (arrow) and that the throttle valve is seated against the stop.

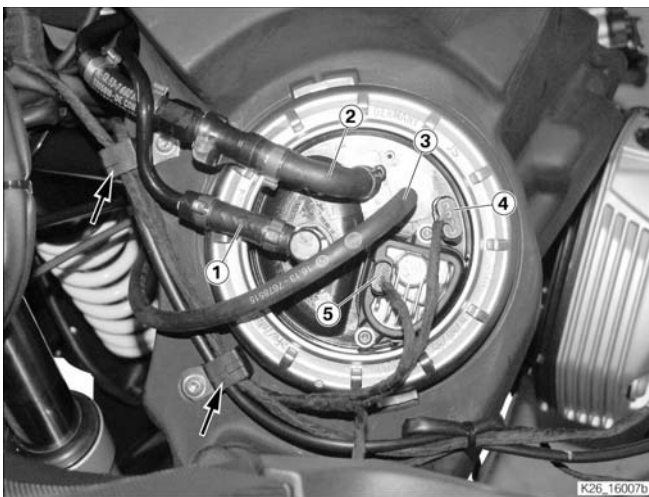


(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

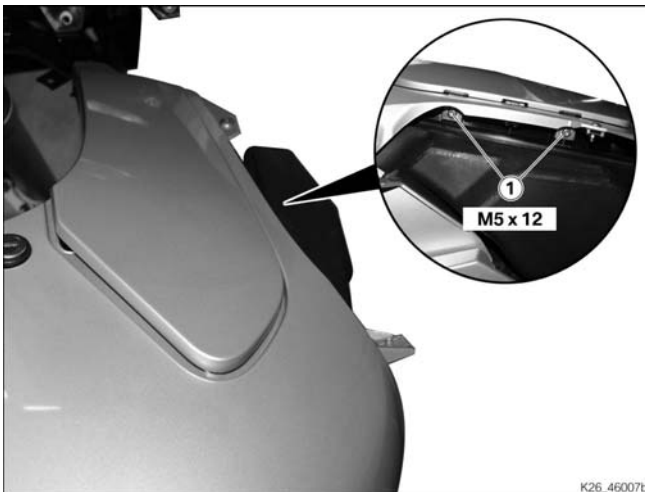
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



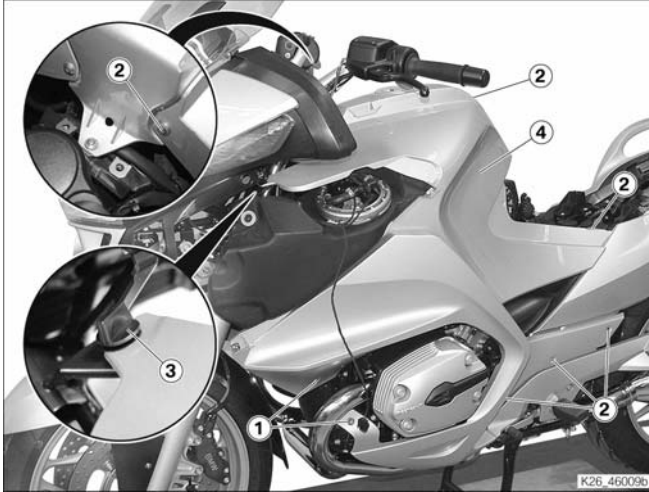
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

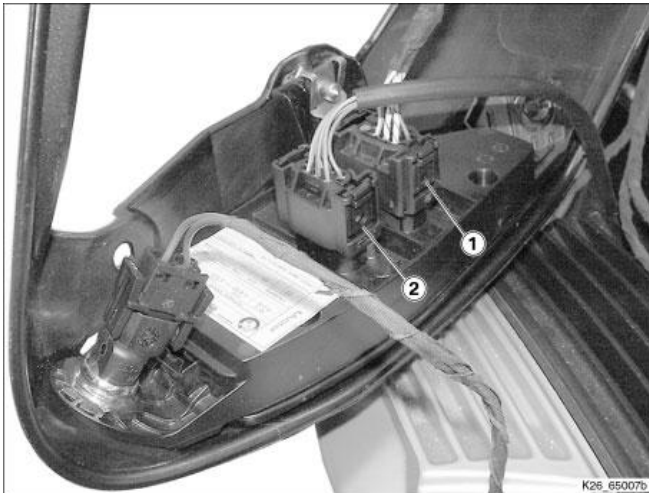
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).

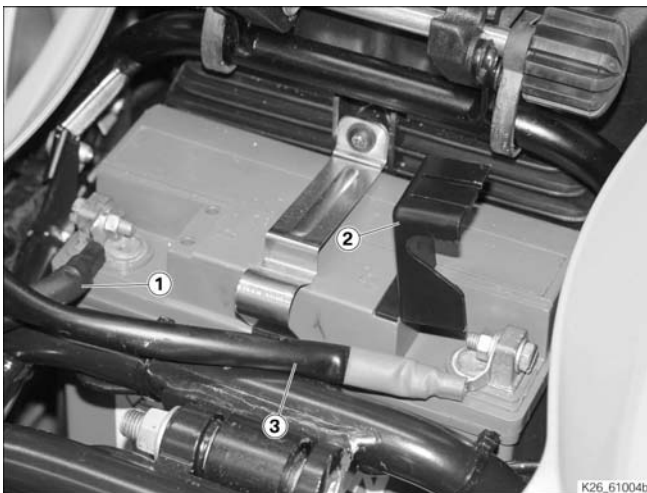


(-) Connecting battery

Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.
Never install the battery without the protective cap.



- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Installing seat

- Introduce the front seat into the front latching



mechanism.

- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **61 12 115 Removing and installing or replacing wiring harness for radio**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

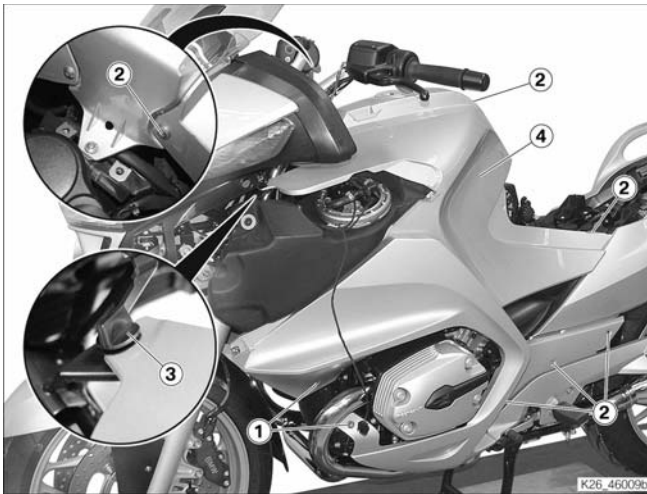


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

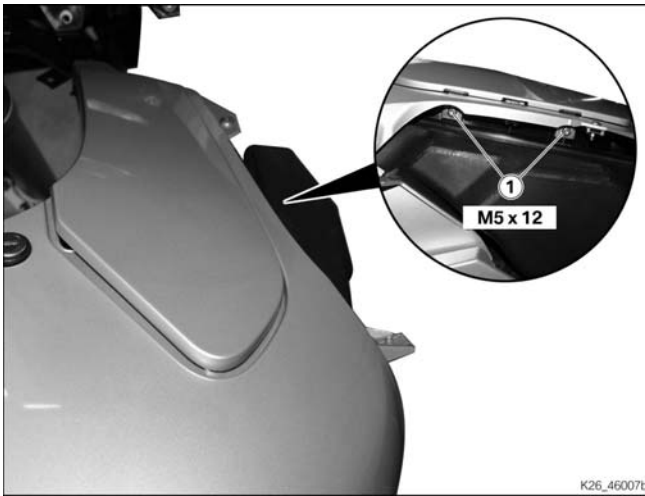
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



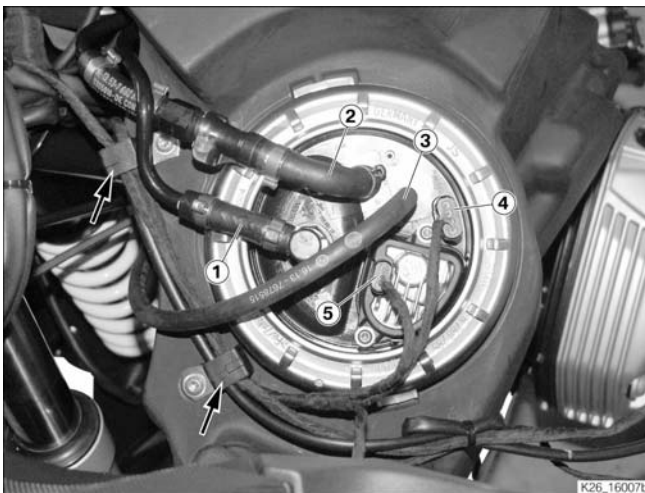
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

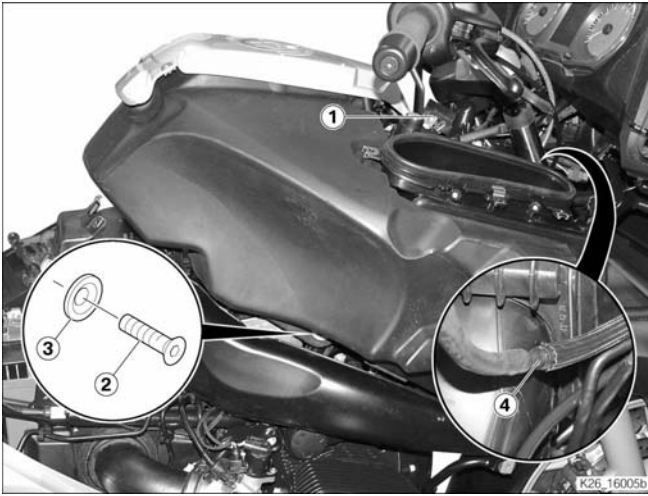


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

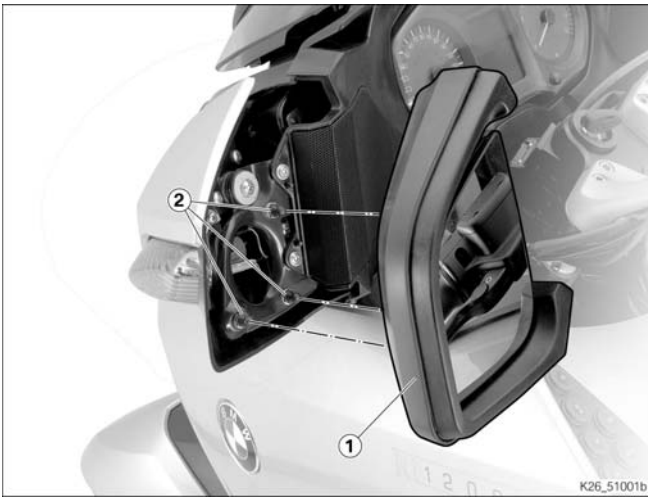


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



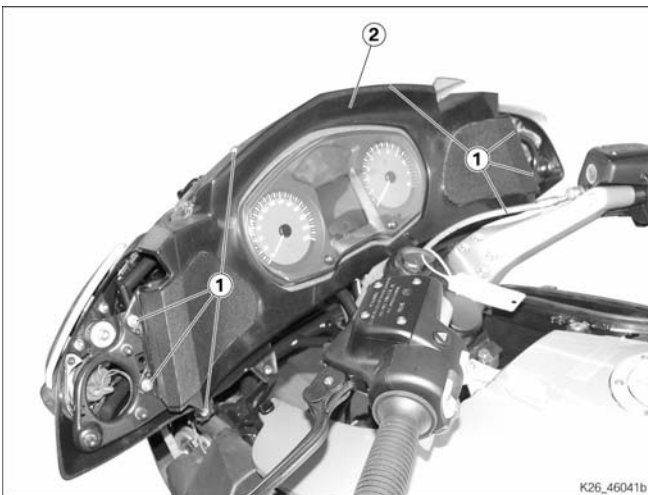
(-) Removing mirror

- Detach mirror (1).



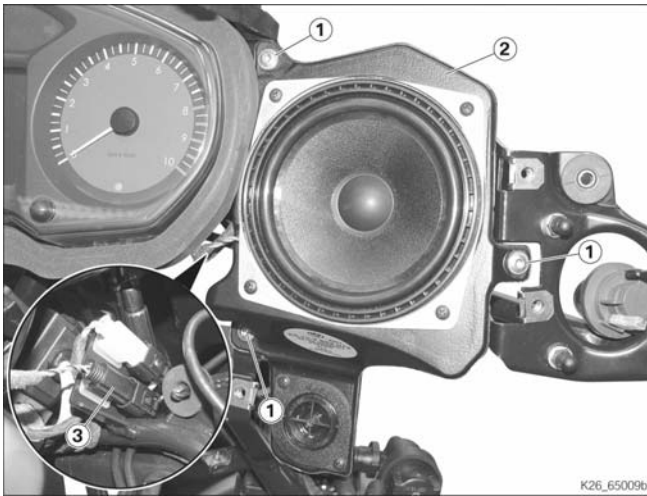
(-) Removing inner trim for instruments

- Remove screws (1).
- Remove inner trim (2).



(-) Removing right loudspeaker box

- Remove screws (1).
- Remove loudspeaker box (2) from its holder.
- Remove plug (3) from the holder.
- Remove loudspeaker box (2).

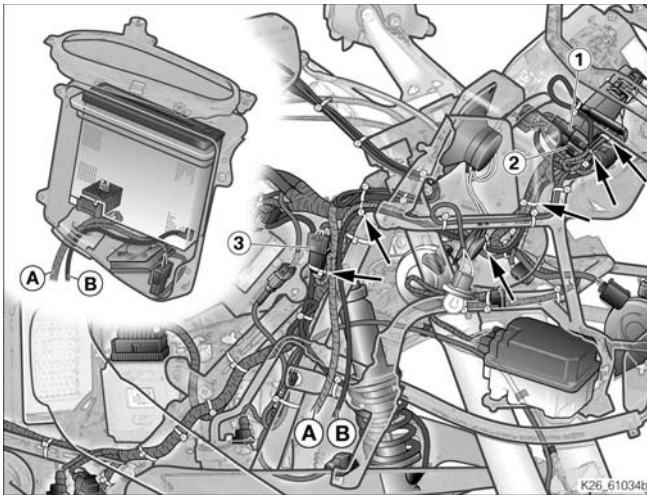


(-) Removing wiring harness for radio

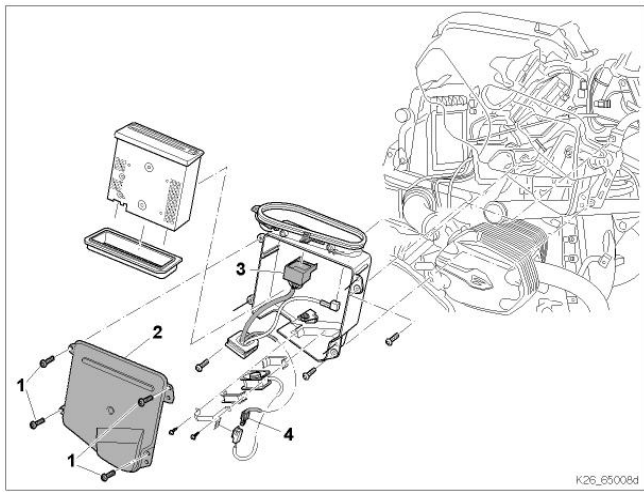
- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment.



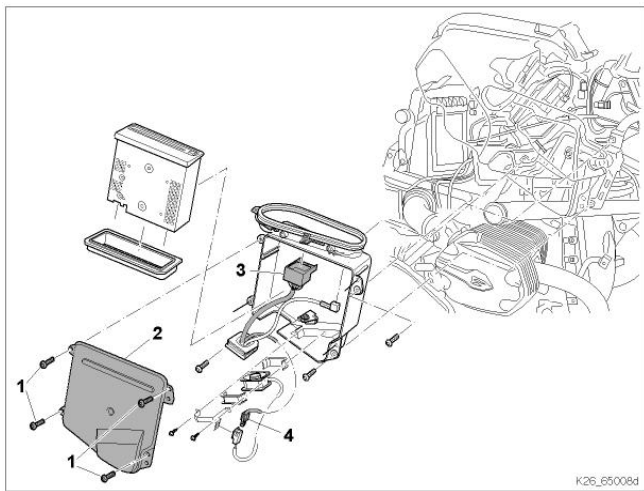
- Open cable ties (arrows).
- Disconnect plugs (1) and (2) and unclip the plug housing.
- Guide the wiring out toward the rear.
- Guide the wiring of the control unit out toward the right-hand side.
- Disconnect plug (3).



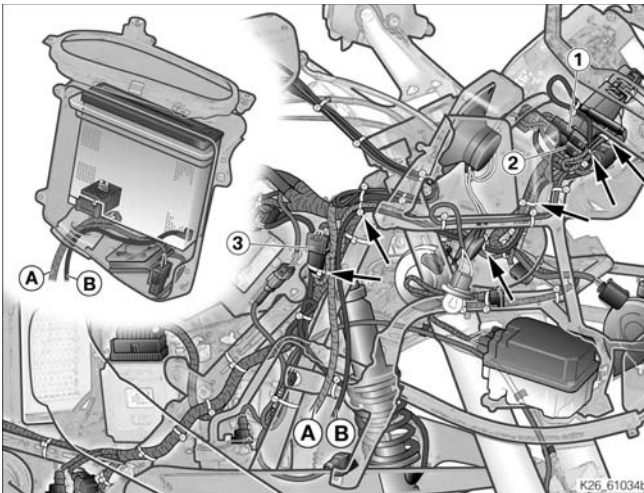
- Cut through the cable ties.
- Remove screws (1) and remove cover (2).
- Pull the radio slightly out of the stowage compartment.
- Disconnect plug (3) of the radio.
- Disconnect plug (4) of the fan.
- Release the cable shoes at plugs (3) and (4).
- Pass the cable through the rubber grommet.



(-) Installing wiring harness for radio



- Pass the cable through the rubber grommet.
- Lock the cable shoes at plugs (3) and (4).
- Seat the rubber grommet in the stowage compartment.
- Connect plug (4) of the fan.
- Connect plug (3) of the radio.
- Fully insert the radio into the stowage compartment.
- Install cover (2) with screws (1).
- Secure the cable ties to the frame on the right-hand side.



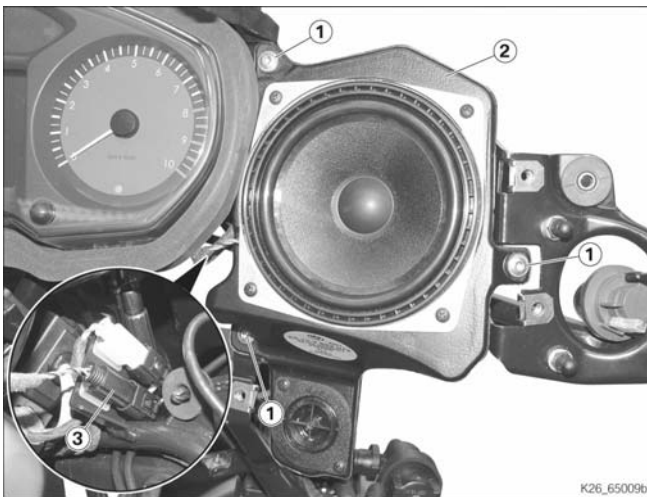
- Connect plug (3).
- Route the wiring of the control unit in to the left-hand side.
- Route the wiring of the loudspeakers forward.
- Clip the plug housing into position and connect plugs (1) and (2).
- Secure cable ties (arrows) to the frame.

- Install the stowage compartment.
- Unclip the cable from the holder.
- Install screws (1).



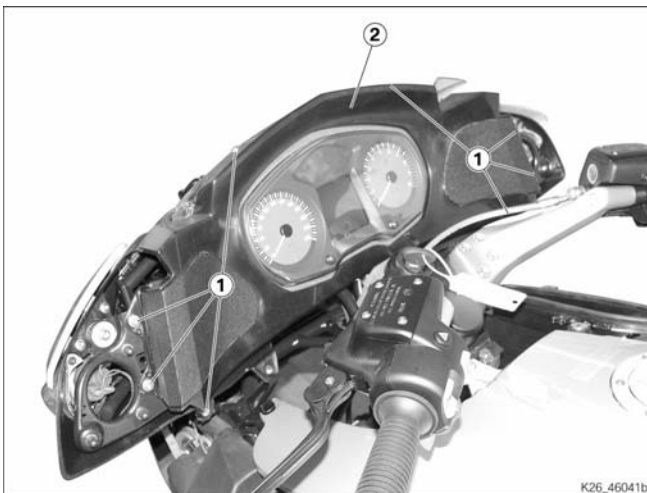
(-) Installing right loudspeaker box

- Clip plug (3) into the holder.
- Seat loudspeaker box (2) in the holder.
- Install screws (1).



(-) Installing inner trim for instruments

- Place inner trim (2) in position.
- Install screws (1).

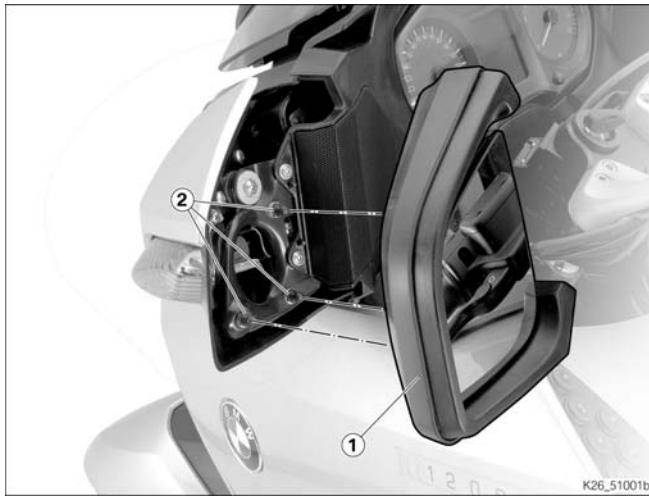


(-) Installing mirrors



Attention

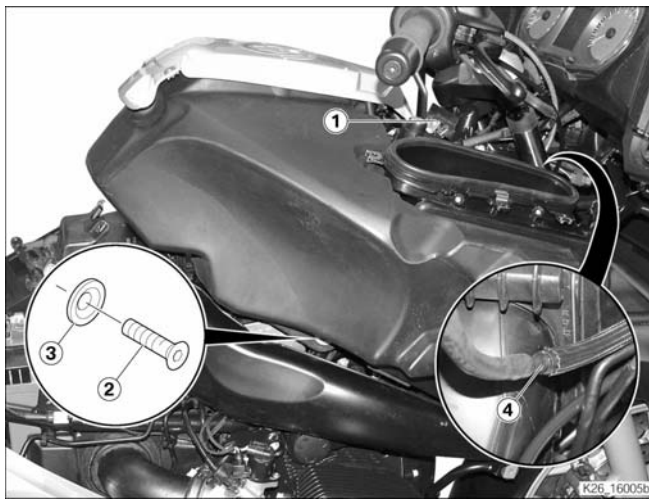
Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.



Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).

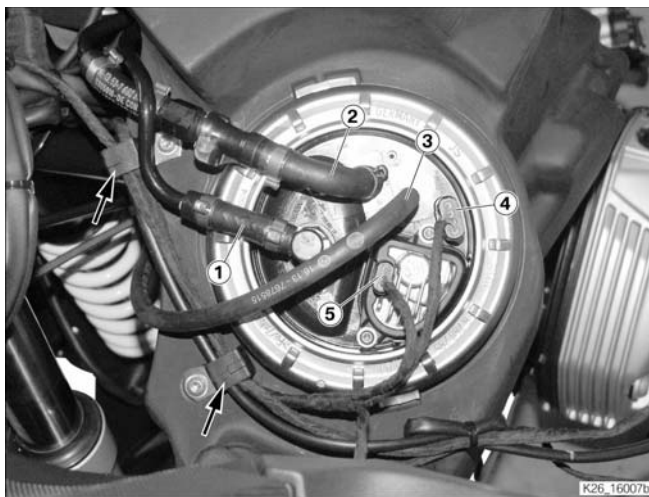
(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.



⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

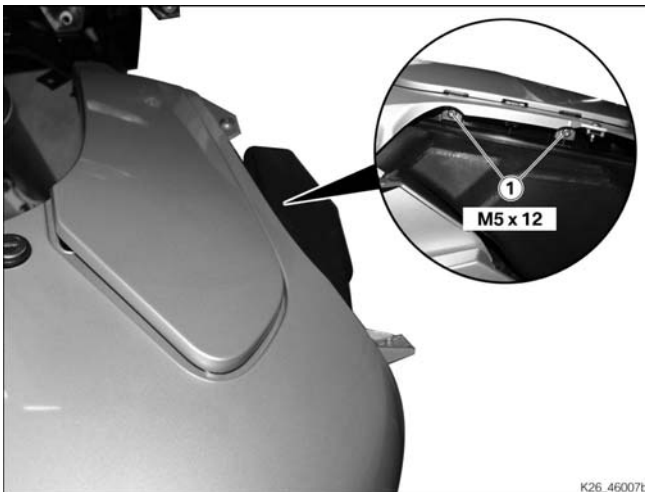
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



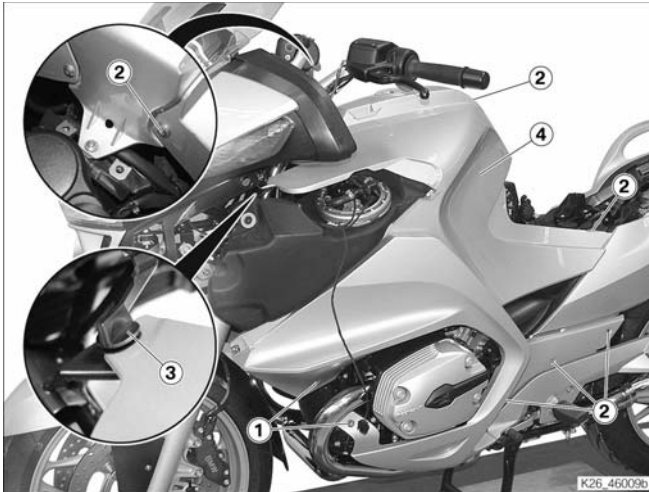
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

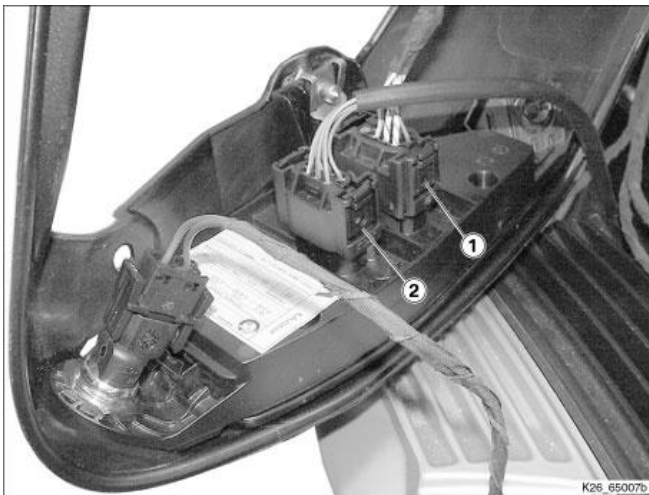
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **61 12 120 Removing and installing or replacing aerial cable**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



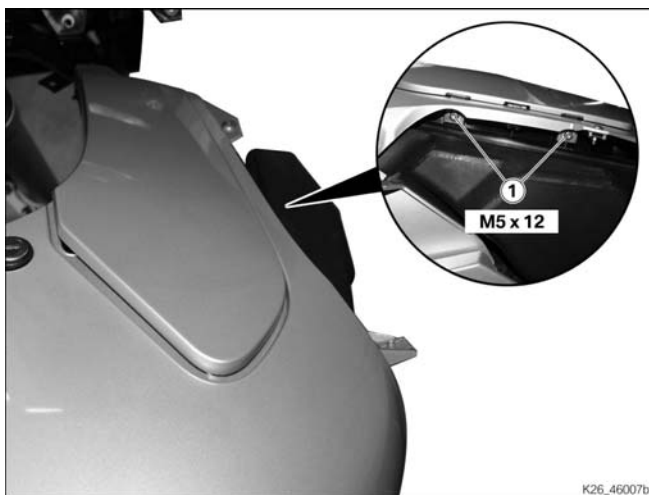
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



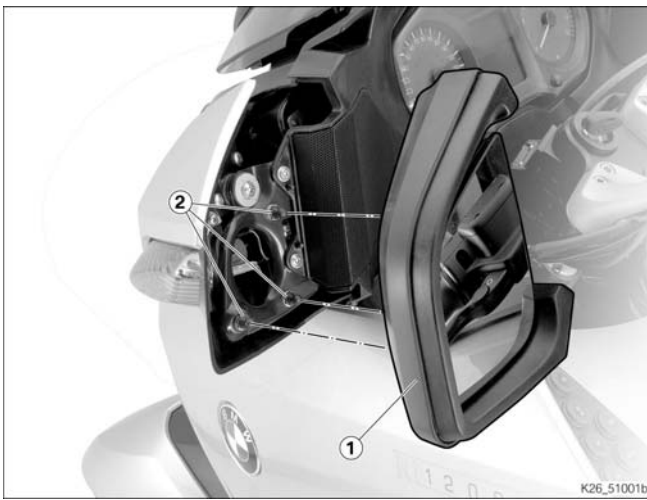
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing mirror

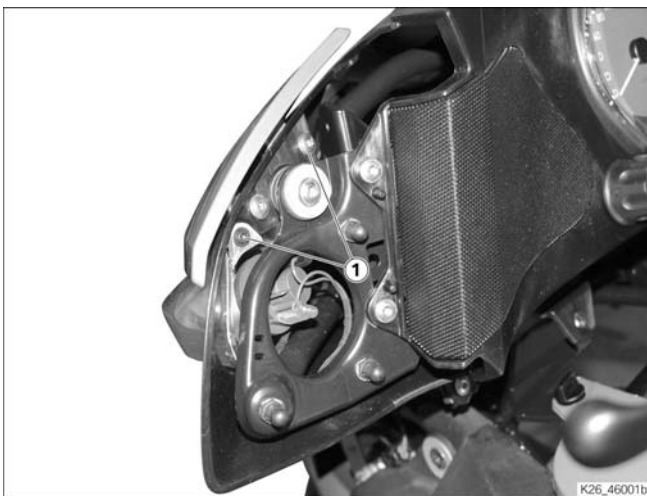
- Detach mirror (1).



Variant, Radio with CD player

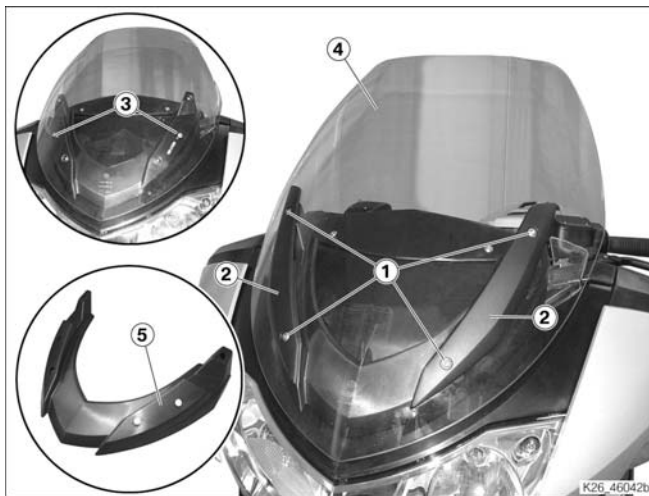
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



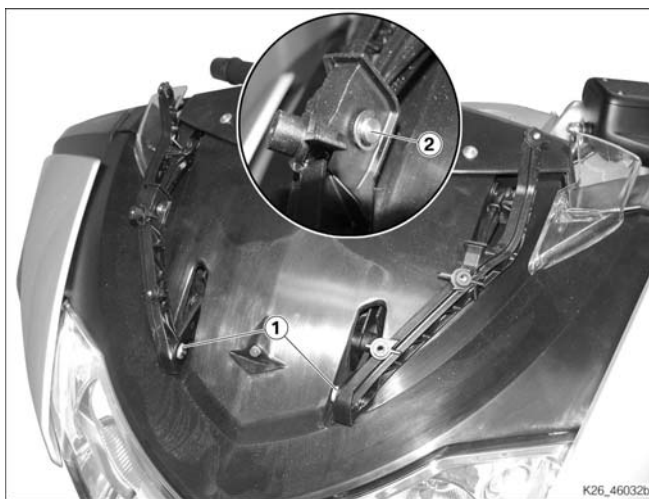
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).



- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Partially removing holder for windscreen



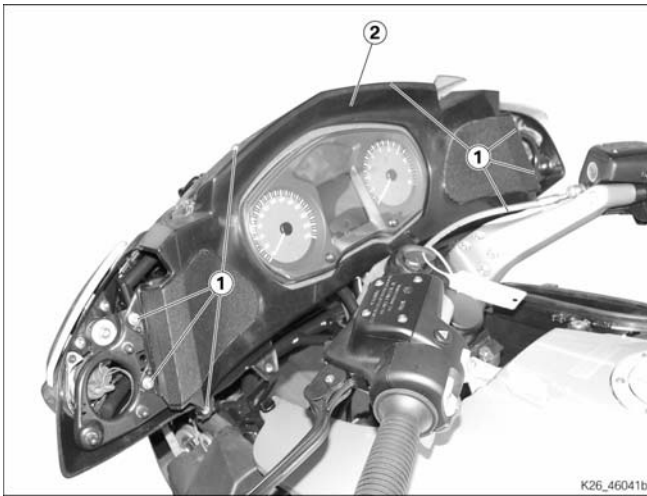
- Remove clips (1).
- Press out pin (2).



- Use a strap to keep holder (1) back out of the way.

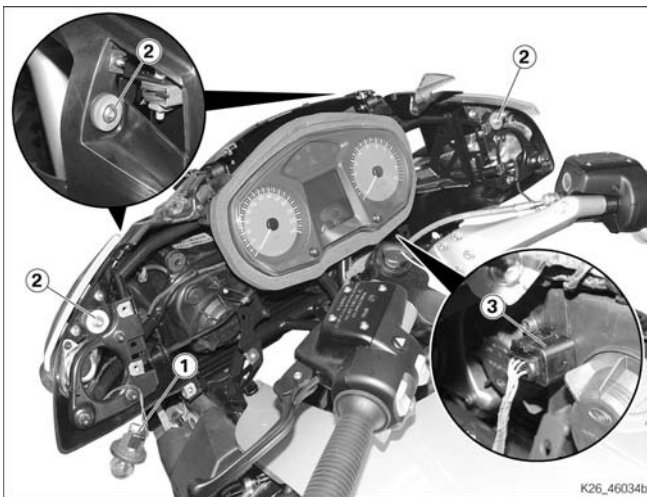
(-) Removing inner trim for instruments

- Remove screws (1).
- Remove inner trim (2).



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

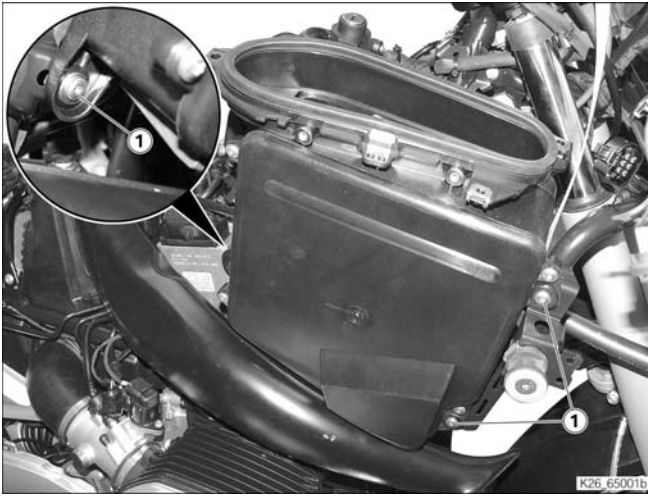
- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

(-) Removing aerial cable

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment.



- Open cable ties (arrows).
- Thread cable (1) through to the fuel tank.
- Remove screws (2) and remove cover (3).
- Pull the radio slightly out of the stowage compartment.
- Disconnect plug (4) of the radio.

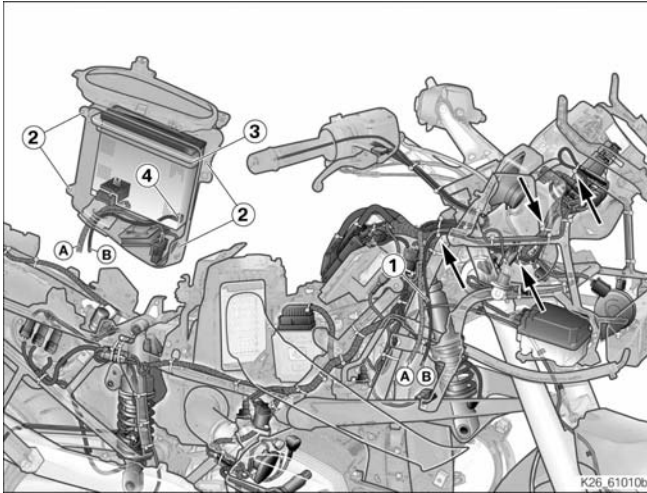
- Using a suitable tool, disengage latch (arrow) on the plug.
- Disconnect plug (1) from cable (2).
- Pass cable (2) down through the rubber grommet.
- Remove the aerial cable.

(-) Installing serial cable

- Install the aerial cable.
- Using a suitable tool, disengage latch (arrow) on the plug.
- Disconnect plug (1) from cable (2).
- Pass cable (2) through the rubber grommet.
- Secure plug (1) to cable (2) and close the latch (arrow).



K26_61009b



K26_61010b

- Connect plug (4) of the radio.
- Fully insert the radio into the stowage compartment.
- Install cover (3) with screws (2).
- Route cable (1) up along the fairing bracket, making sure that the cable routing is correct.
- Secure cable ties (arrows) on the frame and the fairing bracket.



K26_65001b

- Install the stowage compartment.
- Unclip the cable from the holder.
- Install screws (1).

(-) Installing entire top section of fairing

- Carefully place upper section of fairing in position.

Variant, Radio with CD player

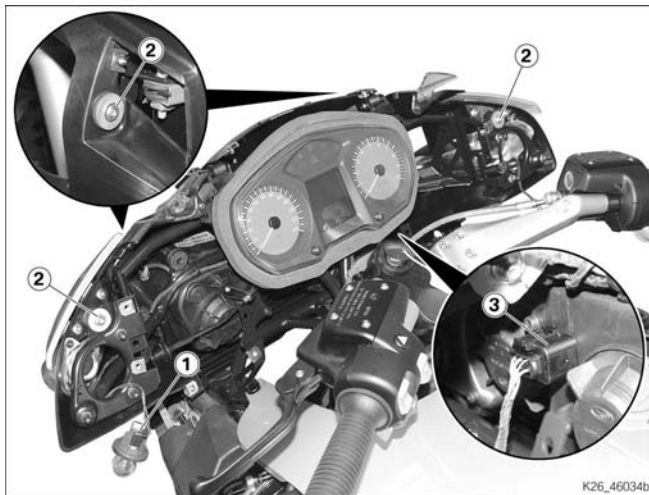
- Connect plug (5).
- Install screw (4).

 Tightening torques	



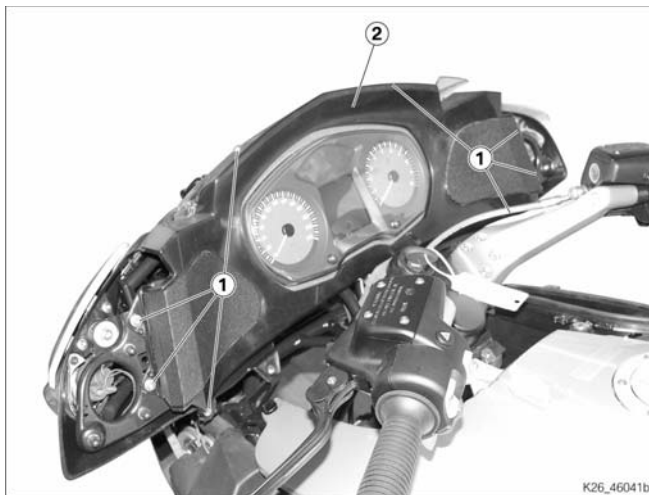
Antenna earth strap to
fairing bracket, M6 x 16

6 Nm



- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.

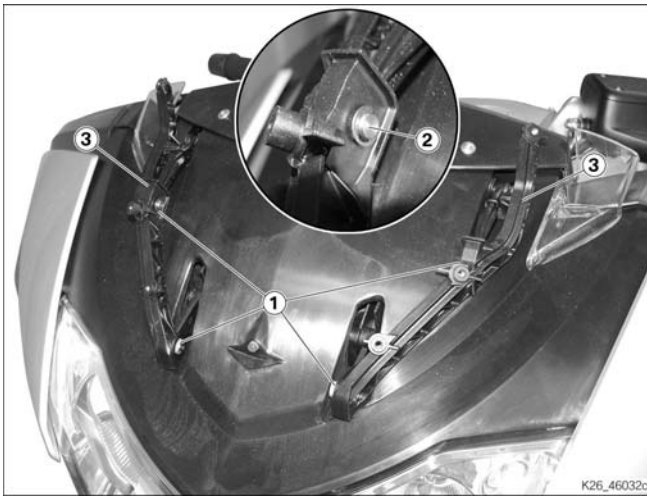
(-) Installing inner trim for instruments



- Place inner trim (2) in position.
- Install screws (1).

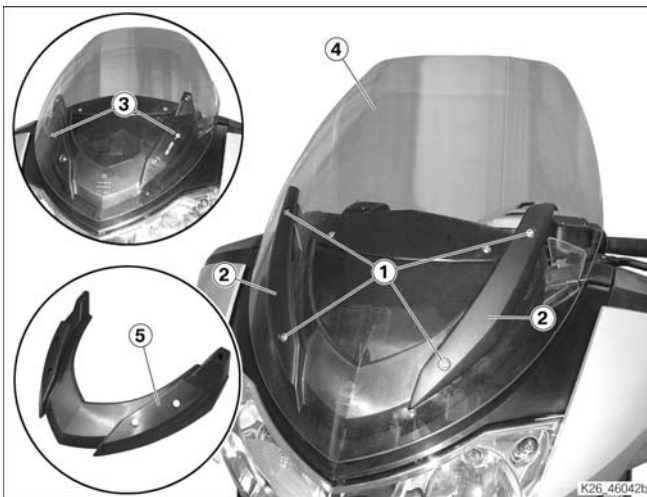
(-) Installing bracket for windscreen


- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).



(-) Installing the windshield

- Install cover (5).
- Place windshield (4) in position.
- Fit screws (3) with washers.



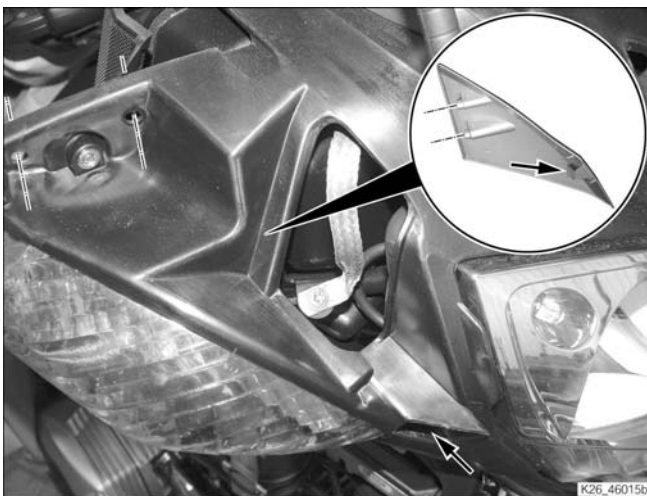
 Tightening torques		
Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	

- Fit left and right trim panels (2) and secure with screws (1).

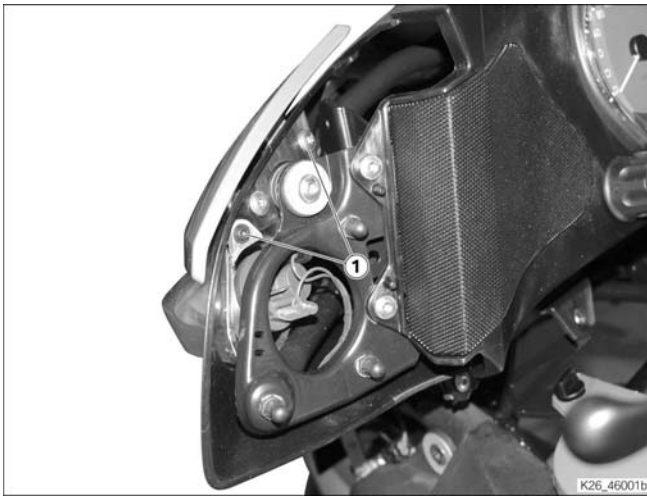
Variant, Radio with CD player

(-) Installing both left and right mirror trim panels

- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



- Install screws (1).



(-) Installing mirrors

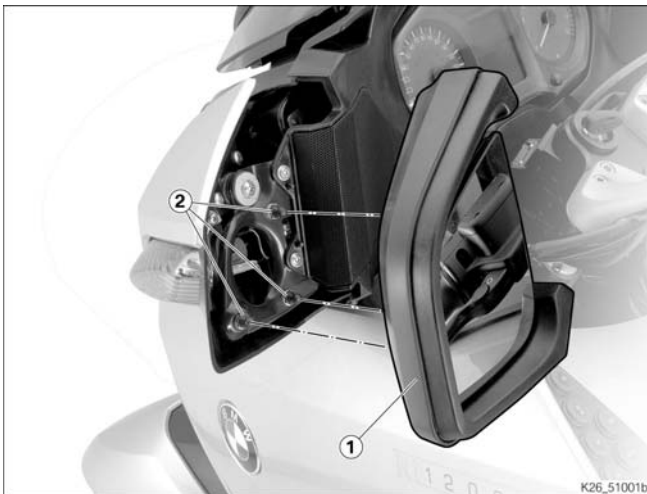


Attention

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



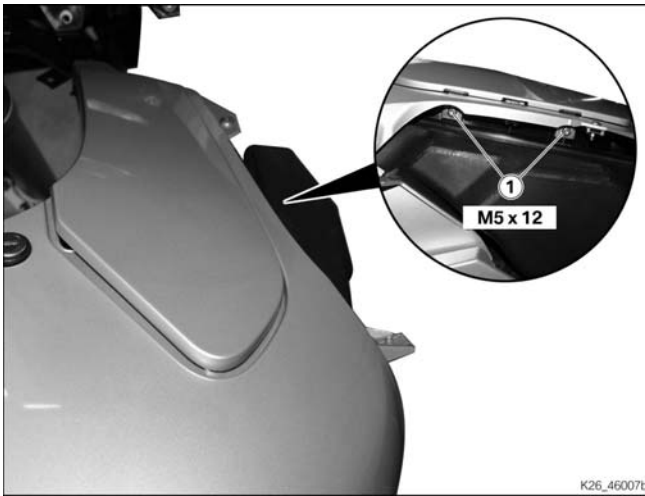
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **61 21 011 Replacing battery**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

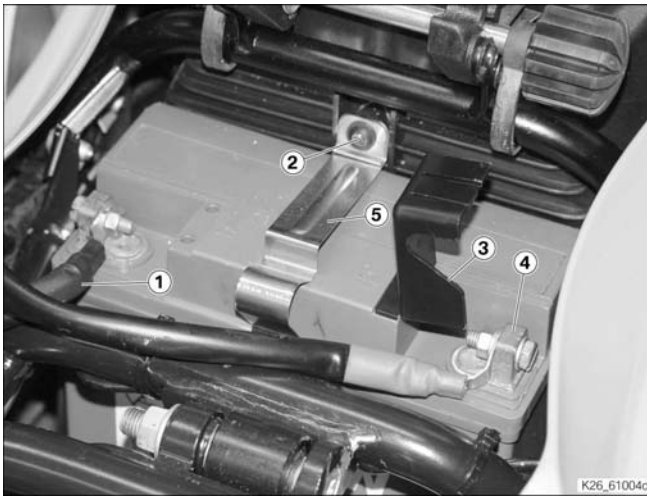
- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing the battery



Attention

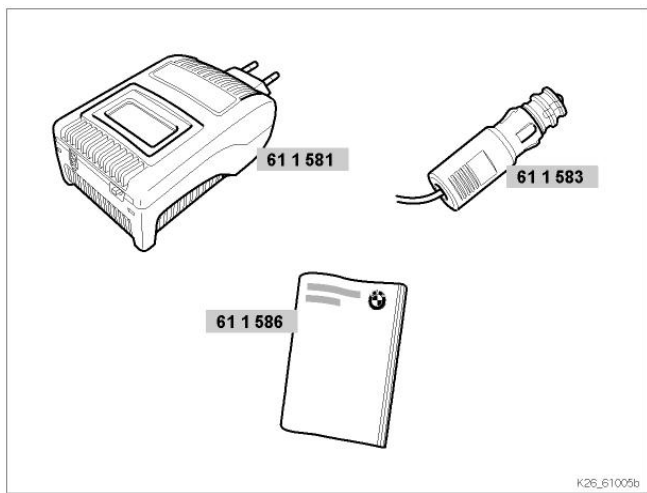
Nature: Disconnection in the wrong sequence increases the risk of short-circuits.



Avoidance: Always proceed in the correct sequence.

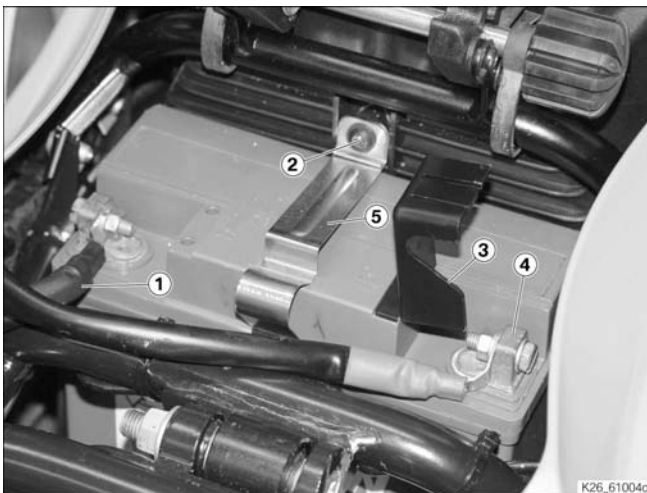
- Release screw (2) and remove battery retainer (5).
- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (3).
- Disconnect the positive lead from the battery's positive terminal (4).
- Remove the battery from its holder.

(-) Charge gel battery




- Set charging characteristic for gel battery on BMW motorcycle battery charger (No. 61 1 581) .
- Charge gel battery with BMW motorcycle battery charger.

(-) Installing the battery



- Place the battery in the battery holder and secure with battery retainer (5) and screw (2).

 Tightening torques		
Battery retaining clip to airbox, M5 x 16	5 Nm	

⚠ Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.

- Connect the positive lead to the battery's positive terminal (4).
- Install protective cap (3).
- Connect the negative lead to the battery's negative terminal (1), making sure that the connecting cable is

routed correctly.

- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

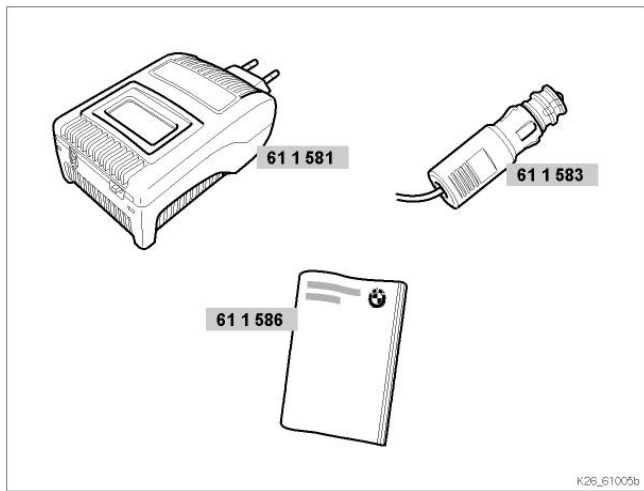
- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **61 21 019 Recharging battery**



(-) Charge gel battery

- Set charging characteristic for gel battery on BMW motorcycle battery charger (No. 61 1 581) .
- Charge gel battery with BMW motorcycle battery charger.

 **61 31 063 Replacing left multifunction switch**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

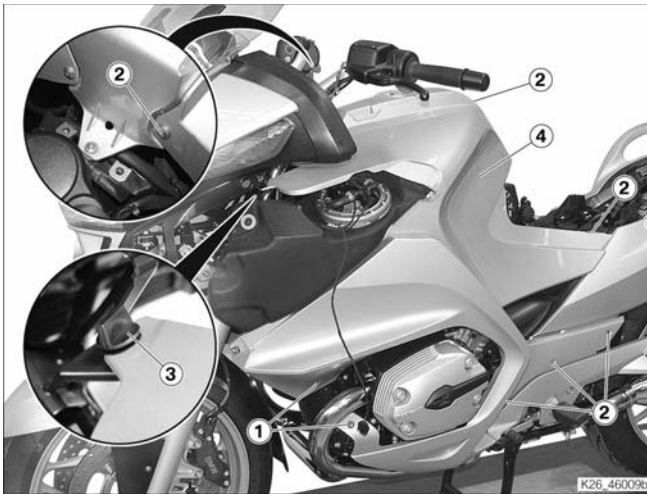


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

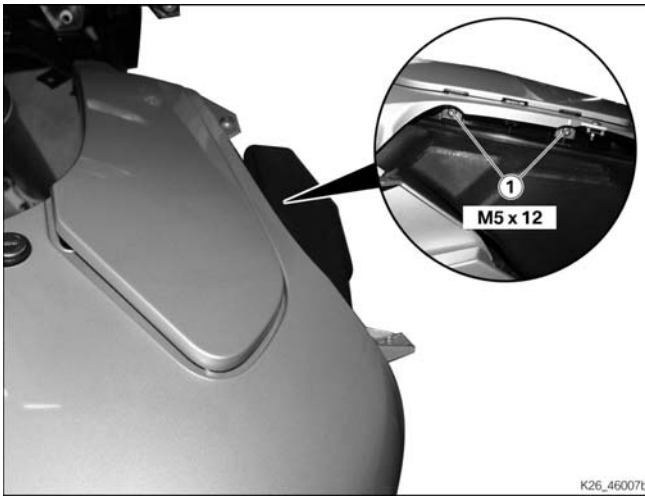
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



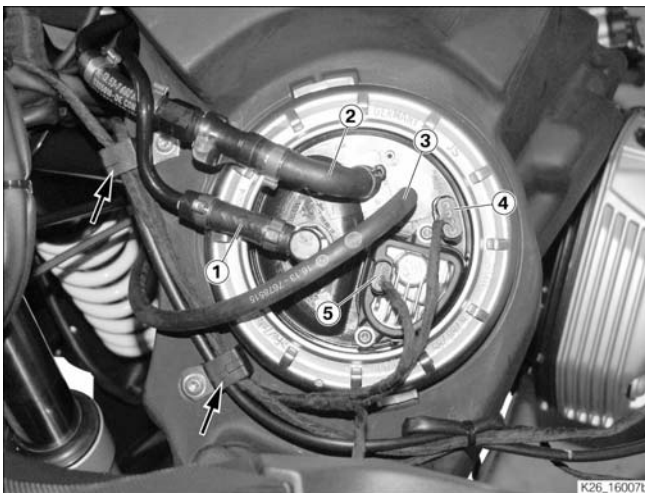
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

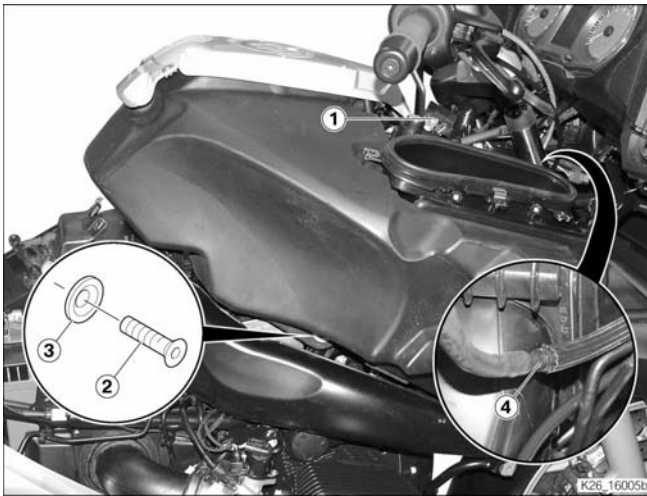


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

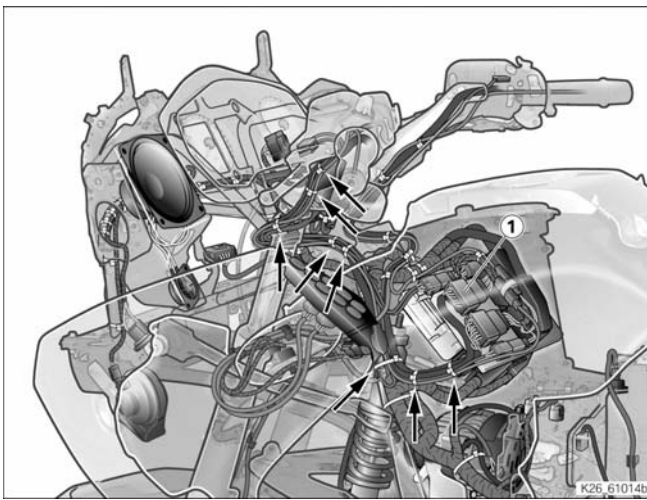


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing left multifunction switch

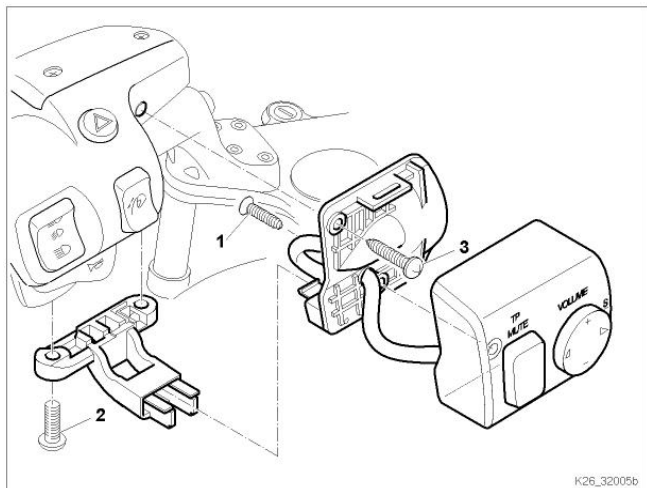
- Cut through cable ties (arrows) and manoeuvre the cable out in the forward direction of travel.
- Disconnect plug (1).



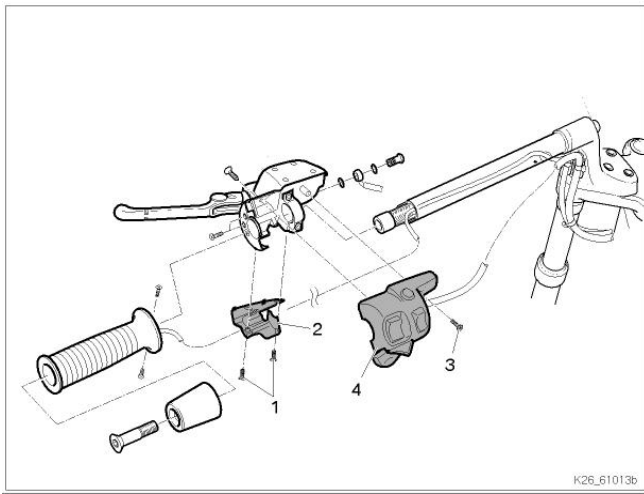
Variant, Radio with CD player

► Removing front remote control unit for radio

- Release screw (1) on the handlebar-mounted remote-control unit.
- Remove the housing cover of the handlebar-mounted remote control unit.
- Release screws (2) and screw (3) and remove the housing of the handlebar-mounted remote-control unit.

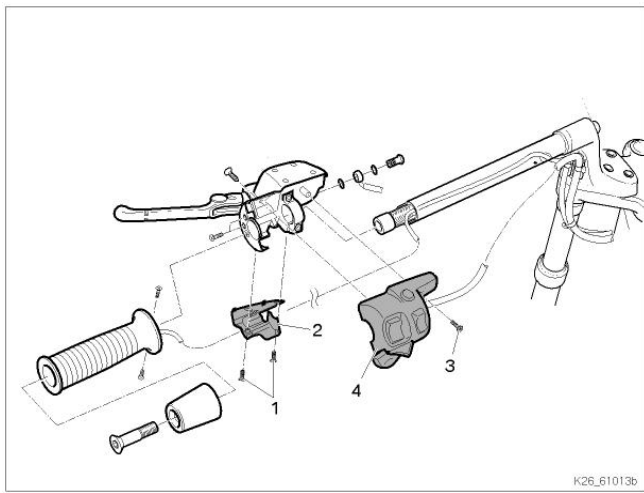


- Remove screws (1) and remove bottom cover (2).
- Remove screw (3).
- Remove multifunction switch (4).



(-) Installing left multifunction switch

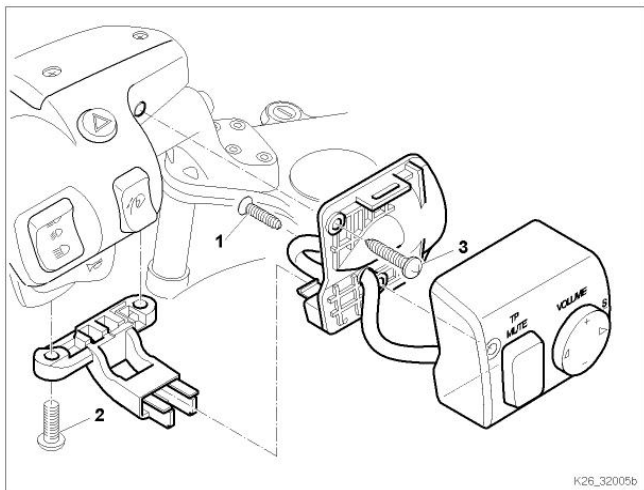
- Hold multifunction switch (4) in position.
- Install screw (3).
- Install bottom cover (2) and secure with screws (1).



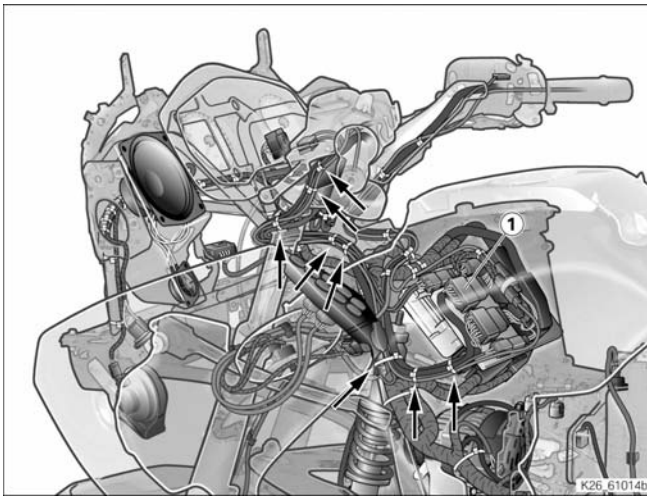
Variant, Radio with CD player

► Installing front remote control unit for radio

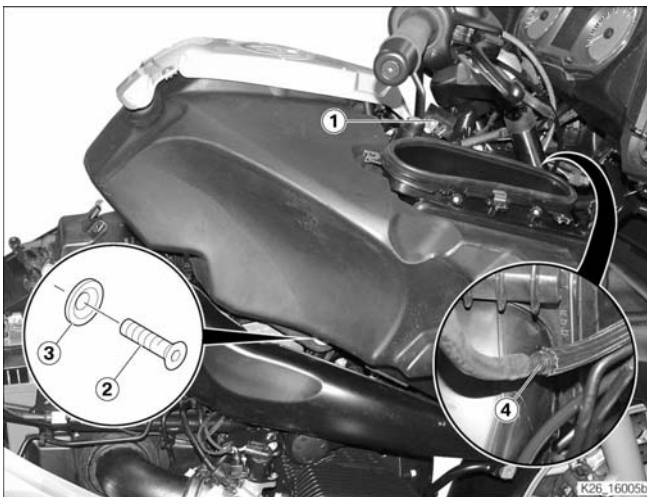
- Place the housing of the handlebar-mounted remote-control unit in position and secure it with screw (3) and screws (2).
- Engage the housing cover of the handlebar-mounted remote control unit.
- Secure the housing of the handlebar-mounted remote-control unit with screw (1).



- Thread the cable up to the control unit box, making sure that cable routing is correct.
- Secure the cable with cable ties (arrows).
- Connect plug (1).

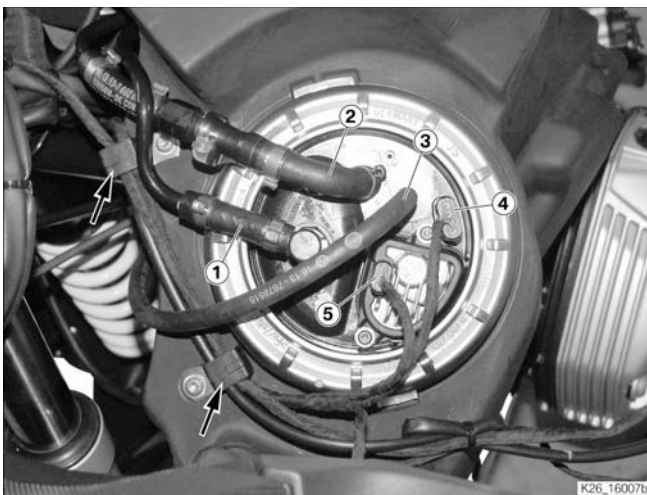


(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

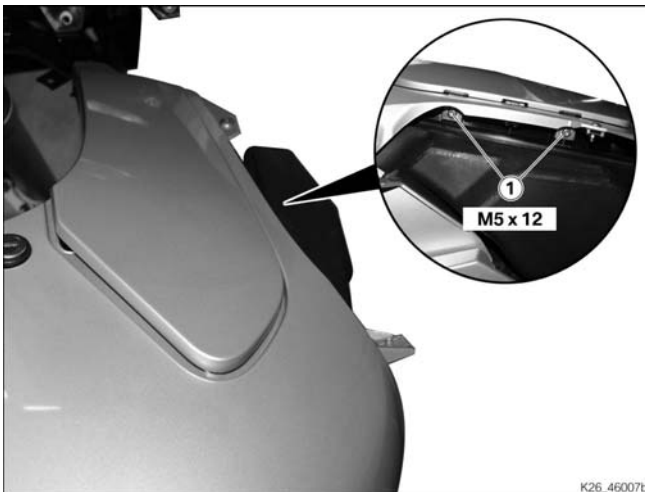
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



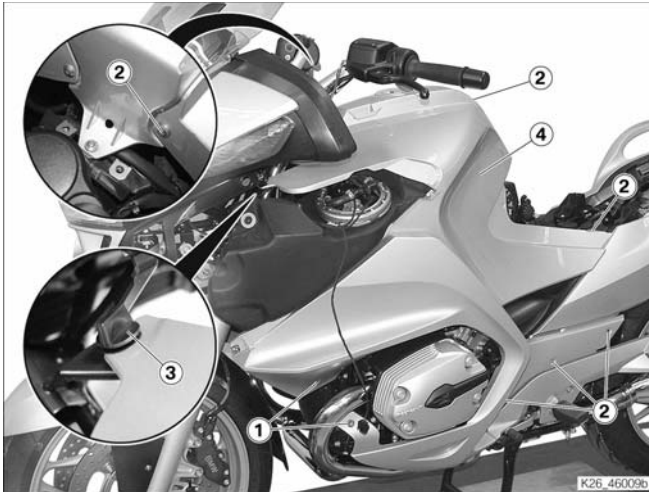
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

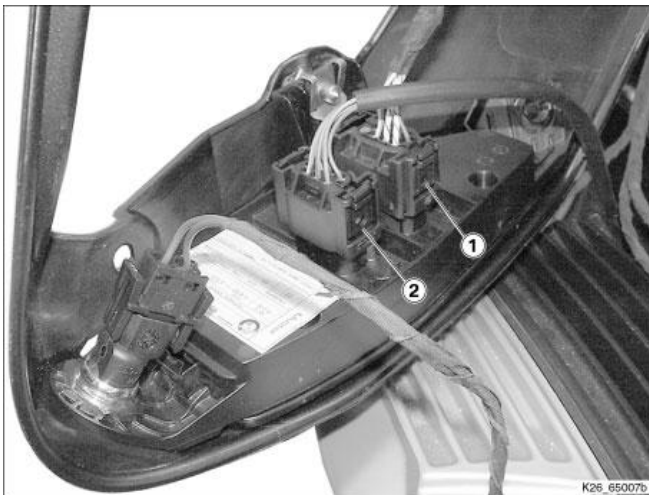
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **61 31 073 Replacing right multifunction switch**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

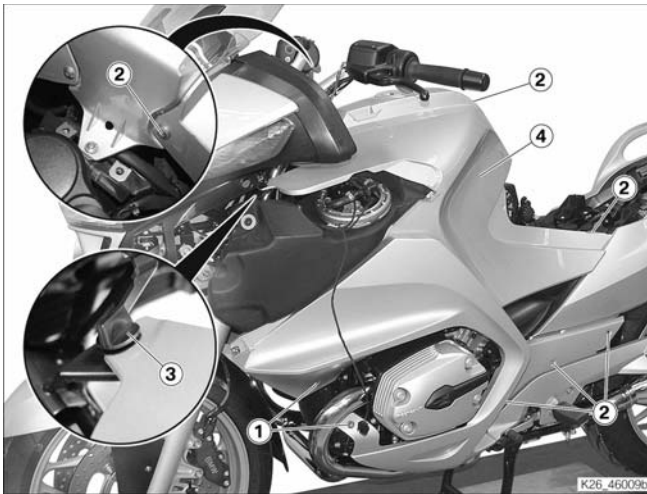


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

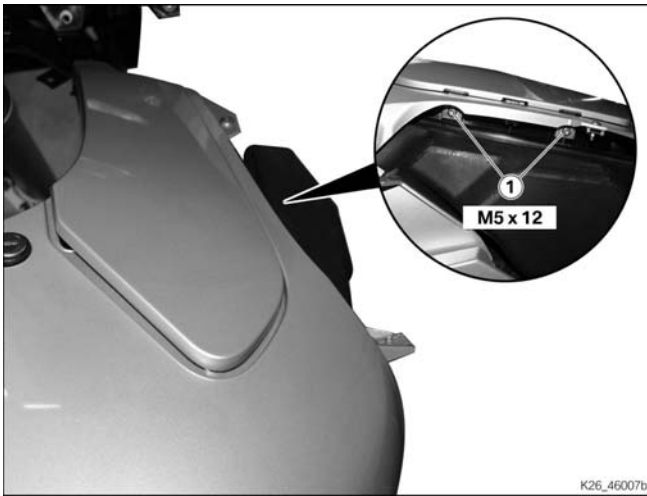
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



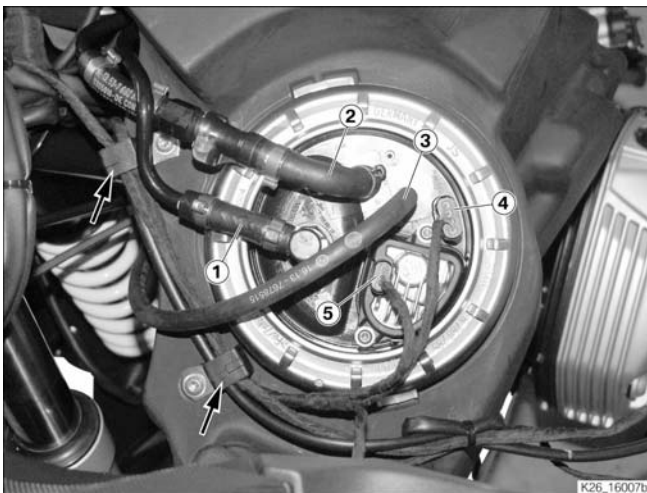
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

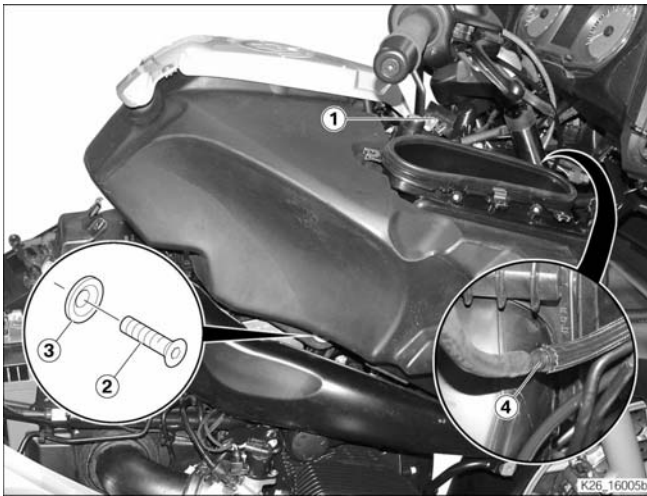


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

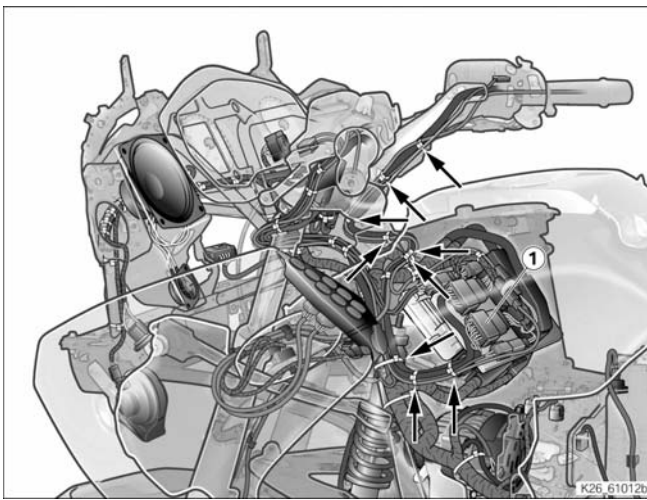


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

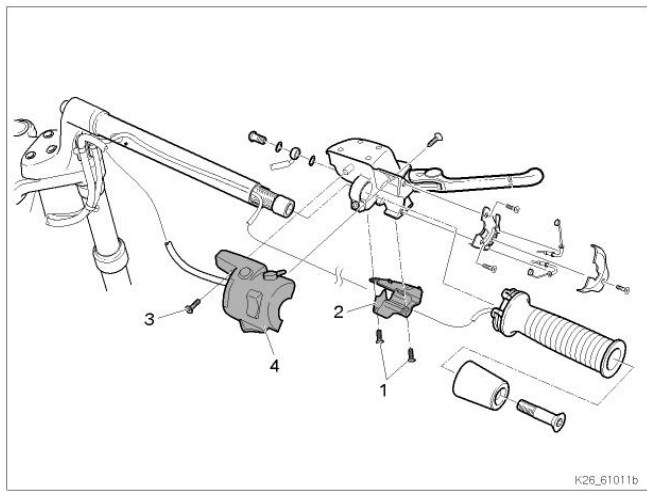


(-) Removing right multifunction switch

- Cut through cable ties (arrows) and manoeuvre the cable out in the forward direction of travel.
- Disconnect plug (1).

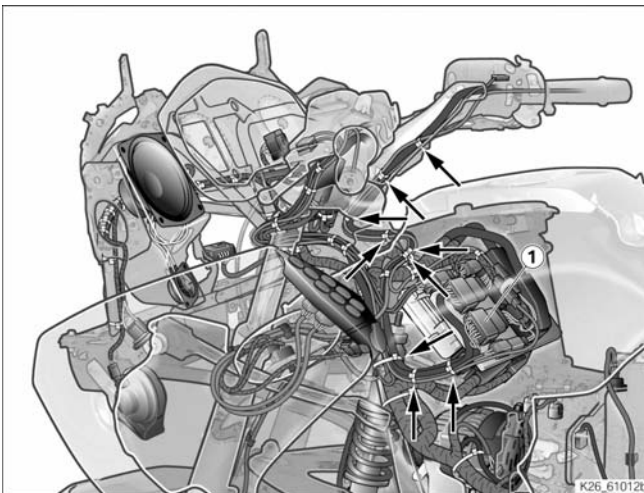
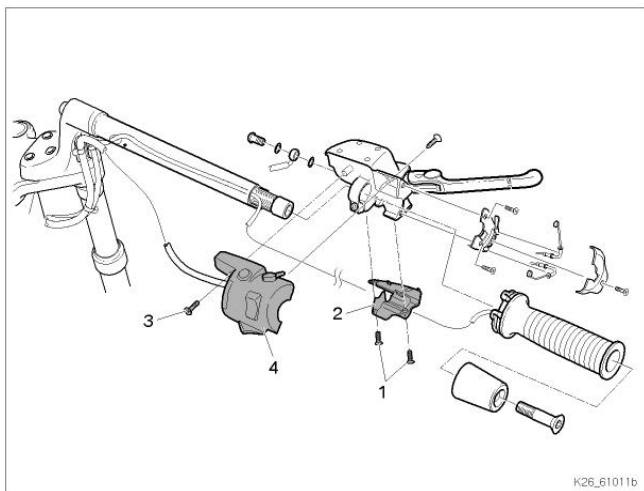


- Remove screws (1) and remove bottom cover (2).
- Remove screw (3).
- Remove multifunction switch (4).

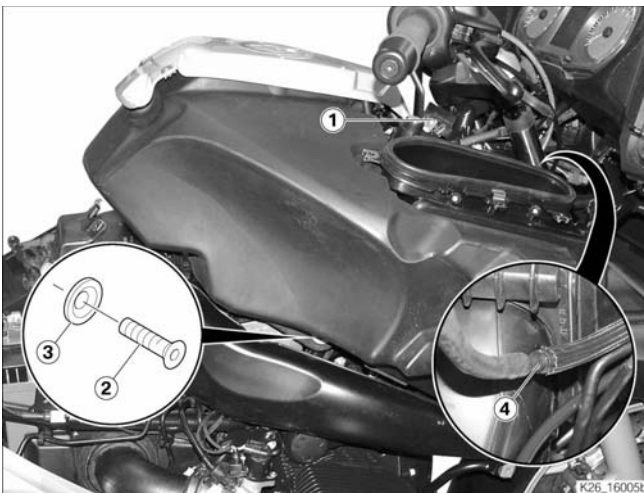


(-) Installing right multifunction switch

- Hold multifunction switch (4) in position.
- Install screw (3).
- Install bottom cover (2) and secure with screws (1).




- Thread the cable up to the control unit box, making sure that cable routing is correct.
- Secure the cable with cable ties (arrows).
- Connect plug (1).

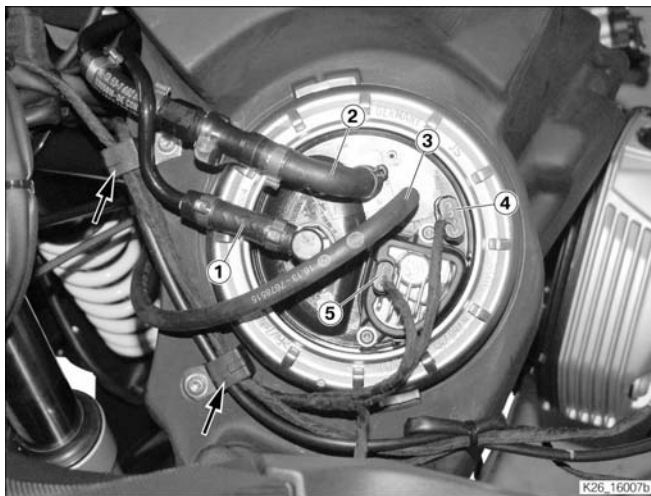


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).



- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

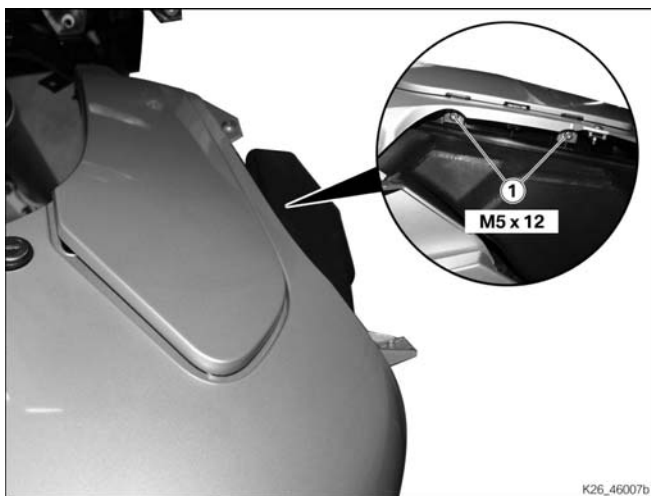
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

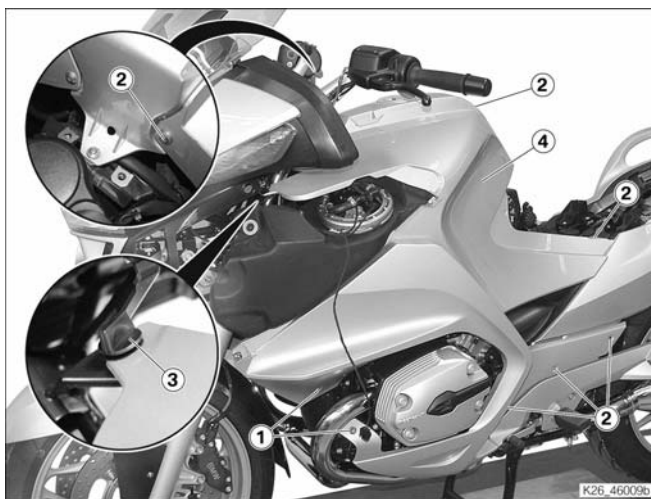
(-) Installing right-hand trim panel

-



- Hold the panel in position.
- Install screws (1).

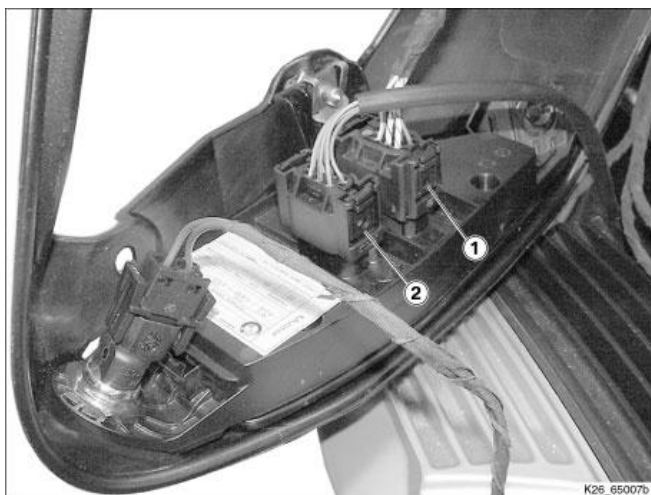
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **61 31 295 Replacing clutch switch**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

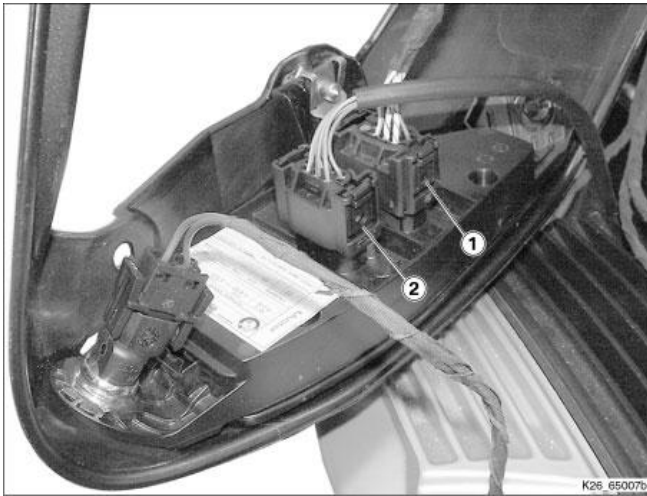


- Disconnect plug (1) from socket.

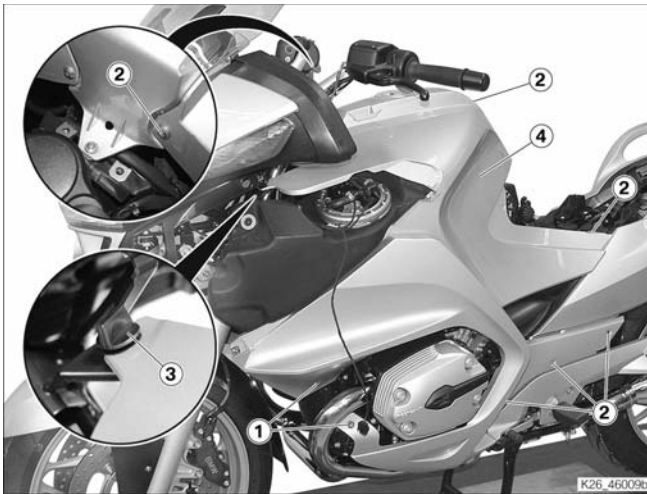


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

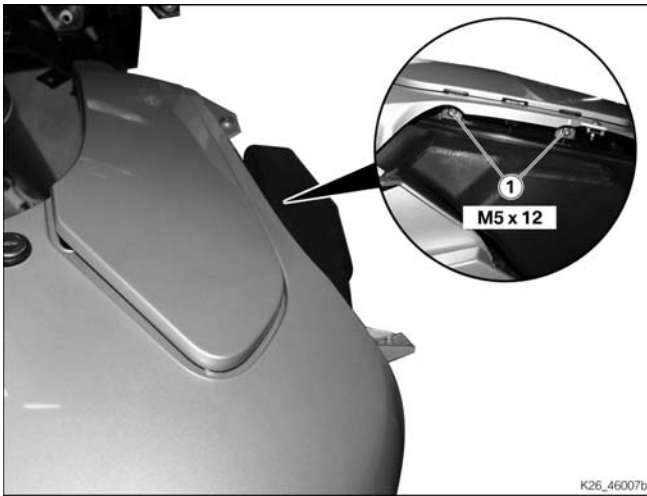
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



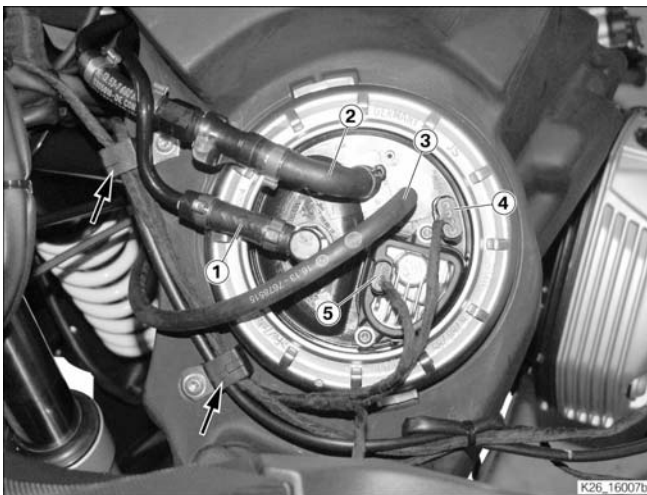
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

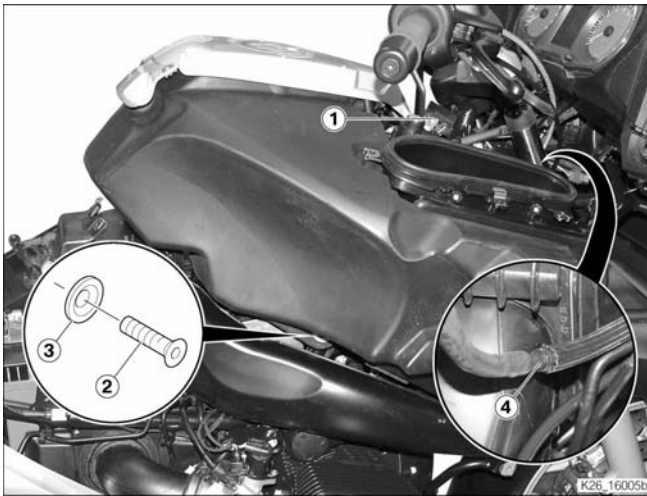


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

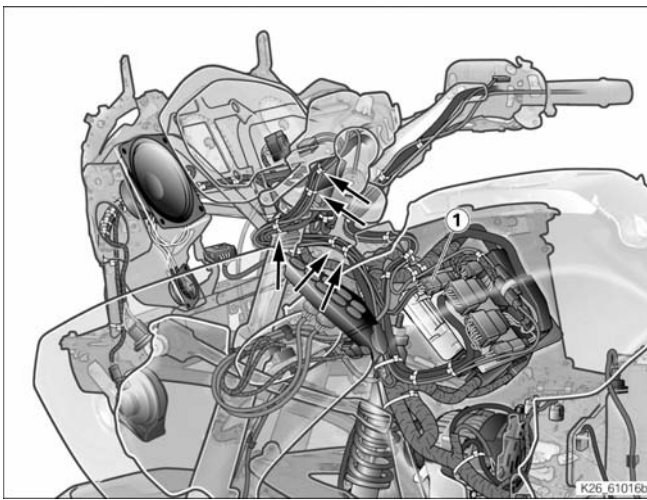


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

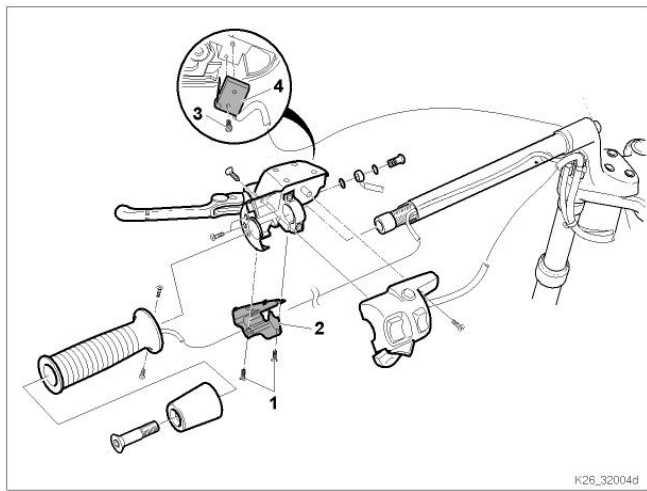


(-) Removing clutch switch

- Disconnect plug (1).
- Open cable ties (arrows).

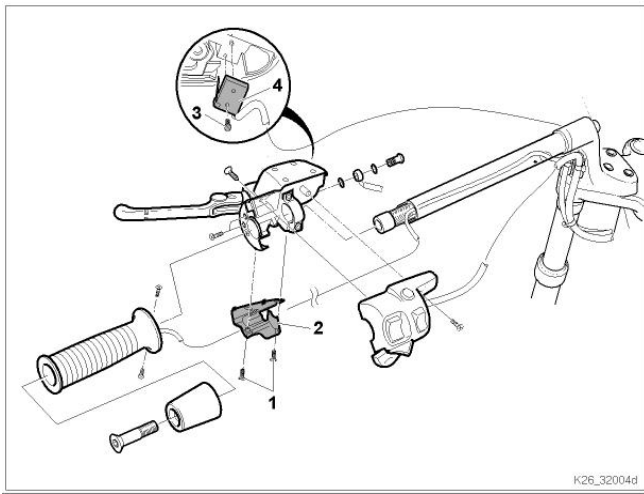


- Remove screws (1) and remove bottom cover (2).
- Remove screw (3).
- Remove clutch switch (4) with the cable.



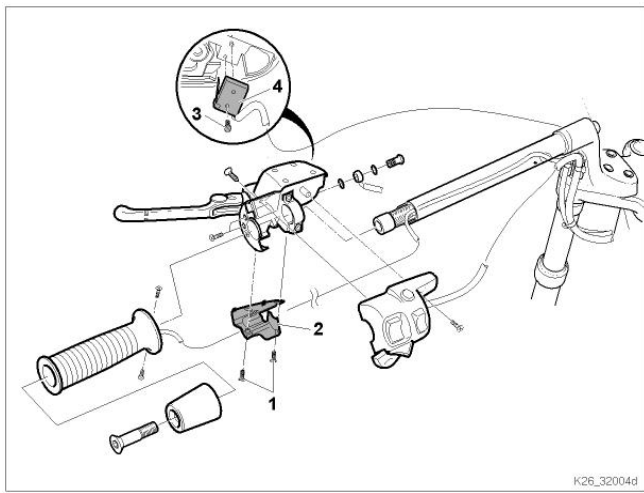
Variant, cruise control

- Remove screws (1) and remove bottom cover (2).
- Remove screw (3).
- Remove double clutch switch (4) with the cable.



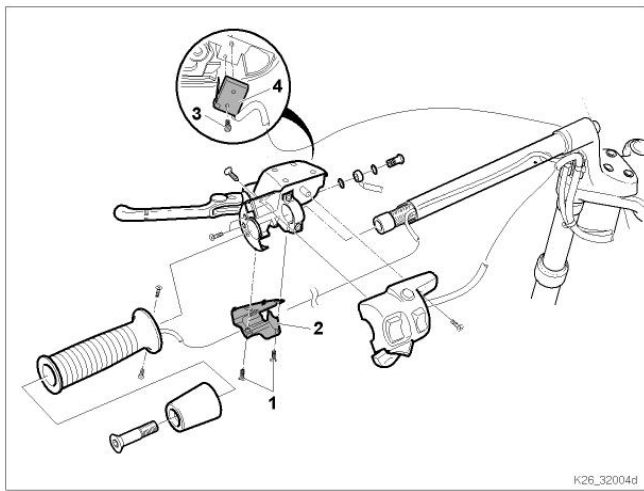
(-) Installing clutch switch

- Introduce clutch switch (4) with cable into the grip unit.
- Install screw (3).
- Install bottom cover (2) with screw (1).

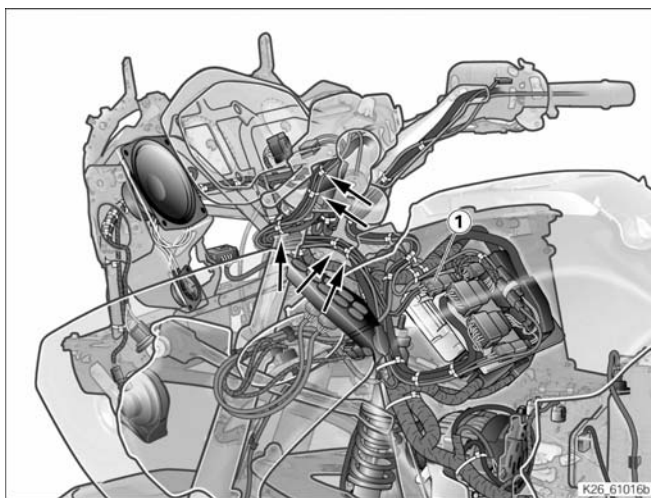


Variant, cruise control

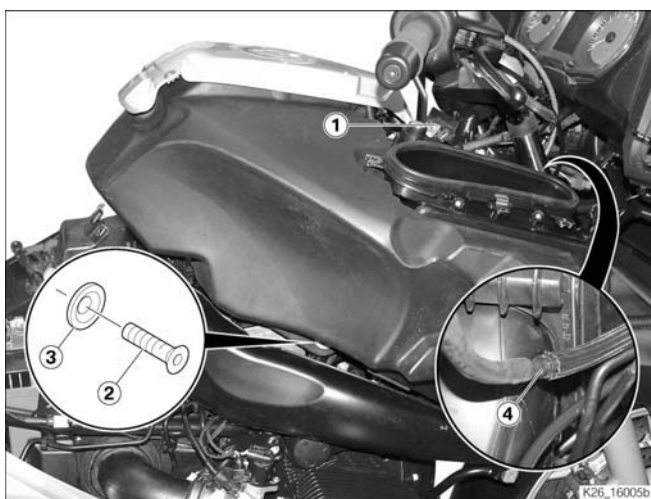
- Introduce double clutch switch (4) with cable into the grip unit.
- Install screw (3).
- Install bottom cover (2) with screw (1).



- Secure the cable with cable ties (arrows).
- Connect plug (1).



(-) Installing the fuel tank



- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	



- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

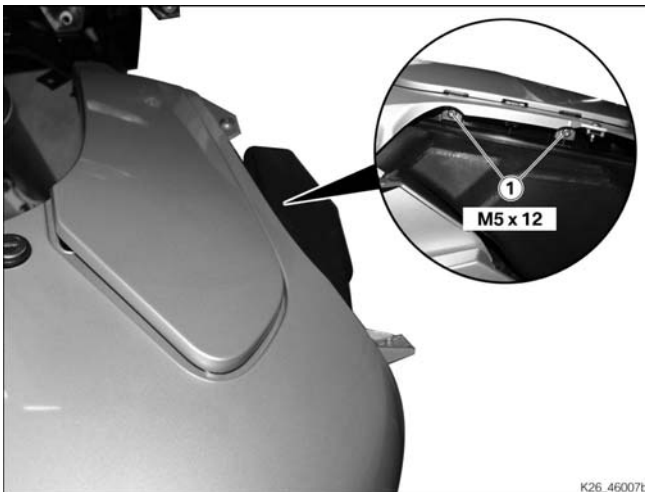
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

(-) Fit storage compartment lid



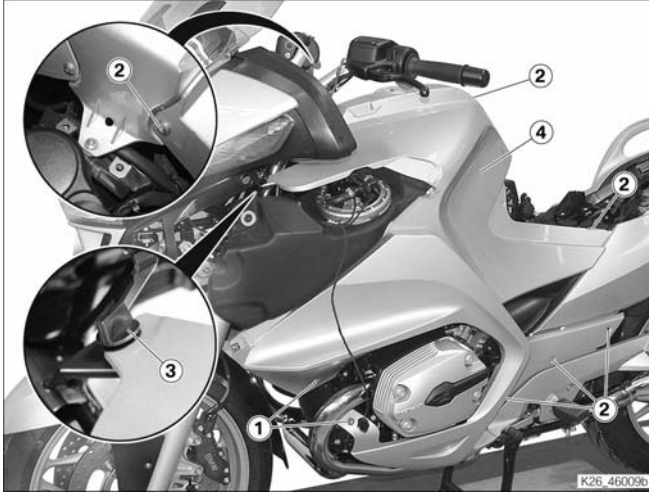
- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

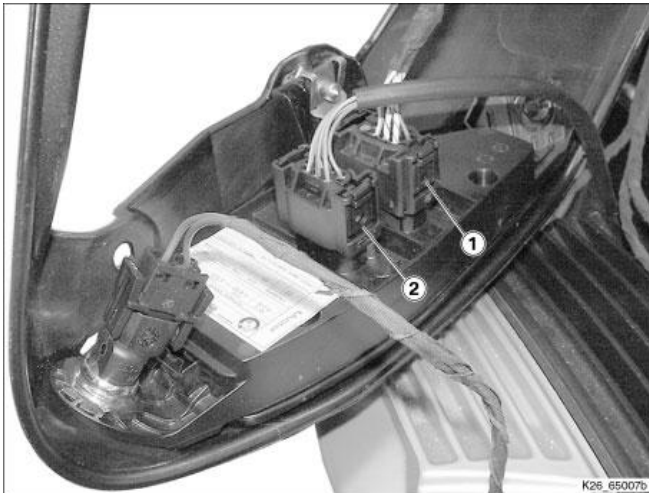
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **61 31 300 Replacing front brake-light switch**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

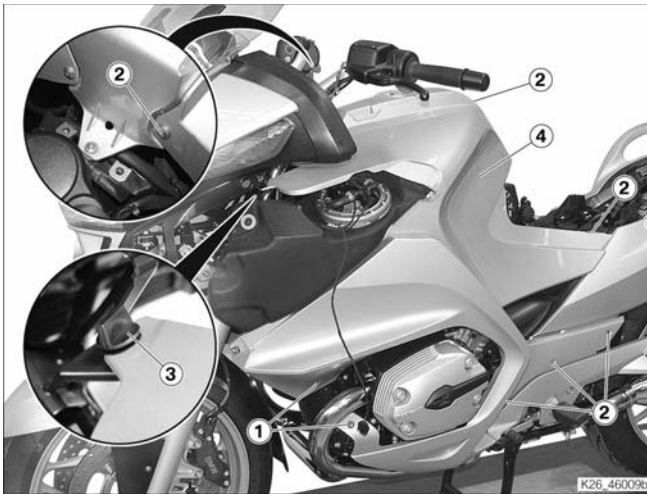


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

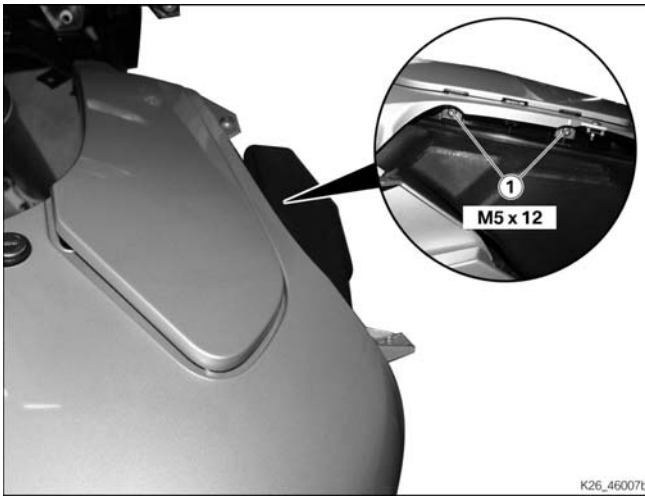
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



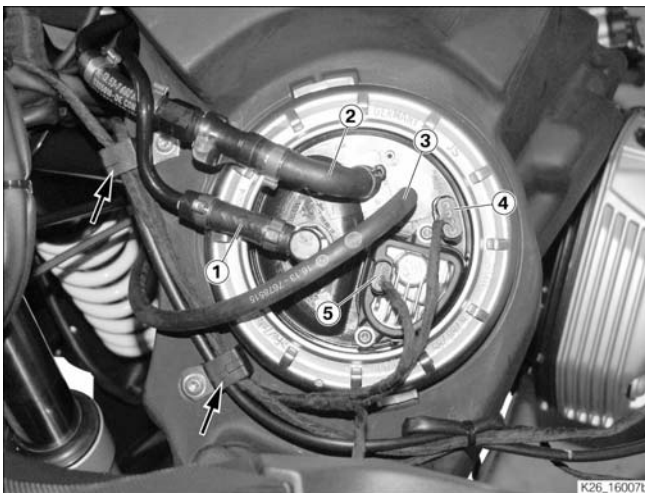
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

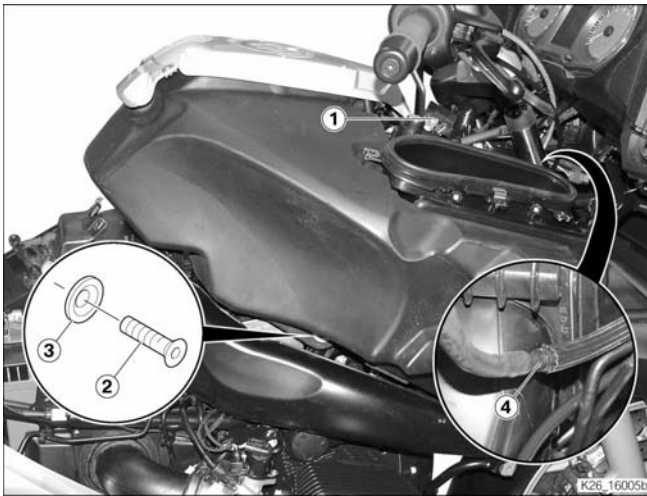


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

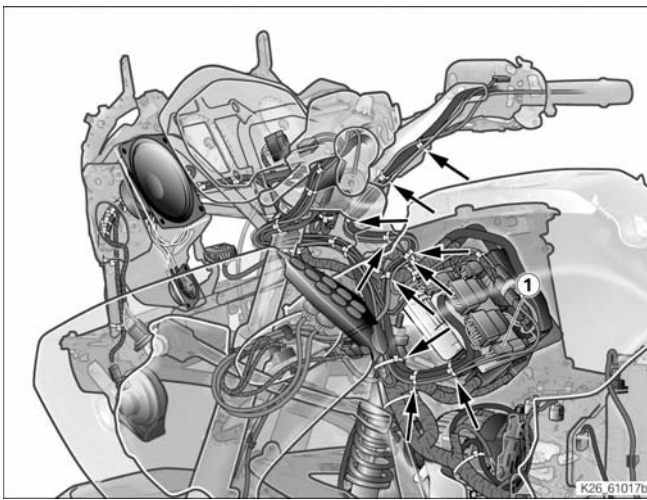


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.

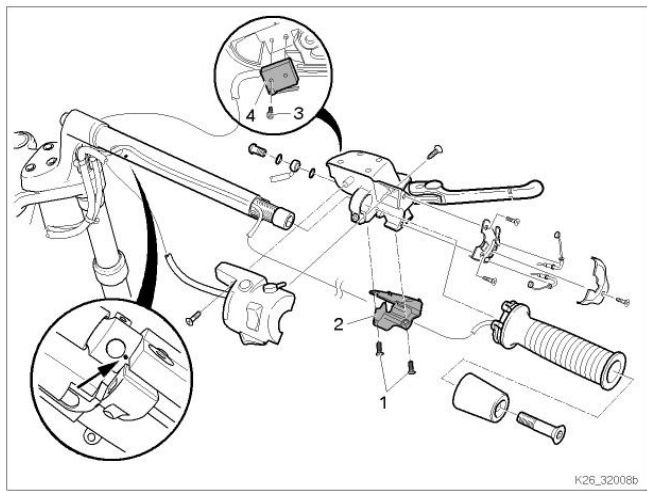


(-) Removing front brake-light switch

- Disconnect plug (1).
- Open cable ties (arrows).

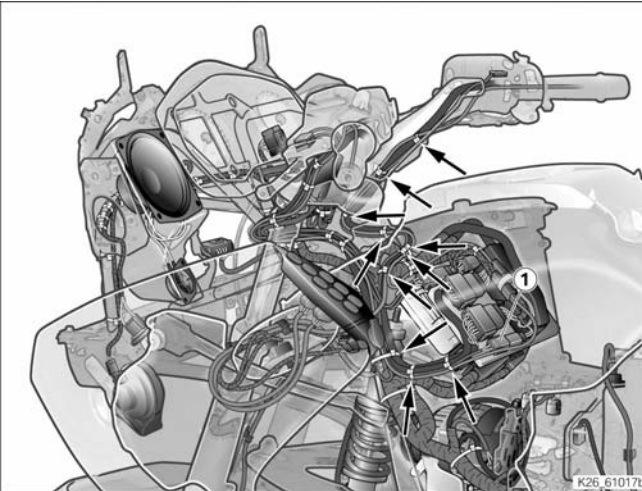
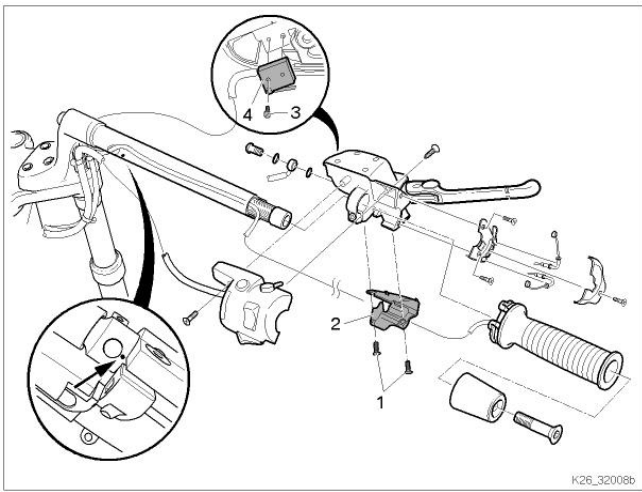


- Remove screws (1) and remove bottom cover (2).
- Remove screw (3).
- Remove brake-light switch (4) with the cable.

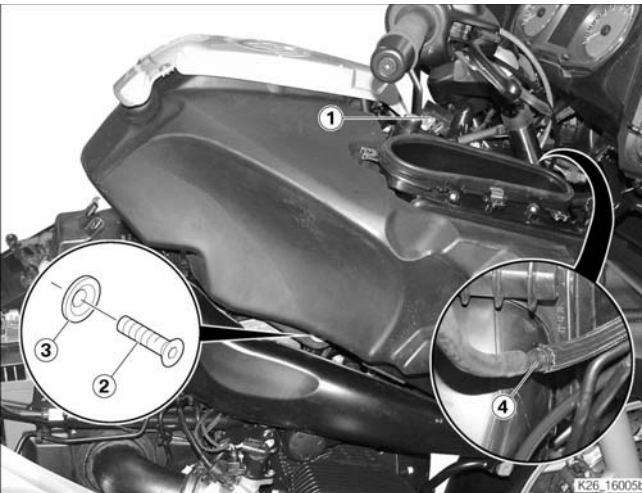


(-) Installing front brake-light switch

- Introduce brake-light switch (4) with cable into the grip unit.
- Install screw (3).
- Install bottom cover (2) with screw (1).




- Secure the cable with cable ties (arrows).
- Connect plug (1).

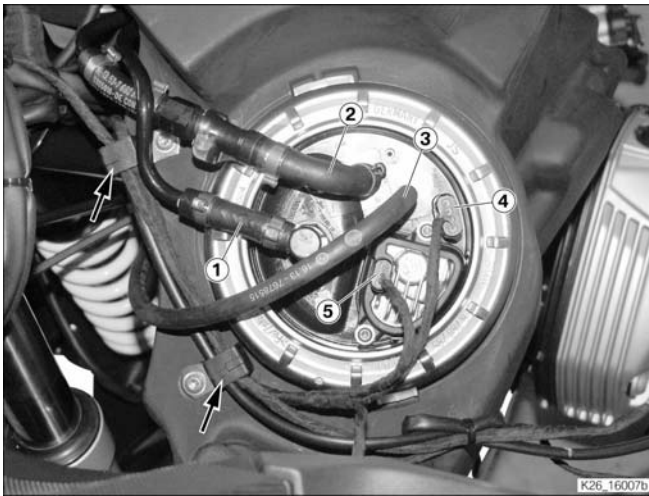


(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).



- Check the O-rings in quick-release couplings and check for damage.

⚠ Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

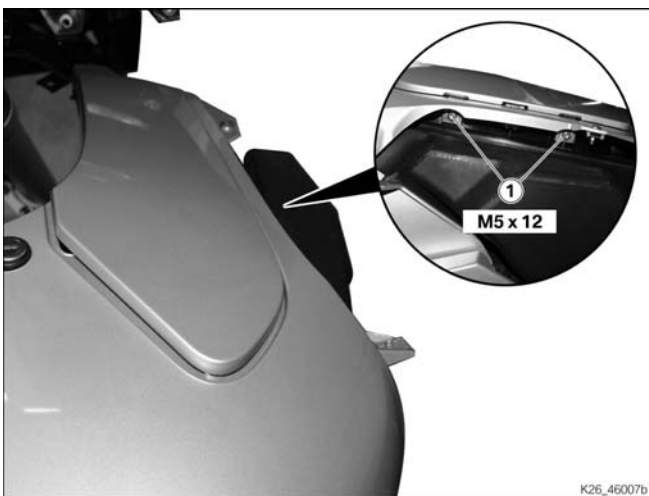
- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

(-) Installing entire right side tank cover



- Fit tank cover.
- Install screws (2).
- Install screws (1).

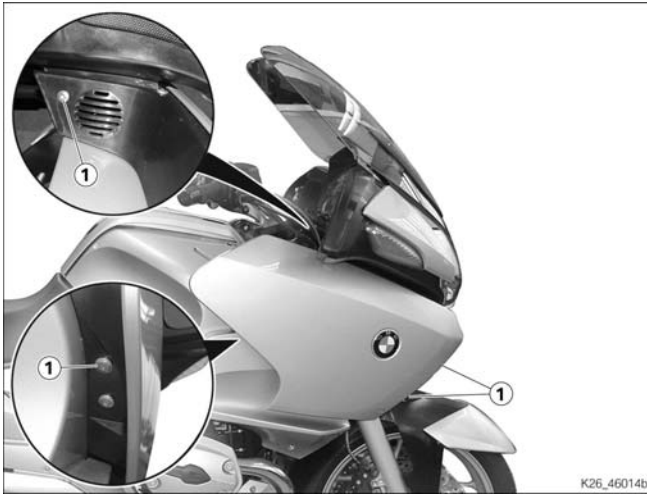
(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

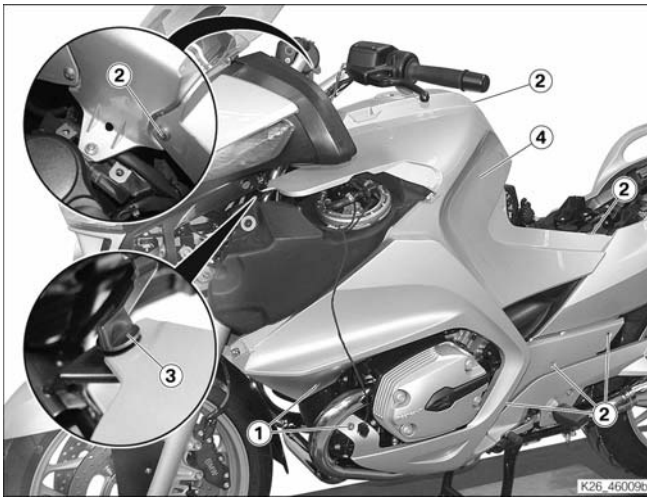
(-) Installing right-hand trim panel

-



- Hold the panel in position.
- Install screws (1).

(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **61 31 302 Replacing side-stand switch**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.

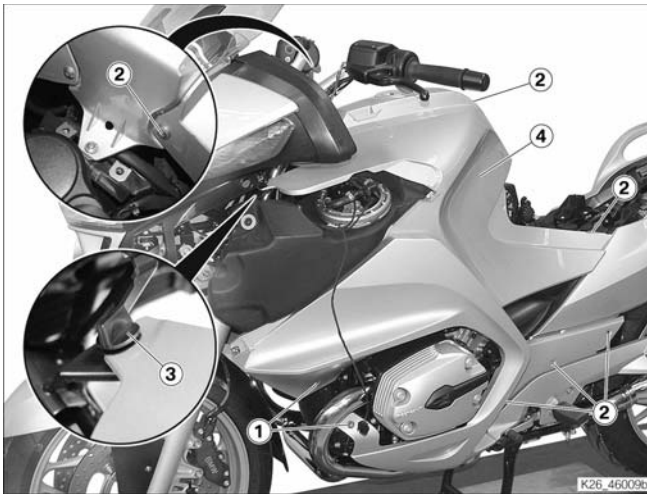


Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

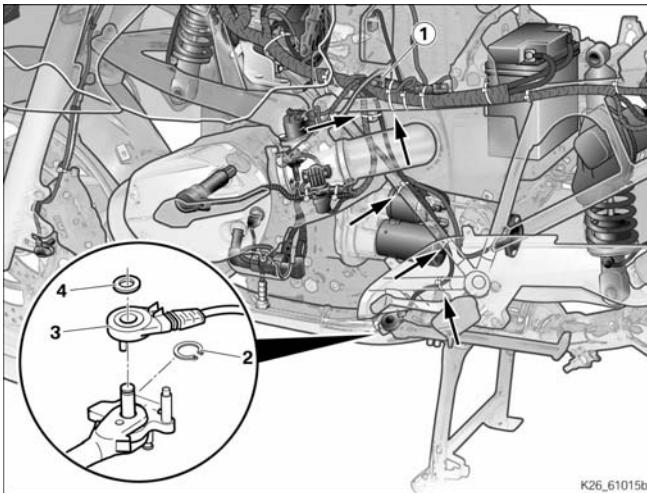


- Remove trim panel.
- (-) Removing entire left side tank cover**



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

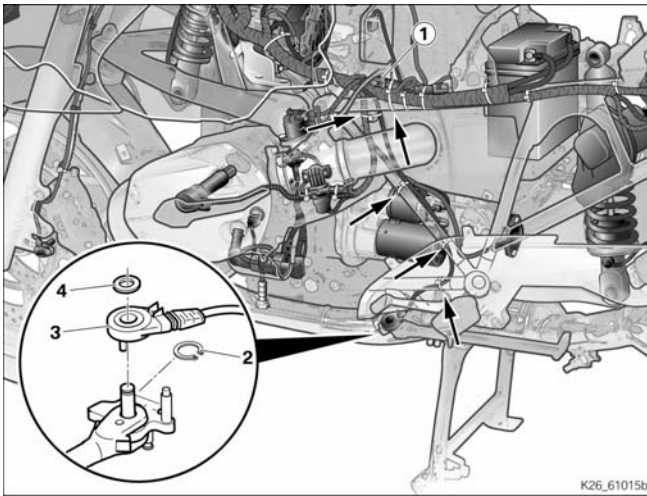
(-) Removing side-stand switch



- Disconnect plug (1).
- Open cable ties (arrows).
- Remove circlip (2).
- Remove washer (4).
- Remove side-stand switch (3).
- Guide the cable down and remove the side-stand switch.

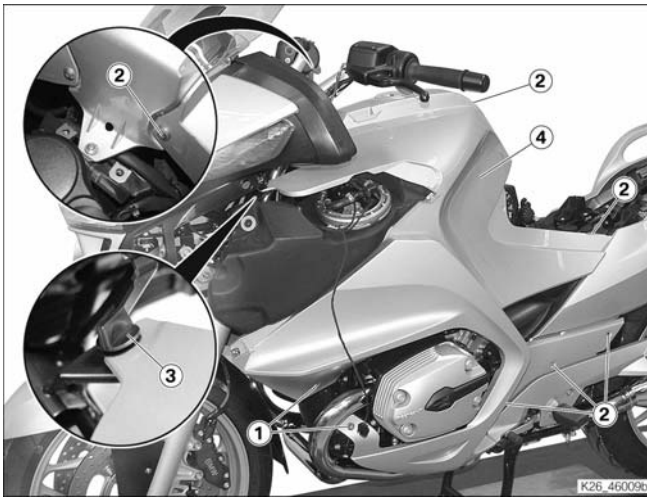
(-) Installing side-stand switch

- Install side-stand switch (3), making sure that the pin engages in the bore in the side stand.
- Thread the cable up through the frame, making sure that cable routing is correct.



- Connect plug (1).
- Close the cable ties (arrows).
- Install washer (4).
- Install circlip (2).

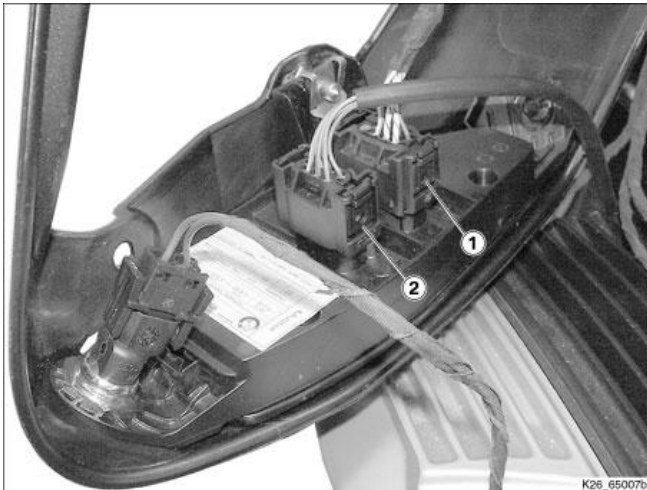
(-) Installing entire left side tank cover



- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

61 31 310 Replacing rear brake-light switch



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

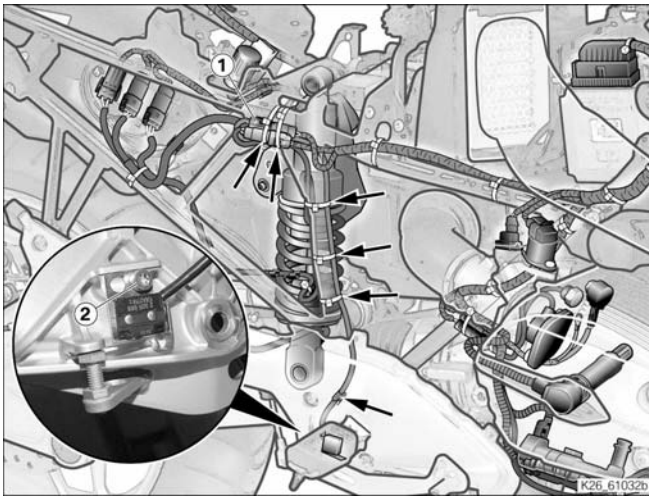


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

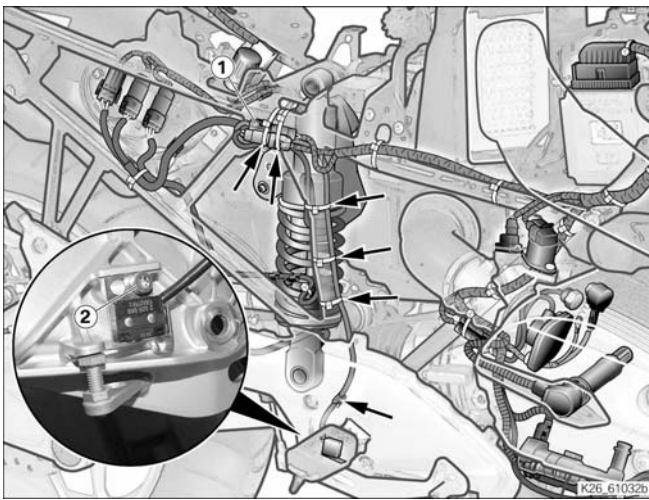
(-) Removing rear brake-light switch

- Disconnect plug (1).
- Cut through cable ties (arrows) at the frame and guide the cable down until clear.
- Remove screw (2).




- Remove the brake-light switch.

(-) Installing rear brake-light switch



- Hold the brake-light switch in position.
- Install screw (2).

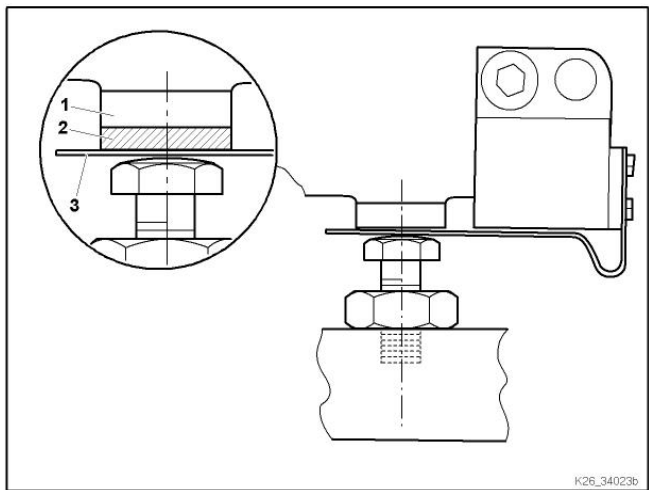
 Tightening torques		
Brake light switch, footbrake, to footrest support, M5 x 8	5 Nm	


- Secure the cable to the frame with cable ties (arrows), making sure that the cable is correctly routed.
- Connect plug (1).

(-) Checking blow-by clearance at piston rod

Test

- Check the play of the piston rod between brake-light switch tab (3) and stop of adjusting screw (1) with feeler gauge (2).



 Technical data		
Play of piston pushrod, rear brake master cylinder	Measured between brake-light switch tongue and stop of adjusting screw	2 ⁺¹ mm

Result: Measured value is not to specification.

Measure:

- Adjusting blow-by clearance at piston rod




Precondition

- The blade of the feeler gauge must be placed transversely with respect to forward direction between the plate of the brake light switch and stop of the adjusting screw.



- Slacken nut (1) on pushrod (2).
- Turn push rod (2) to relieve the pressure until it has play.
- Turn pushrod (2) until all play **at the pushrod** is taken up.
- Lock nut (1).

 Tightening torques		
Lock nut, pushrod, rear brake master cylinder, M6	8 Nm	
Sealing lacquer		

- When work is completed, apply coloured sealing lacquer across nut (1) and the adjacent component.

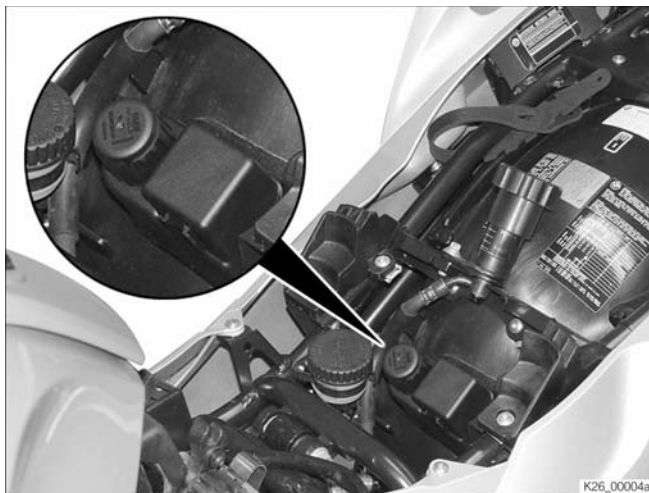


(-) Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581), (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Function test, rear brake-light switch

Test

- Test the brake-switch setting with the BMW Motorrad diagnostic system.


Result: If test result is not OK

Measure:




► **Adjusting blow-by clearance at piston rod**

- Slacken nut (1) on pushrod (2) at the brake master cylinder.

 Technical data			
Play of piston pushrod, rear brake master cylinder	Measured between brake-light switch tongue and stop of adjusting screw	2 ⁺¹ mm	

- Increase play in small steps to the maximum value.
- Lock nut (1).

 Tightening torques		
Lock nut, pushrod, rear brake master cylinder, M6 Sealing lacquer	8 Nm	

- When work is completed, apply coloured sealing lacquer across nut (1) and the adjacent component.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating



- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **61 31 390 Replacing starter relay**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

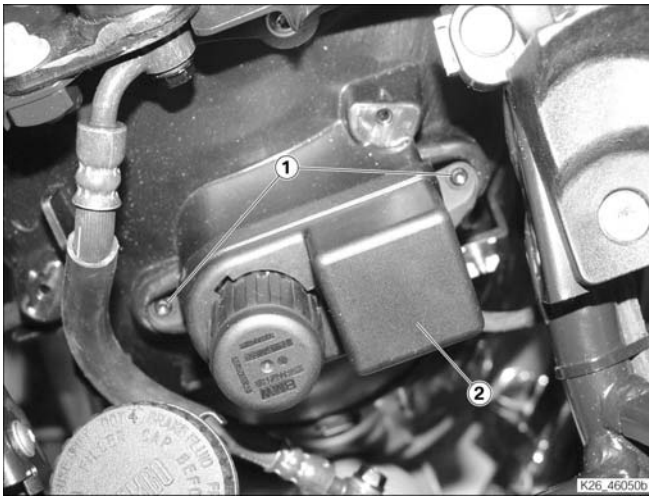


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing starter relay

- Remove screws (1) and remove cover (2).



- Take out the starter relay.

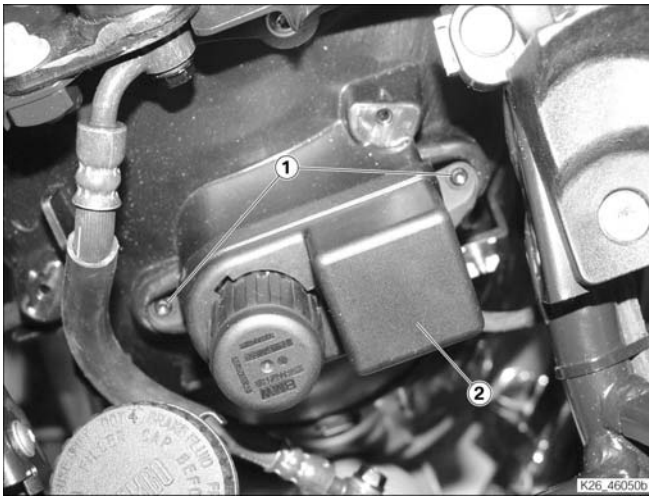


(-) Installing starter relay

- Seat the starter relay in its holder.



- Seat the starter relay in its holder.
- Install cover (2) and secure with screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **61 31 475 Replacing front wheel-speed sensor**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



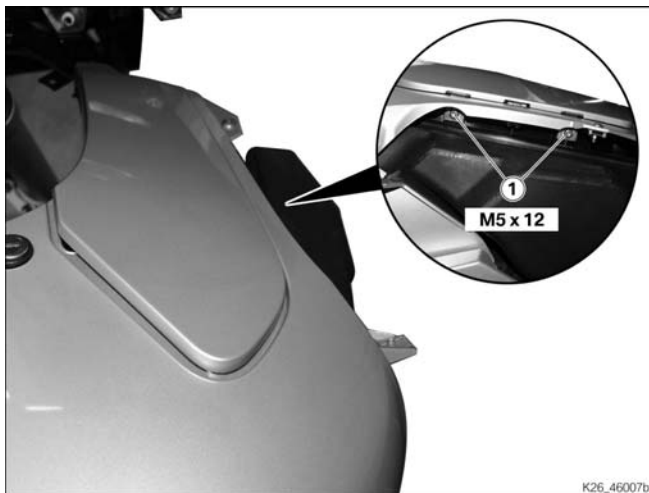
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



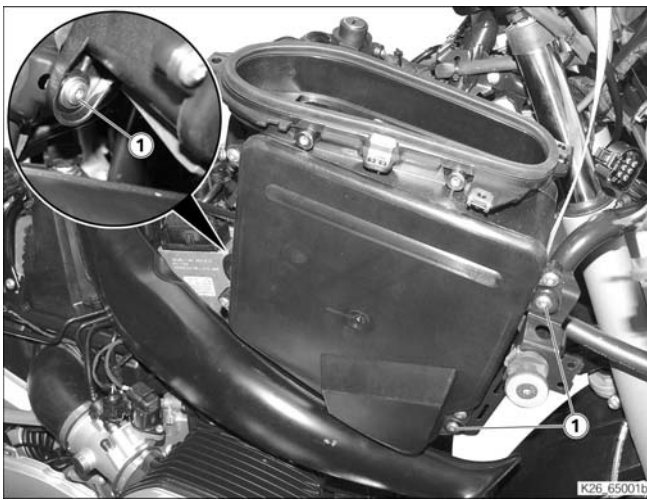
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing stowage compartment

- Remove screws (1).
- Remove the stowage compartment.



Variant, Radio with CD player

- Remove screws (1).
- Unclip the cable from the holder.
- Remove the stowage compartment and carefully lay it aside, with the cable attached.



(-) Removing left brake caliper

Attention

Nature: The front brake lever also applies the rear brakes (integral brakes). Once the brake calipers and brake pads have been removed, operating a brake lever could result in the pistons being pushed out.



Avoidance: Do not operate the brakes with a brake caliper removed.
Install the brake caliper with brake pads or insert the piston resetting device.

- Remove brake-caliper securing screws (1).

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

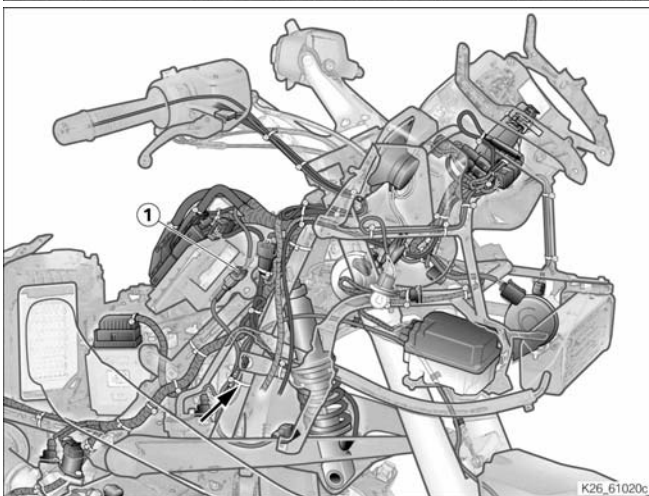
- Carefully remove the brake caliper from the brake disc, noting ABS sensor cable (2).

(-) Removing front ABS sensor

- Remove ABS sensor (1).
- Unclip the ABS sensor cable from holder (2).




- Disconnect plug (1) of the ABS sensor.
- Cut through the cable ties.
- Remove the ABS sensor with the cable.



(-) Installing front ABS sensor

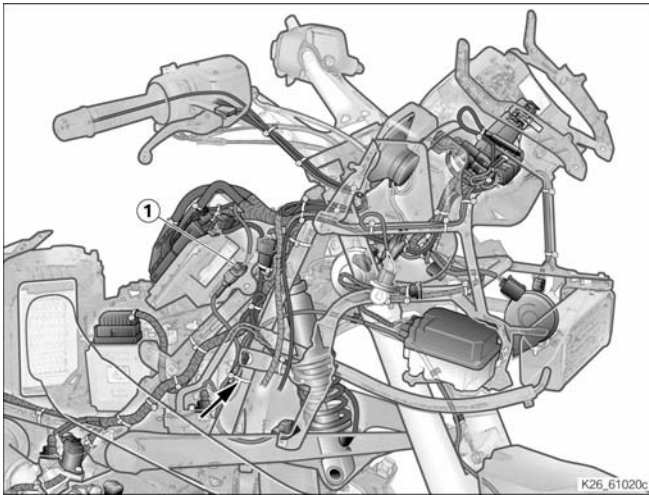
- Install ABS sensor (1).

 Tightening torques		
Speed sensor to fork leg,	4 Nm	



M5 x 10		
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- Clip the ABS sensor cable into holder (2).




- Pass the cable up.
- Connect plug (1) of the ABS sensor.
- Install the cable ties.



(-) Securing left brake caliper

- Carefully place brake caliper on brake disc, making sure the ABS sensor cable (2) is routed correctly.
- Install brake-caliper screws (1).

 Tightening torques		
Brake calliper to slider tube, M8 x 32 - 10.9	30 Nm	



Warning

Nature: Self-diagnosis is not performed unless both brake levers are in their fully released positions. Only the RESIDUAL BRAKING FUNCTION is available until self-diagnosis is completed.

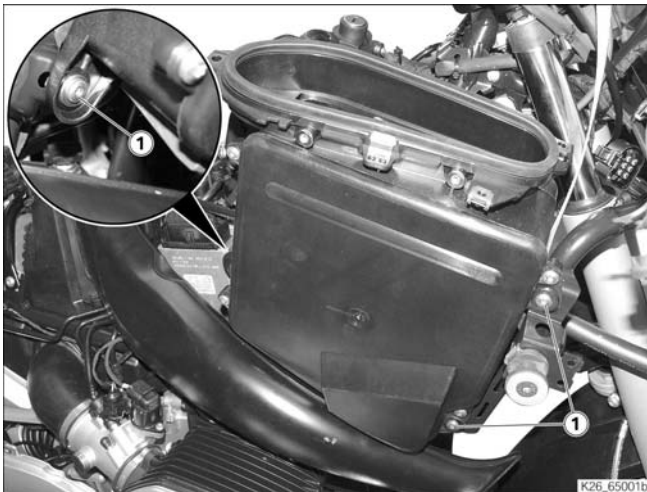
Avoidance: Before and during self-diagnosis, be sure

to leave both brake levers in their fully released positions.

- Once the work has been completed, with the ignition switched on seat the pads against the brake discs and check operation of the brake system.

(-) Installing stowage compartment

- Place the stowage compartment in position and align it correctly.
- Install screws (1).



Variant, Radio with CD player

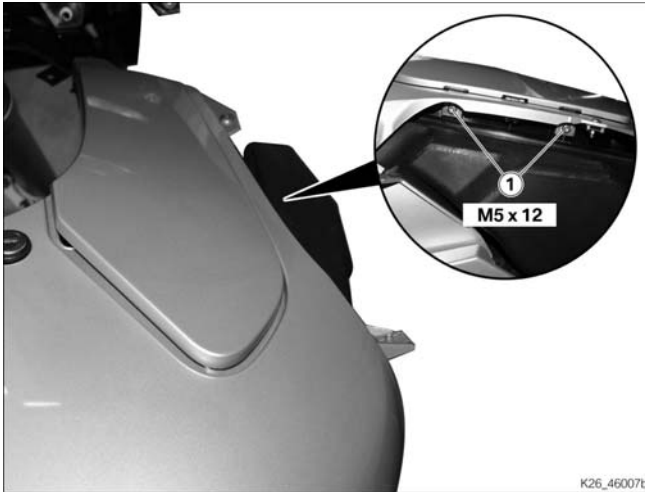
- Place the stowage compartment in position and align it correctly.
- Clip the cable into the holder.
- Install screws (1).

(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid



- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).

(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing tank rail



- Fit tank rail.
- Install screws (1).

(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

61 31 476 Replacing rear wheel-speed sensor

(-) Removing rear wheel

Precondition

- The motorcycle is on its centre stand.



- Remove wheel studs (1).



Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.



K26_36005b

(-) Removing brake-hose cover

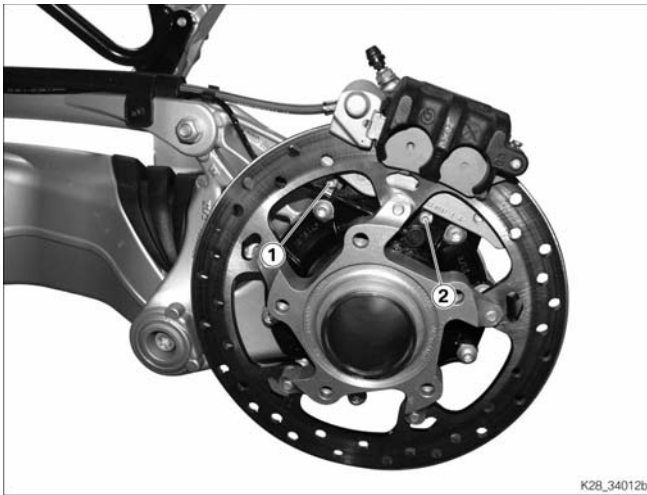
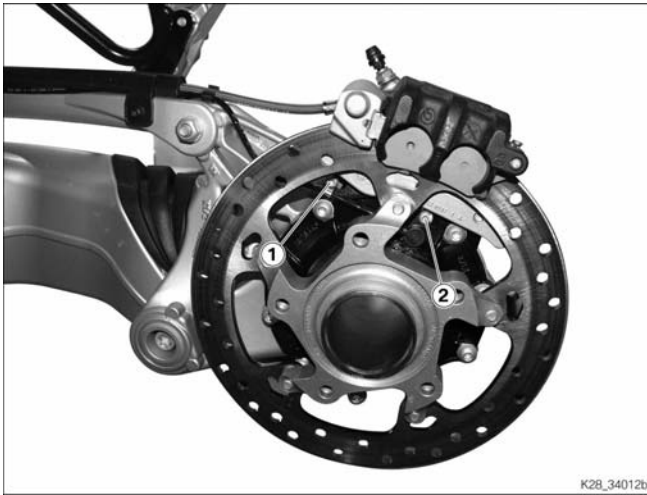
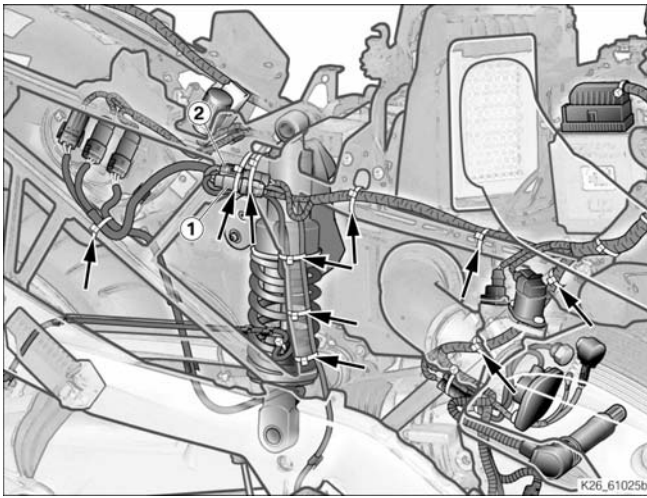
- Remove the screws and lift off the cover.



K25_34028a

(-) Removing rear speed sensor

- Disconnect plug (1) and disengage the cable from the motorcycle.
- Guide the cable and plug out to the rear.



- Remove screw (2).
- Disengage the sensor cable from clip (1).
- Carefully pull out the speed sensor.
- Disengage the sensor cable from the motorcycle.

(-) Installing rear speed sensor

- Fit new O-ring on speed sensor.
- Grease speed sensor and O-ring.



Consumables/lubricants

Acid-free friction-bearing grease	Ring gear, battery posts, starter pinion, etc.	81 22 9 407 174
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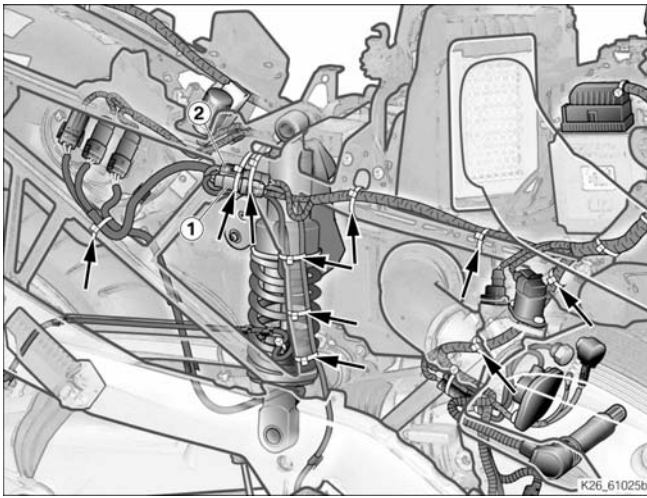
- Carefully fit speed sensor with O-ring in final drive unit.
- Install screw (2).



Tightening torques

Speed sensor to final drive housing cover, M5 x 10	4 Nm	
--	------	--

- Route the sensor cable correctly and secure it in clip (1).
- Route the cable forward into position and connect plug




- (1).
- Secure the sensor cable to the brake hose and to the motorcycle.

(-) Installing brake hose cover



- Hold the cover in position and secure it with screws.

 Tightening torques		
Brake hose cover to strut, M6 x 16	8 Nm	

(-) Installing rear wheel




- Check that the wheel centering spigot and contact surfaces of the wheel hub are free of grease.

⚠ Attention

Nature: Components can be damaged by hard or sharp-edged objects.

Avoidance: Avoid scratching the components; use masking tape if necessary.

- Insert the rear wheel into the centering hole.
- Hand-tighten wheel studs (1) and then tighten in diagonally opposite sequence.

 Tightening torques		
Wheel flange with bushing, M10 x 43 x 1.25, in diagonally opposite sequence	60 Nm	
Wheel flange with cut	60 Nm	

thread, M10 x 40 x 1.25, in diagonally opposite sequence		
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 **61 33 000 Replacing horn**



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



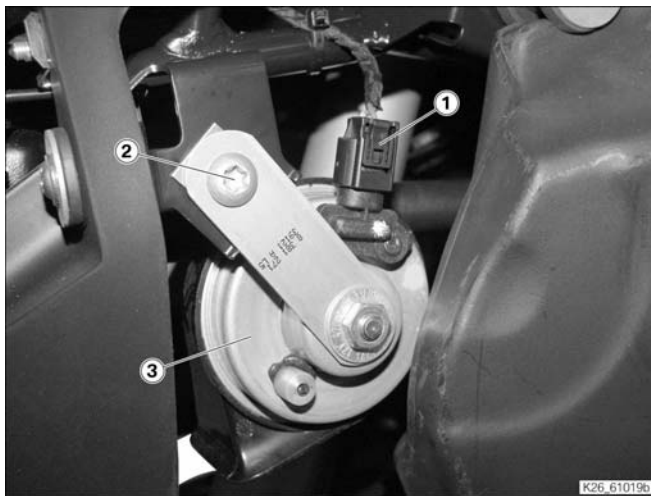
Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

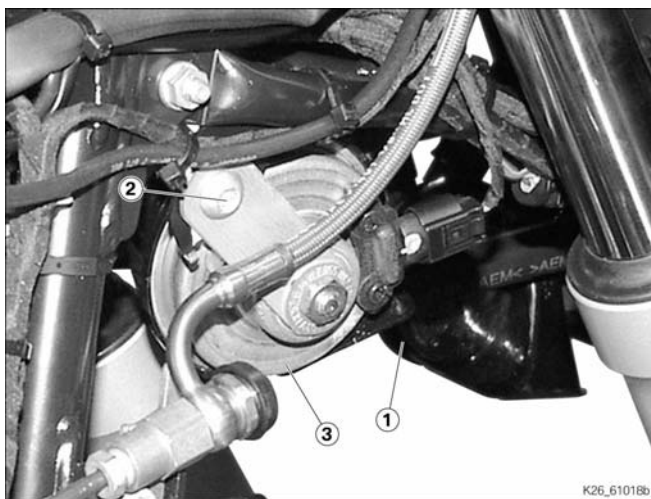
(-) Removing front horn

- Disconnect plug (1).
- Remove screw (2) and remove horn (3).



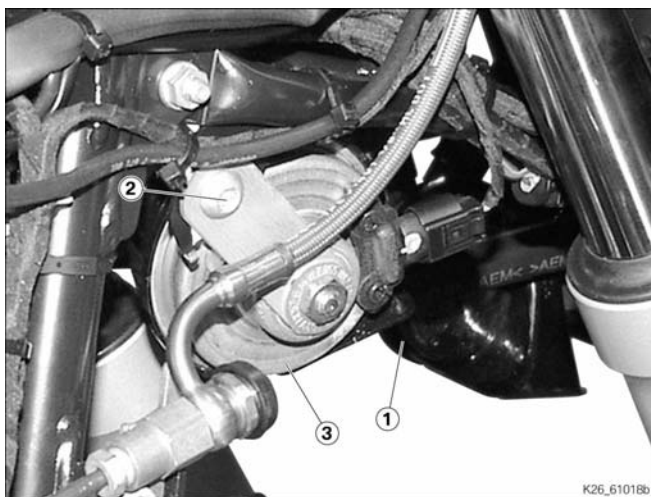
(-) Removing rear horn


- Disconnect plug (1).
- Remove screw (2) and remove horn (3).



(-) Installing rear horn

- Place horn (3) in position.
- Install screw (2).



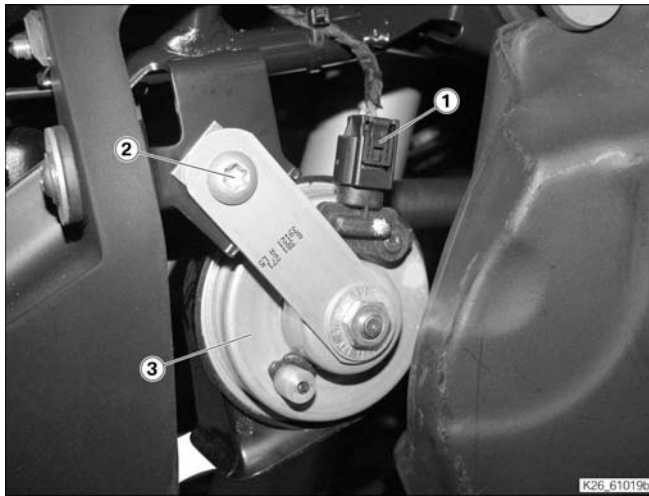
 Tightening torques		
Horn to fairing bracket, M8 x 16	16 Nm	

- Connect plug (1).

(-) Installing front horn

- Place horn (3) in position.
- Install screw (2).

 Tightening torques		

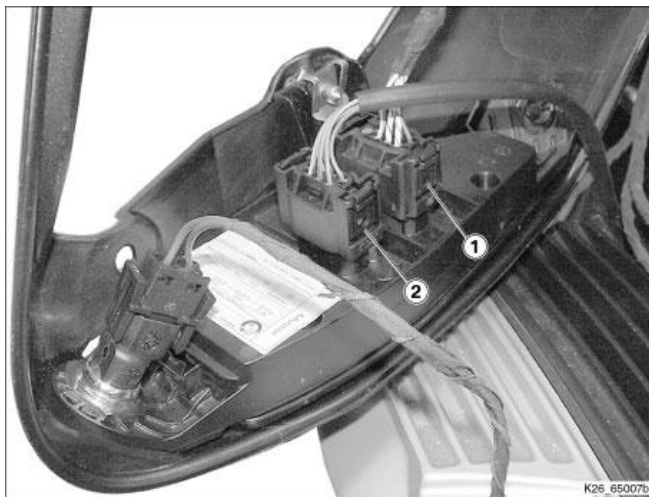


Horn to fairing bracket, M8 x 16	16 Nm	
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- Connect plug (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.

- Hold the panel in position.
- Install screws (1).



 **61 35 020 Replacing ZFE control unit (central vehicle electronics)**

(-) Draining fuel tank



Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

- Drain the fuel tank, using commercially available special tool.

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_46016a



K26_52002b

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



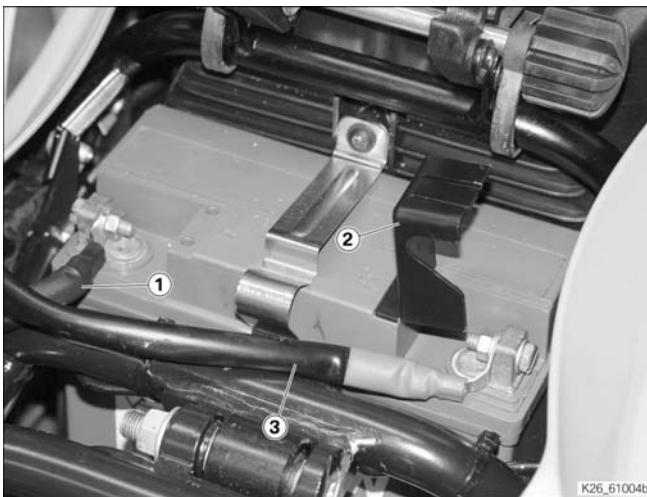
(-) Disconnecting battery

- Switch off the ignition.

! Attention

Nature: Disconnection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.



- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing left-hand trim panel

- Remove screws (1).

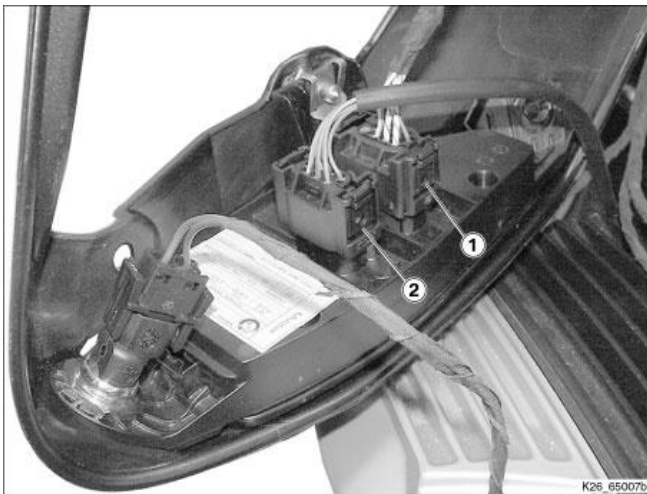


- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

(-) Removing entire left side tank cover

- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).



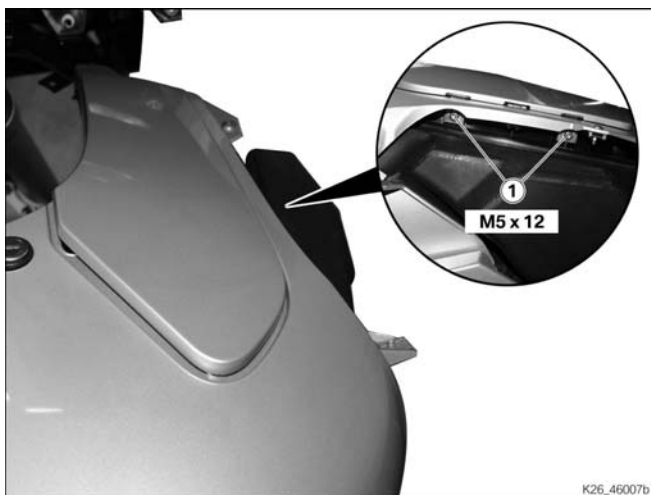
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



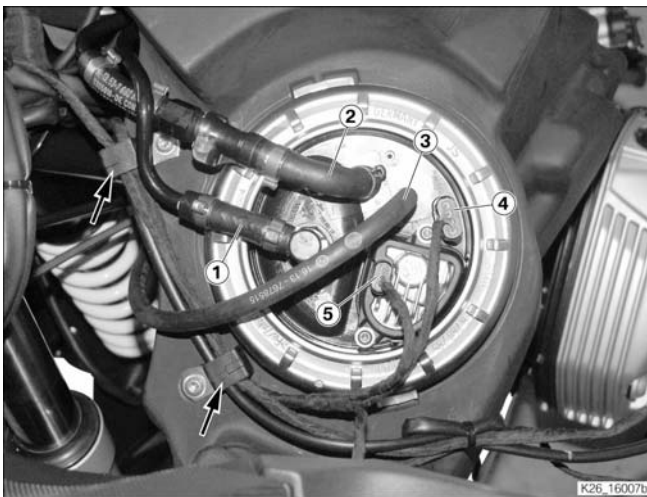
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

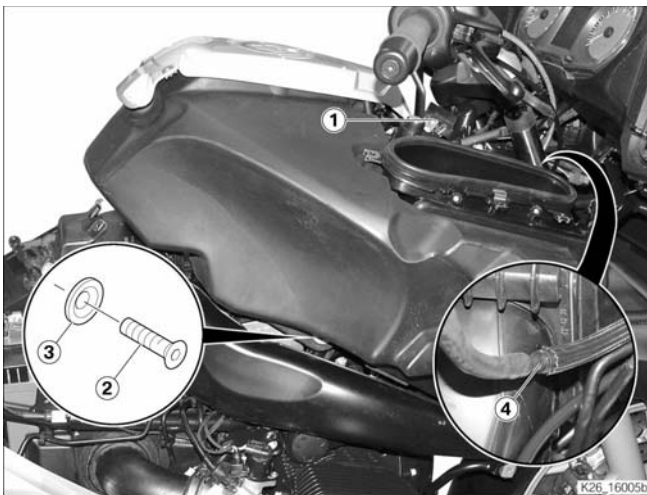


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

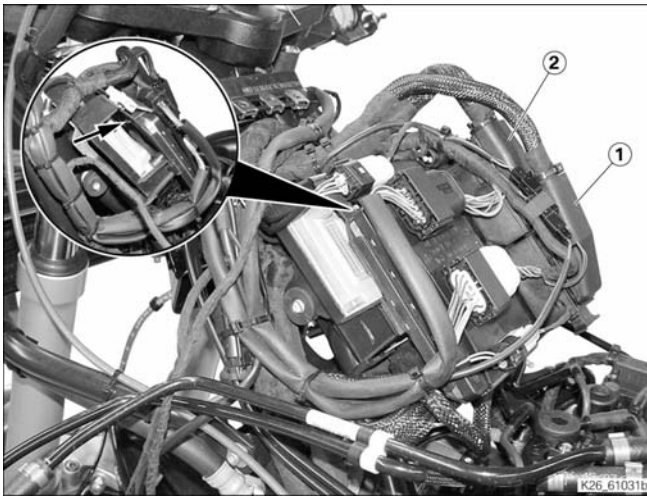


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



(-) Removing central vehicle electronics (ZFE) control unit

- Disconnect plugs (1) and (2).
- Open the clips (arrows) and swing the cover up.
- Remove the ZFE control unit.



(-) Installing central vehicle electronics (ZFE) control unit

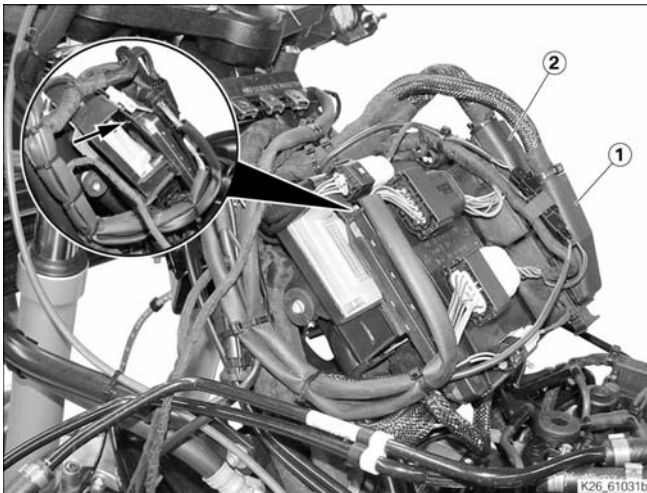


Note

Do not, **under any circumstances** temporarily install control units from other vehicles by way of testing. The possible consequences include:

Coding data could be overwritten.


The control units could malfunction.

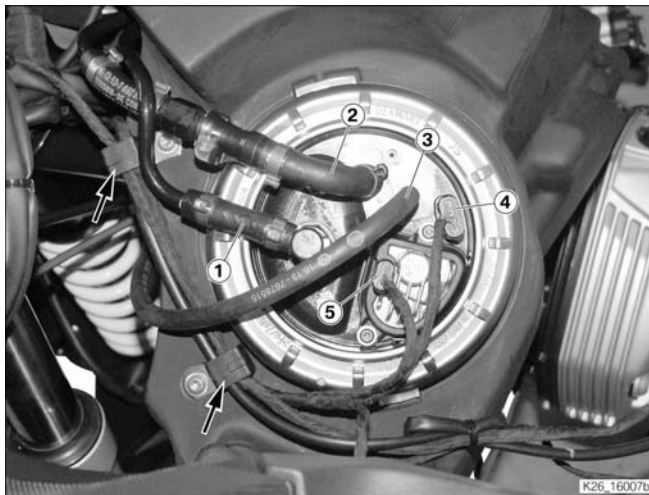
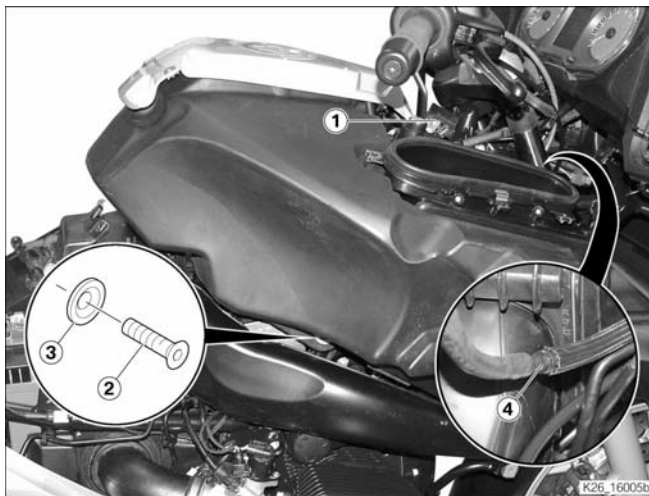


- Seat the ZFE control unit in its holder.
- Close the cover and engage the clips (arrows).
- Connect plugs (1) and (2).

(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.
- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame	16 Nm	



strut, right, M8 x 40		
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).

- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

Attention

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

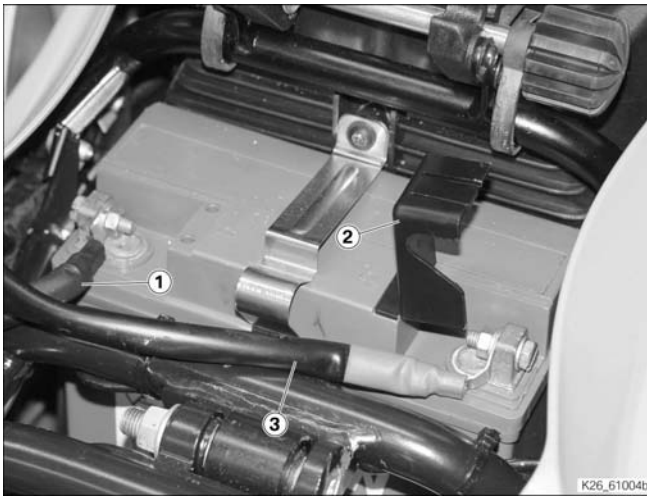
(-) Connecting battery

Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.



- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Preparing the motorcycle for CIP (coding, individualisation and programming)

Precondition

- Engine switched off.
- Prop the motorcycle in such a way that it cannot move while programming/coding is in progress.
- Motorcycle's battery is fully charged.



Note

Do not attempt to perform work of any other kind on the motorcycle while programming/coding are in progress.

- Switch off all electrical consumers.



Attention

Nature: Programming/coding is aborted if the voltage in the on-board system drops below 12.6 volts.

Avoidance: Connect the charger to the battery.

- Connect charger (No. 61 1 581) with cables (No. 61 1 582) to the battery. While programming/coding is in progress, **do not** connect or disconnect the charger.

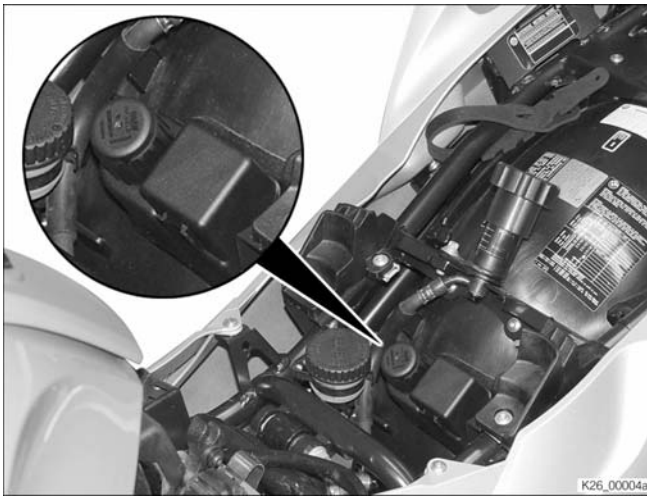
► Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.

- Connect the BMW Motorrad battery charger (No. 61 1 581), (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.



- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



- Perform diagnosis. Rectify faults, if found, **before** starting programming/coding.
- Start programming/coding with the CIP program and follow the instructions issued by the BMW Motorrad diagnostic system.

(-) Registering components with the ZFE control unit

- Once the ZFE control unit has been programmed, initialise/calibrate the following components:
- Fuel gauge
- Electrically adjustable windscreen

Variant, ESA

- ESA spring strut

► Preparation for initialising/calibrating new parts

Precondition

- Engine switched off.
- Prop the motorcycle in such a way that it cannot move while initialisation/calibration is in progress.
- Motorcycle's battery is fully charged.



Note

Do not attempt to perform work of any other kind on the motorcycle while programming/coding are in progress.

- Switch off all electrical consumers.



Attention

Nature: Programming/coding is aborted if the voltage in the on-board system drops below 12.6 volts.

Avoidance: Connect the charger to the battery.

- Connect charger (No. 61 1 581) with cables (No. 61 1

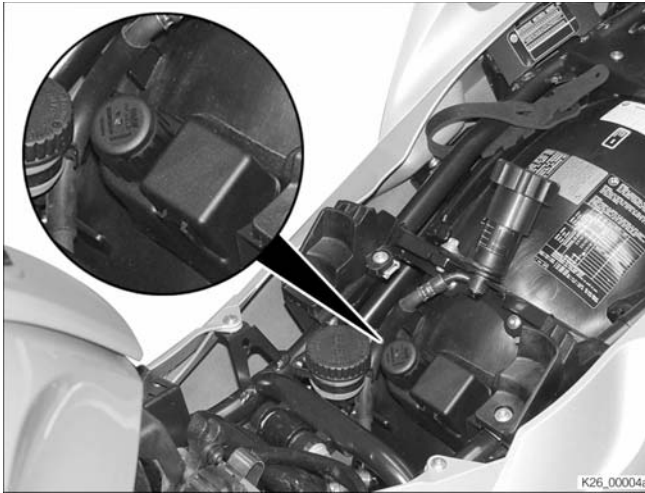
582) to the battery. While initialisation/calibration is in progress, **do not** connect or disconnect the charger.

▷ Connecting BMW Motorrad diagnostic system to motorcycle



Note

See the Instructions for Use supplied with the Group Tester One for detailed information on initial startup, installation of the operating system, diagnosis software and hardware periphery of the GT1.



- Connect the BMW Motorrad battery charger (No. 61 1 581) , (No. 61 1 582) to the motorcycle.
- **Begin** by switching on and booting the BMW Motorrad diagnostic system.
- » The "Start Diagnosis" screen appears
- From this point on, follow the instructions issued by the BMW Motorrad diagnostic system.



- Perform diagnosis. Rectify faults, if found, **before** starting initialisation/calibration.
- Start initialisation/calibration with the CIP program and follow the instructions issued by the BMW Motorrad diagnostic system.



(-) Disconnecting the BMW Motorrad diagnostic system from the motorcycle

- Terminate the diagnosis session correctly and switch off the ignition.
- Disconnect (KOMET) from the motorcycle and screw the cap onto the diagnosis plug.
- Disconnect the BMW Motorrad battery charger from the vehicle.

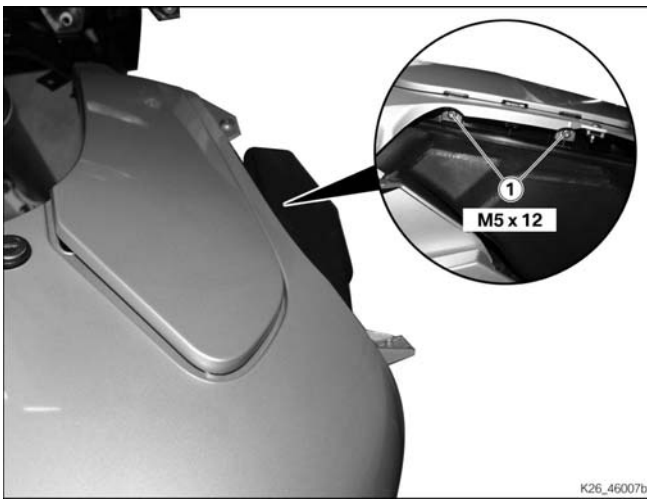
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



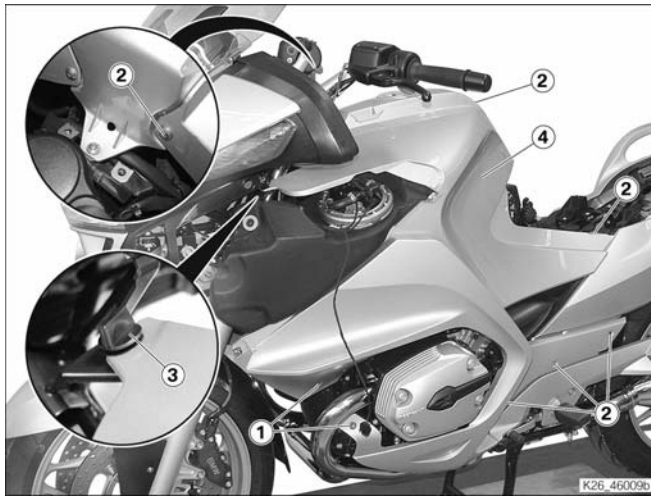
(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

(-) Filling fuel tank




Warning

Nature: Fuel is flammable and a hazard to health.

Avoidance: Observe all applicable safety regulations.

- Fill the fuel tank with fuel.

 Technical data			
Fuel-tank capacity	usable	27 l	
	including reserve of	4 l	

 **61 35 150 Replacing ring aerial, ignition switch and steering lock**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



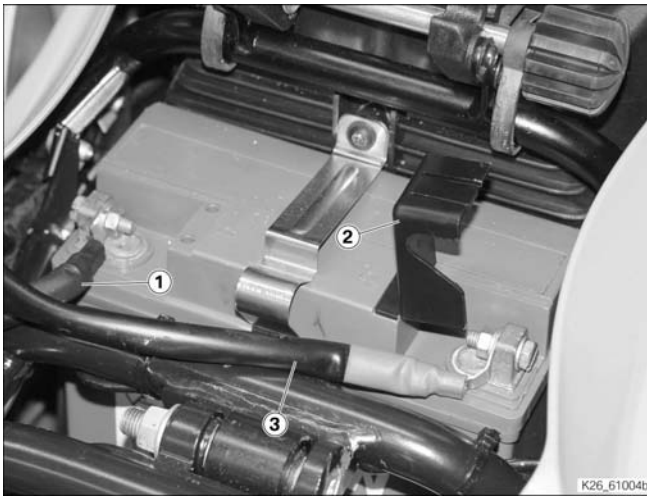
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence

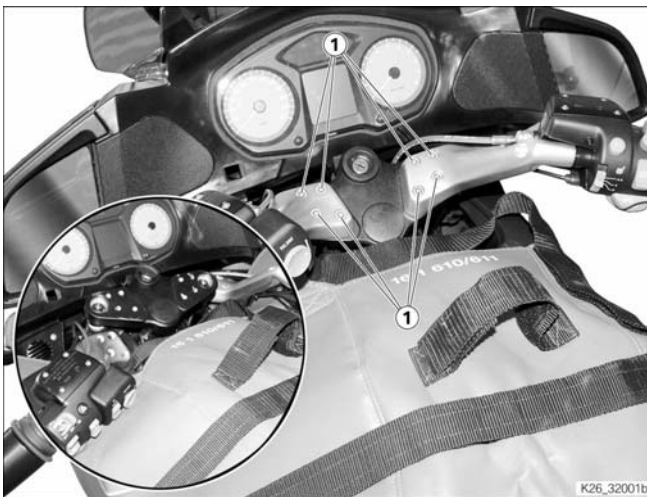


increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Releasing stub handlebars

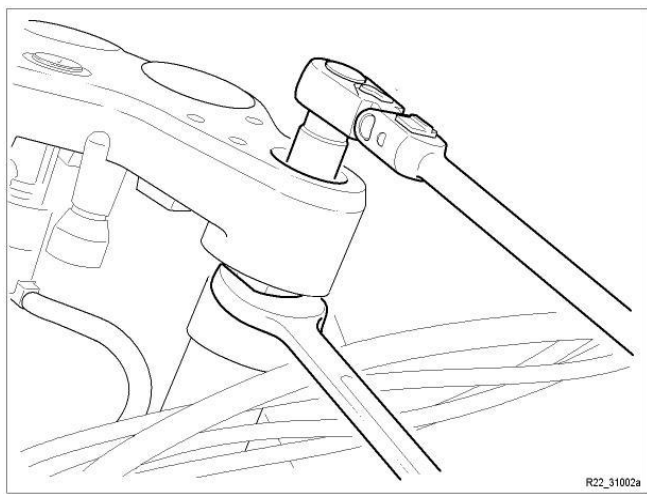


- Cover the fuel tank with fuel-tank protective cloth (No. 16 1 611).
- Remove screws (1) from the stub handlebars.
- Lay the stub handlebars back out of the way.

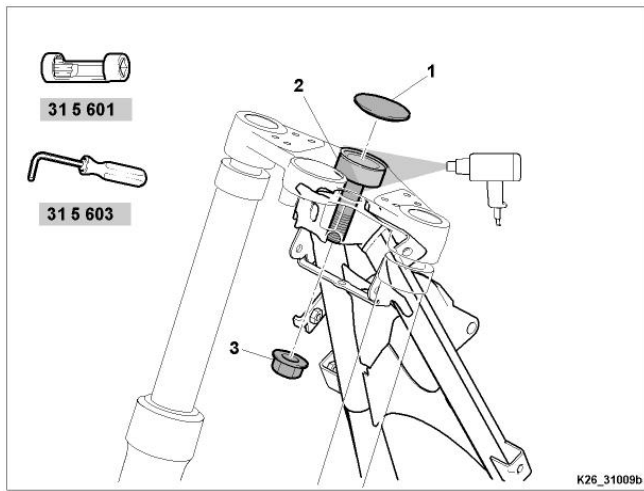
(-) Removing upper fork bridge

► **Releasing fixed fork tubes**

- Slacken fixed-tube fastener at the top fork bridge, while holding the fixed fork tube at the hexagon underneath the fork bridge.



- Remove cap (1).
- Heat threaded fastener (2) of the fork bridge from above.



Technical data

Release temperature, top fork bridge		120 °C	
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- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, remove nut (3) with socket wrench insert (No. 31 5 601).



Attention

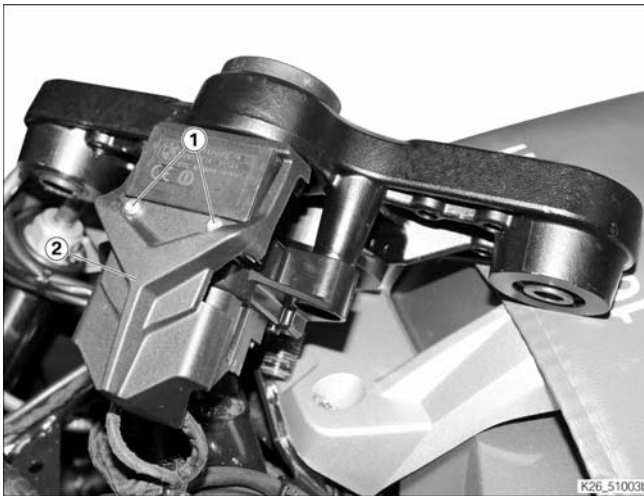
Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

- Turn the fork bridge all the way to the left and carefully remove the steering head bearing from the frame front section.
- Carefully lay the fork bridge back out of the way.

► **Disconnecting plug for ignition switch/ring aerial**

- Remove screws (1).
- Remove cover (2).



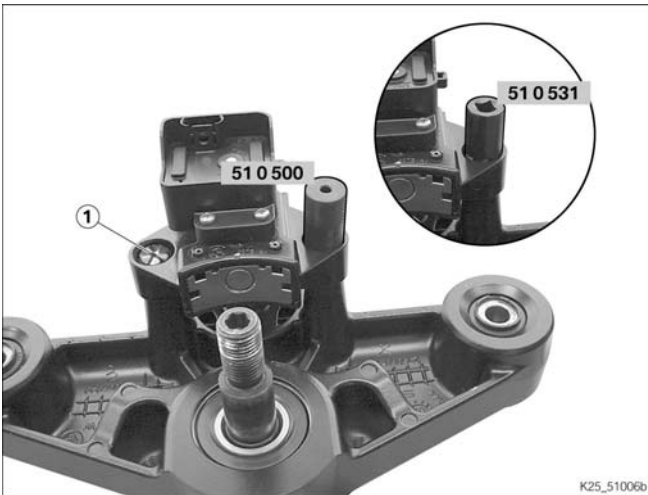
- Disconnect plugs (3) and (4).






(-) Removing lock barrel from ignition lock

- Insert the ignition key and turn it to the ON position.
- Insert a length of wire or similar into the hole (arrow) and push in the retainer.
- Pull the lock barrel out with the ignition key.

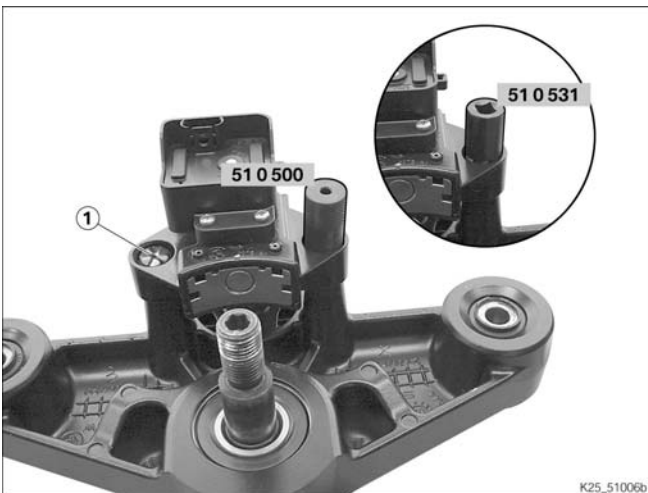


(-) Removing ring aerial and ignition/steering lock housing

- Drill pilot holes into non-removable screws (1) with drill bit (No. 51 0 500) and then continue drilling out the holes until the screw heads come off.


 Technical data			
Ignition/steering lock - depth for drilling out the non-removable screws	Bore diameter 4 mm Bore diameter 8 mm	min. 5 mm 5 mm	

- Removing and disassembling ring aerial with ignition/steering lock housing
- Use a stud remover to remove the shanks of the non-removable screws.



(-) Installing ring aerial and ignition/steering lock housing


- Clean the threads.
- Assemble the ring aerial with ignition/steering lock housing, using a new O-ring.
- Install the ring aerial with ignition/steering lock housing in the fork bridge.
- Install non-removable screws (1) with socket wrench insert (No. 51 0 531) .

 Tightening torques		
Ignition/steering lock to fork bridge, M8 non-removable screw, Replace screws Micro-encapsulated	20 Nm	

(-) Installing lock barrel for ignition lock



- Grease the lock barrel.

 Consumables/lubricants		
Grease for lock cylinders	Lubricating grease	81 22 9 407 421

- Insert the ignition key in the lock barrel and turn it to the ON position.



Note

The lock barrels of the ignition/steering lock and of the remaining locks are of a different design (different locking latch).

- Push down on the lock barrel until the retainer engages.

(-) Installing upper fork bridge

- Clean the threads.

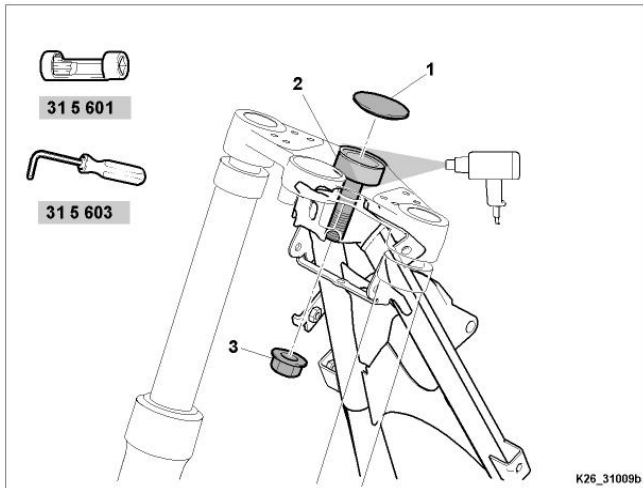
► Connecting plug for ignition switch/ring aerial

- Connect plugs (3) and (4).



- Install cover (2) and secure with screws (1).






Attention

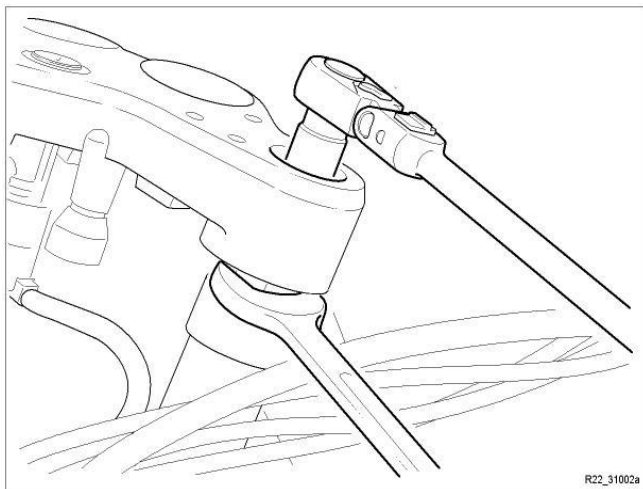
Nature: Excessive mechanical strain can damage the hoses of the brake and clutch system.

Avoidance: Do not overstretch brake or clutch hoses.

- Turn the fork bridge all the way to the left and carefully introduce the steering head bearing into the frame front section.
- From above, hold threaded fastener (2) from the fork bridge with Allen screw adapter (No. 31 5 603) and, from below, install new nut (3) with socket wrench insert (No. 31 5 601) .


 Tightening torques		
Fork bridge to front frame, M14 x 1.5, Replace nut Micro-encapsulated	130 Nm	

- Install cap (1).



▶ Installing fixed fork tubes


- Introduce the fixed fork tube into the fork bridge.
- Secure the fixed fork tube in the top fork bridge with a new nut, while holding the fixed fork tube at the hexagon underneath the fork bridge.

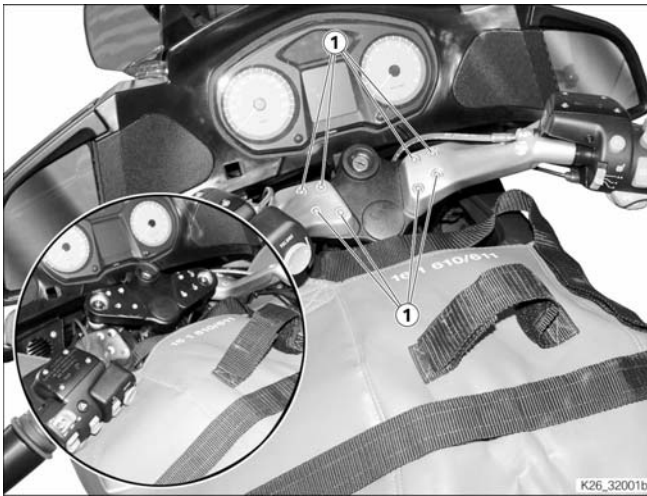
 Tightening torques		
Fork bridge, top, with fork fixed tube, M10 x 1.25, Replace nut Mechanical thread lock	40 Nm	



(-) Securing stub handlebars

- Position the stub handlebars on the top fork bridge, noting the seals.
- Install screws (1).

 Tightening torques		
Handlebar, left/right to fork bridge, M8 x 30	19 Nm	



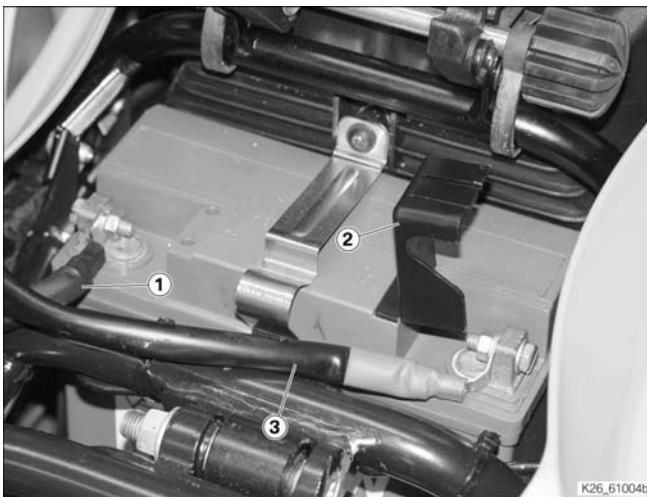
(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence. Never install the battery without the protective cap.



- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Installing seat



- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.



- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **62 11 200 Replacing instrument panel**

(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

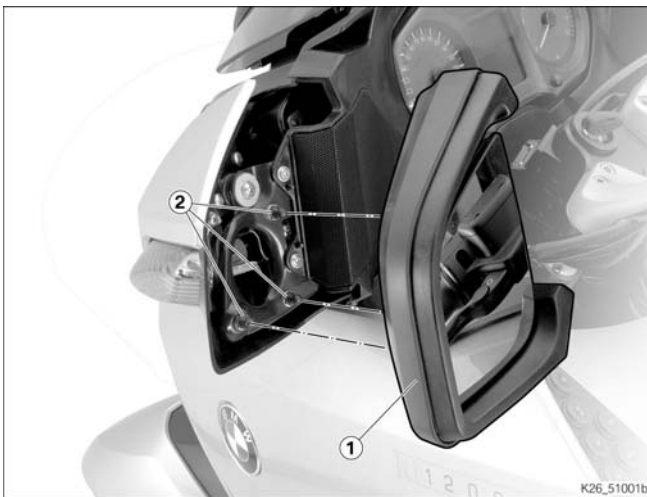
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing mirror

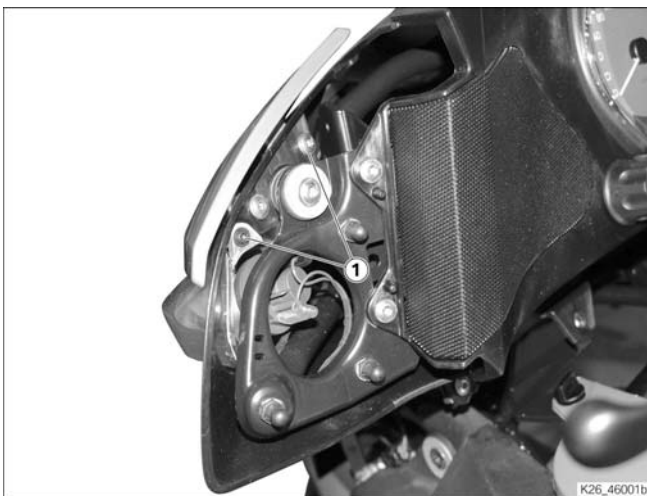
- Detach mirror (1).



Variant, Radio with CD player

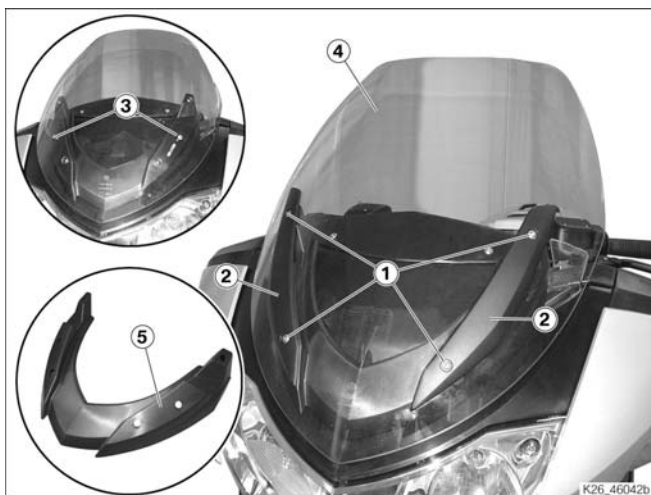
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



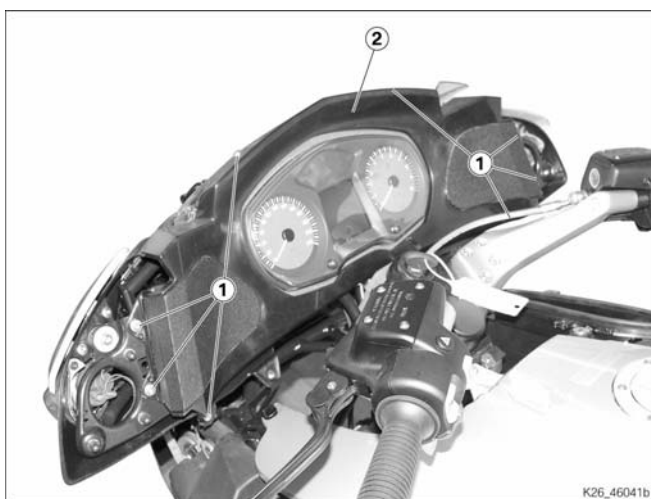
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).



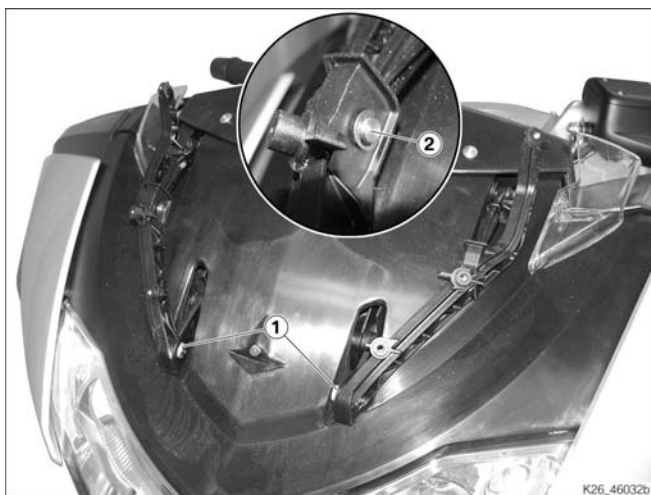
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Removing inner trim for instruments



- Remove screws (1).
- Remove inner trim (2).

(-) Partially removing holder for windscreen



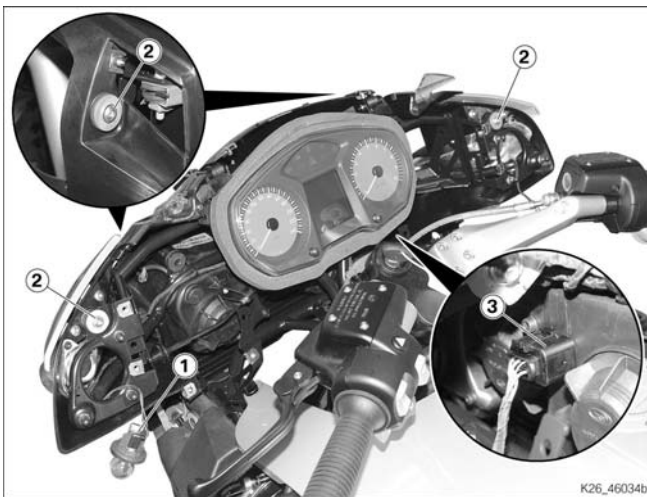
- Remove clips (1).
- Press out pin (2).

- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

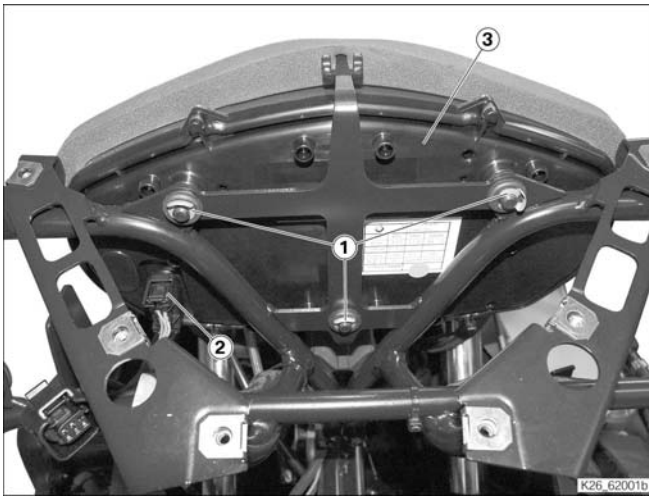
- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

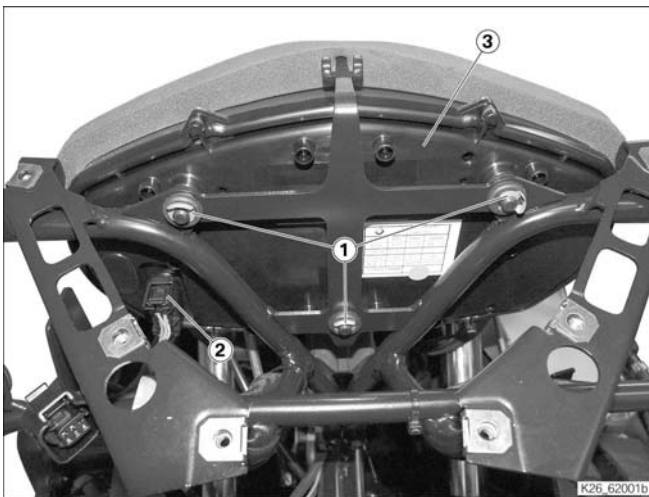
(-) Removing instrument panel

- Remove clips (1).
- Disconnect plug (2).
- Remove instrument panel (3).



(-) Installing instrument panel

- Place instrument panel (3) in position.
- Connect plug (2).
- Install clips (1).




(-) Installing entire top section of fairing

- Carefully place upper section of fairing in position.

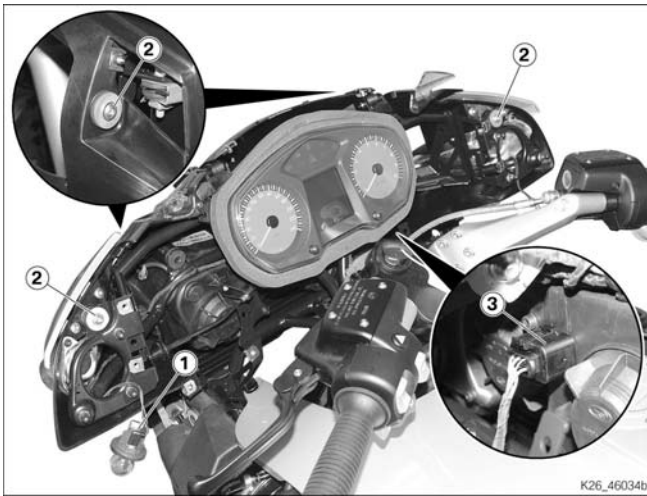
Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



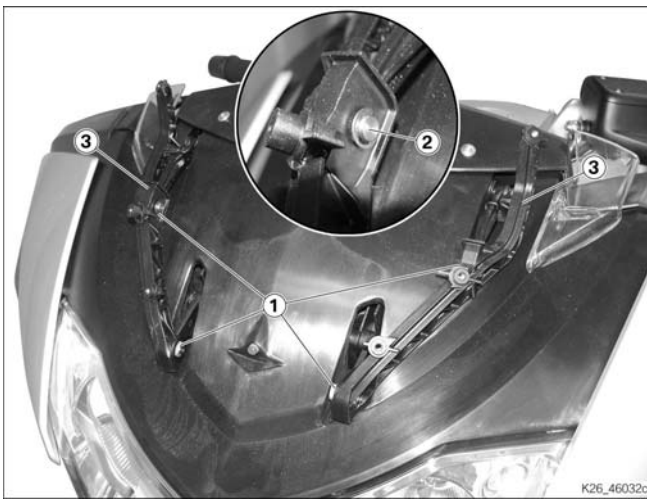
 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	

- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.



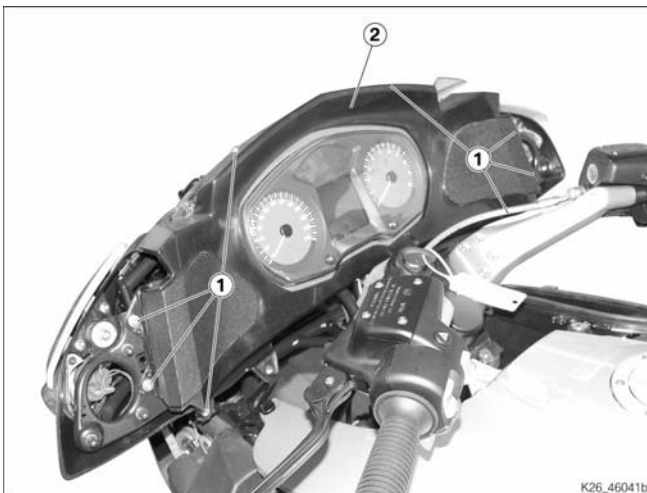
(-) Installing bracket for windscreen

- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).



(-) Installing inner trim for instruments

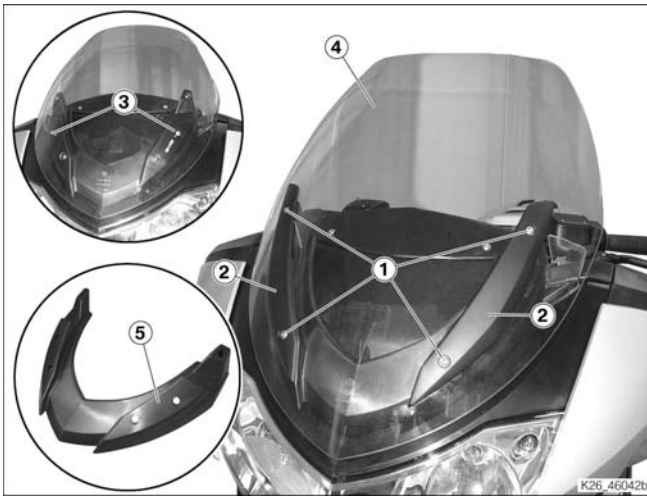
- Place inner trim (2) in position.
- Install screws (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.





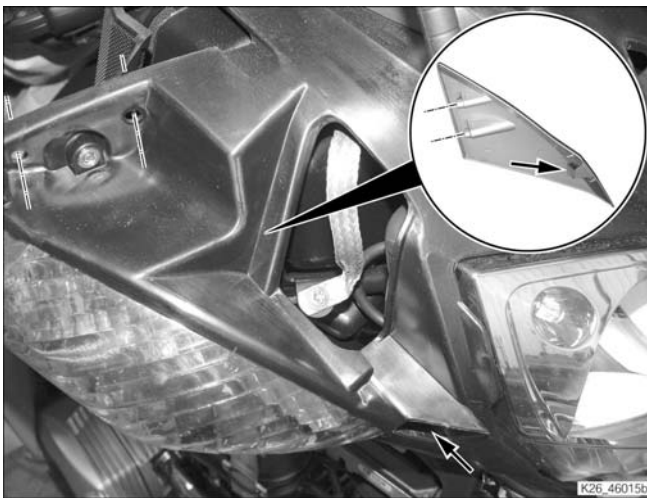
Tightening torques

Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	
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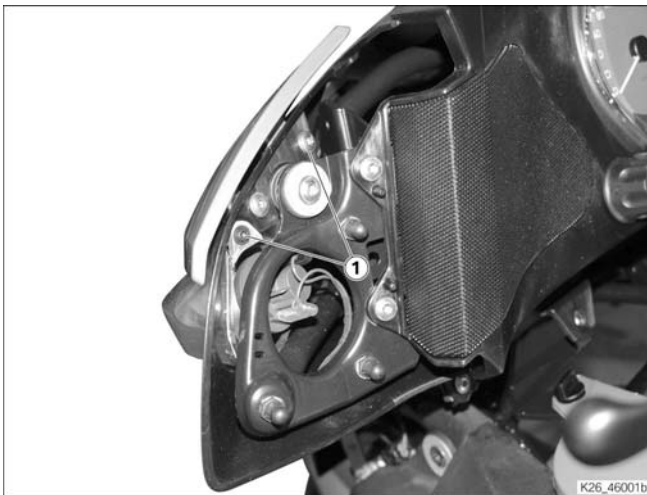
- Fit left and right trim panels (2) and secure with screws (1).

Variant, Radio with CD player

(-) Installing both left and right mirror trim panels



- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



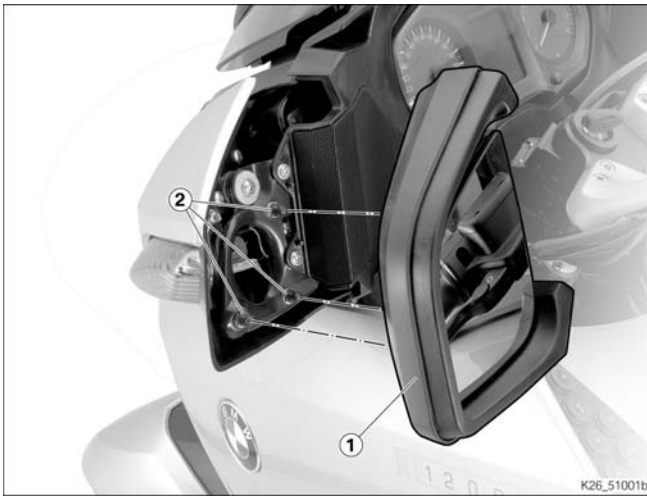
- Install screws (1).

(-) Installing mirrors



Attention

Nature: The mirrors can easily work loose from



their anchoring if the rubber holders or snap-fit studs are greased.

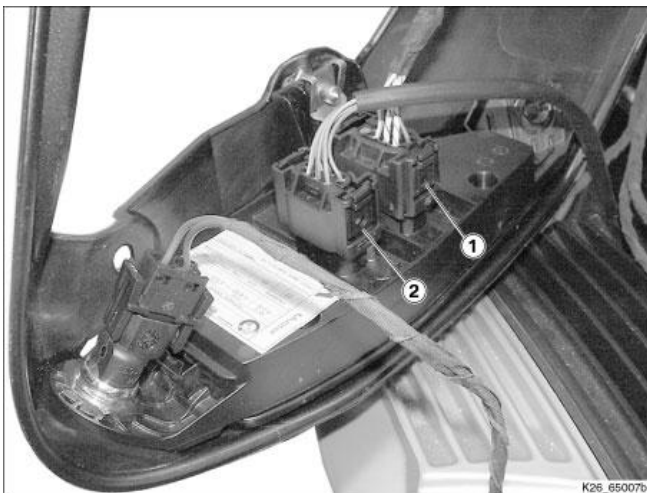
Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



K26_46017b



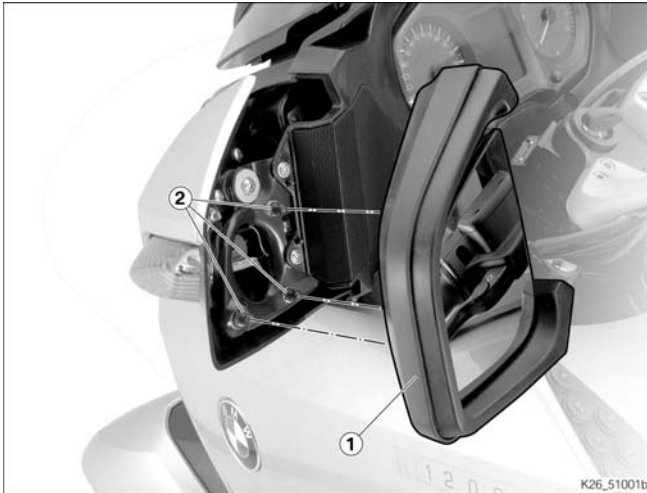
K26_46013b

- Hold the panel in position.
- Install screws (1).

 **62 11 205 Replacing cover for instrument cluster**

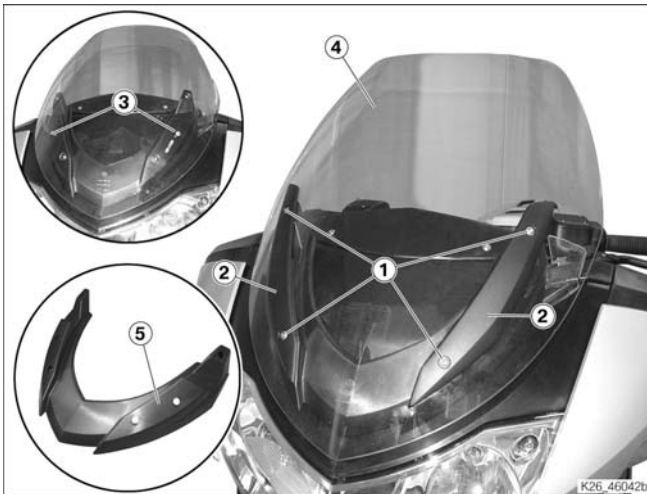
(-) Removing mirror

- Detach mirror (1).



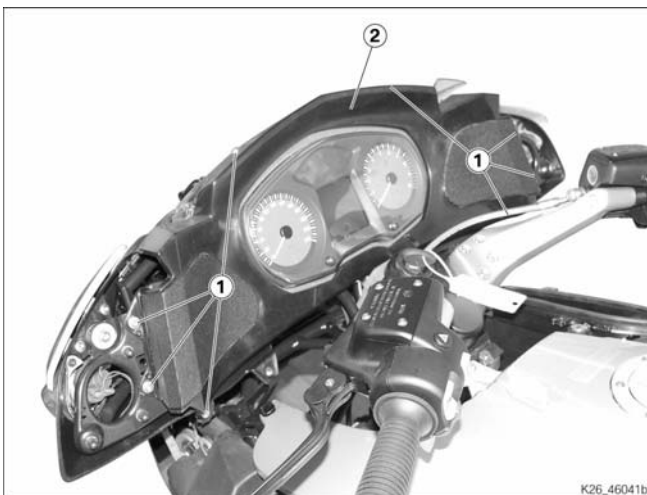
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).



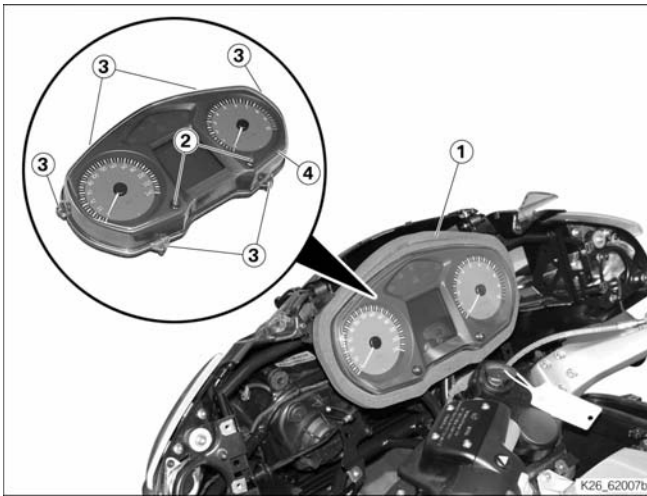
(-) Removing inner trim for instruments

- Remove screws (1).
- Remove inner trim (2).



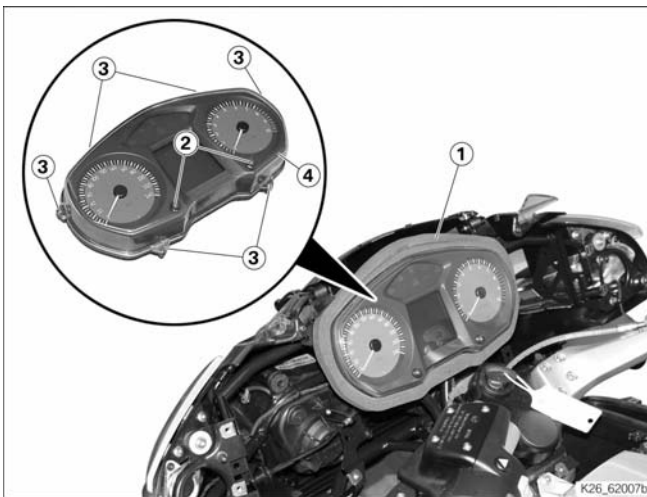
(-) Removing cover for instrument panel

- Remove foam-rubber surround (1).



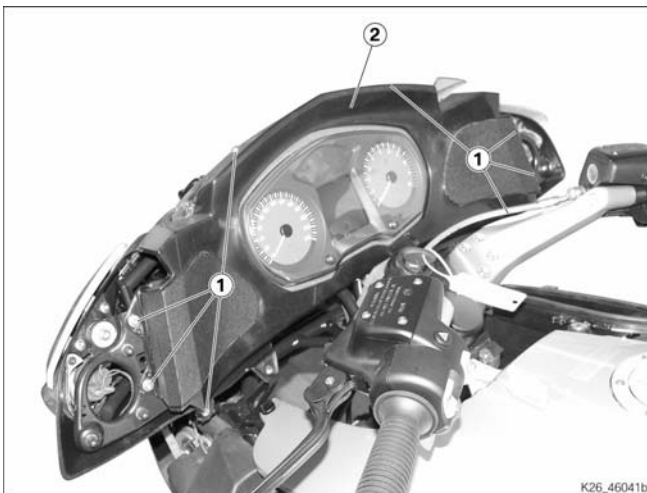
- Remove rubber caps (2).
- Remove screws (3).
- Remove transparent cover (4).

(-) Installing cover for instrument panel



- Install transparent cover (4).
- Install screws (3).
- Install rubber caps (2).
- Install foam-rubber surround (1).

(-) Installing inner trim for instruments

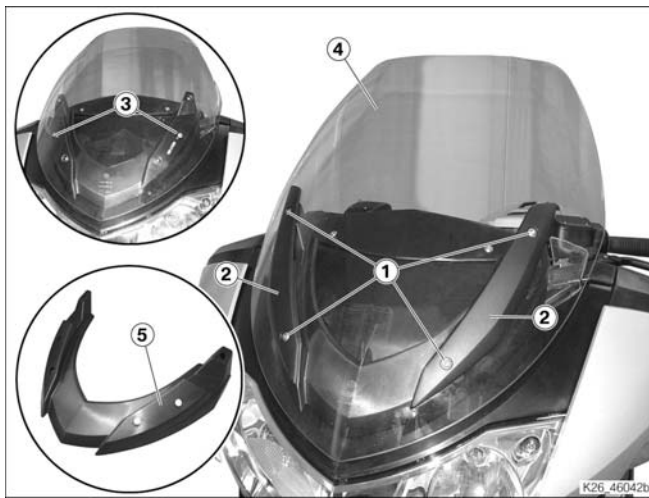


- Place inner trim (2) in position.
- Install screws (1).

(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.





Tightening torques

Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	
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- Fit left and right trim panels (2) and secure with screws (1).

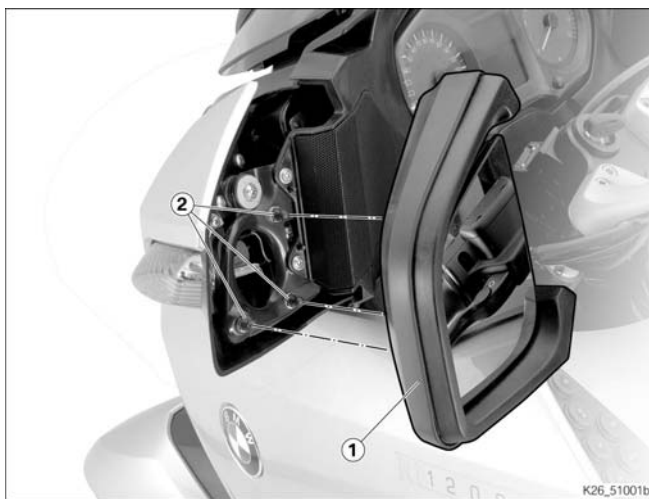
(-) Installing mirrors



Attention

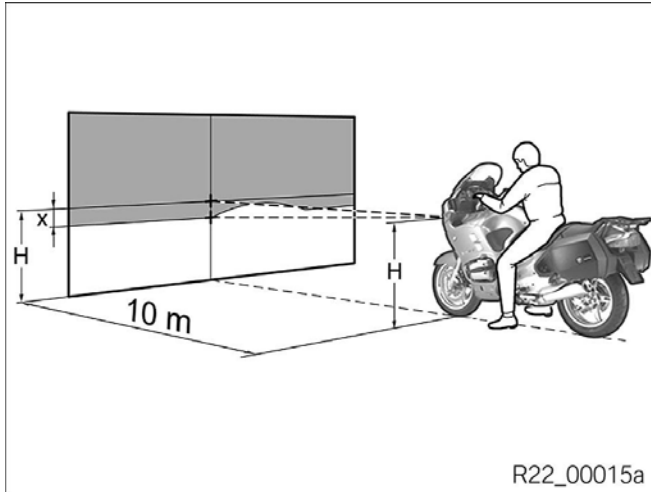
Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

Avoidance: Do not grease the rubber holder or snap-fit stud.



- Press mirror (1) in forward direction on to snap-fit studs (2).


63 12 000 Adjusting headlight



(-) Checking headlight beam throw

- Stop the motorcycle on a smooth, level surface.
- Set the spring preload to the basic setting.
- Apply the rider's weight to the motorcycle.
- Setting for headlight beam angle adjuster

Test

 Technical data			
Distance between headlight and vertical surface		10 m	
Distance between light/dark cut-off and mark at height of centre of headlight	Motorcycle loaded with 85 kg	-15 cm	
	ESA set for one-up riding (1 helmet) and motorcycle loaded with 85 kg	-15 cm	Variant, ESA


Result: Headlight beam angle not correct.

Measure:

► **Correcting headlight beam angle**

- Manually adjust the height of the beam throw by turning adjusting screw (1).

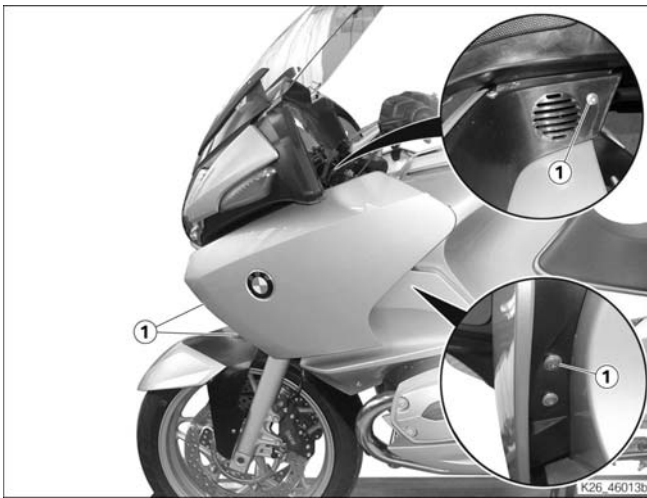


 Technical data			
Distance between light/dark cut-off and mark at height of centre of headlight	Motorcycle loaded with 85 kg	-15 cm	
	ESA set for one-up riding (1 helmet) and motorcycle loaded with 85 kg	-15 cm	Variant, ESA

- If necessary, adjust lateral throw by turning screws (2) with the aid of a socket wrench.



 **63 12 091 Replacing headlight**



(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).

- Remove trim panel.

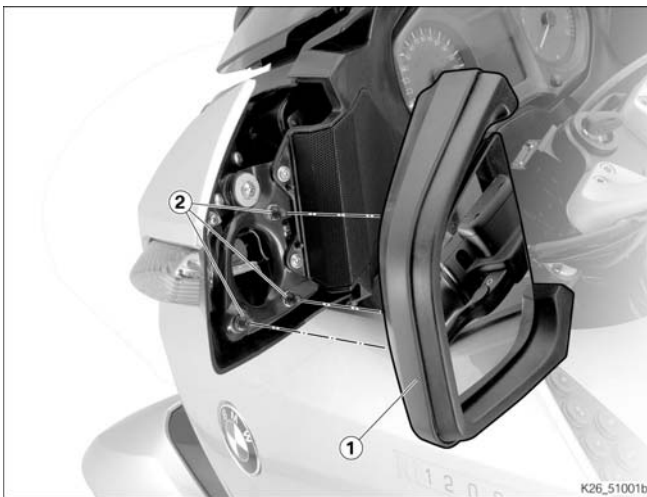
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing mirror

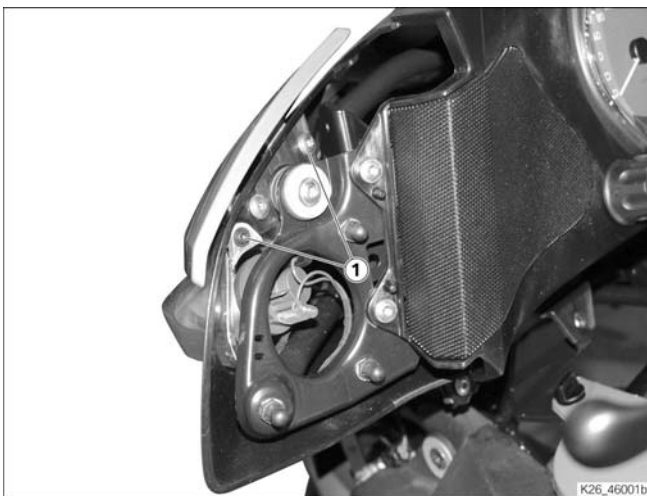
- Detach mirror (1).



Variant, Radio with CD player

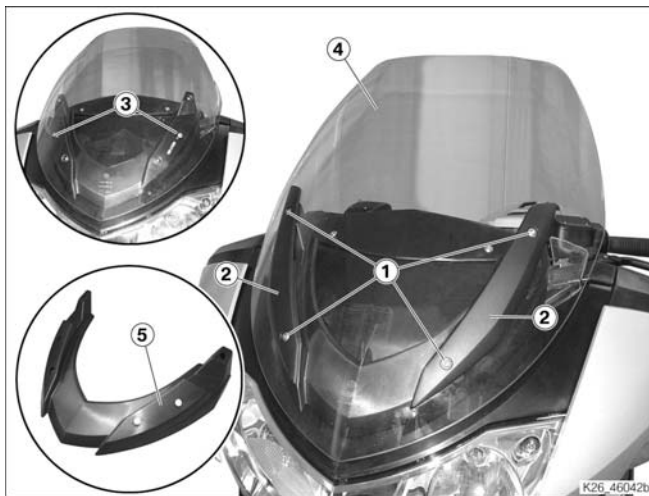
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



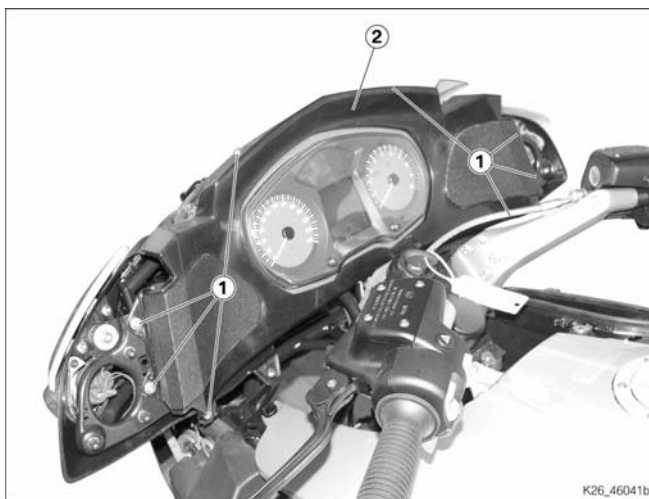
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).



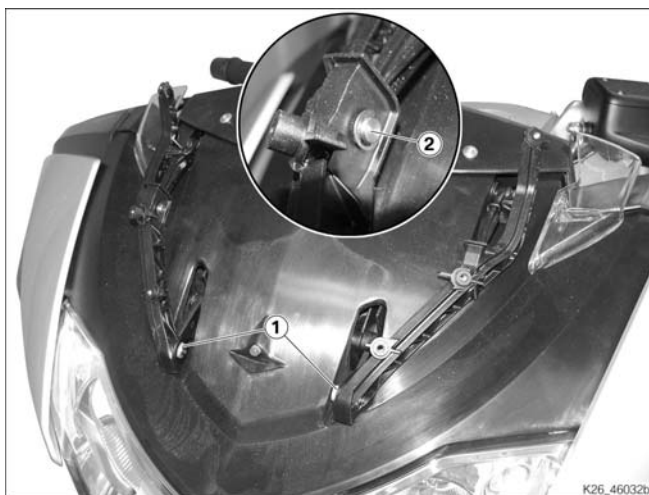
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Removing inner trim for instruments



- Remove screws (1).
- Remove inner trim (2).

(-) Partially removing holder for windscreen



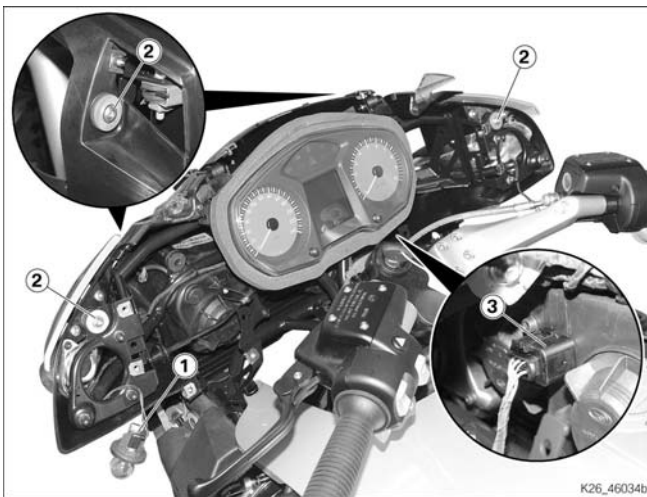
- Remove clips (1).
- Press out pin (2).

- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

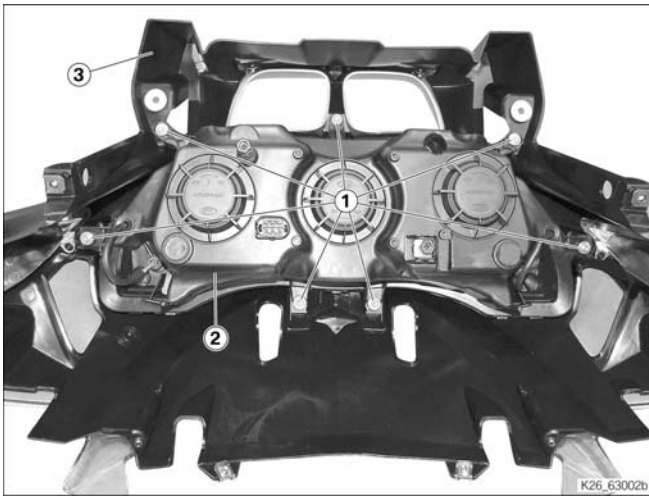
- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

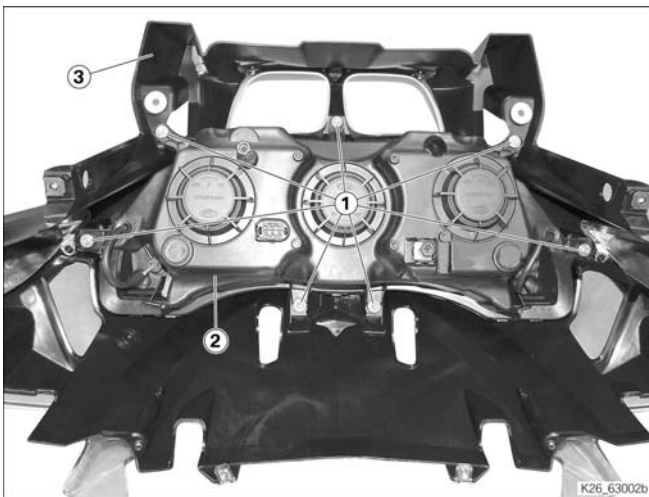
(-) Removing headlight

- Remove screws (1).
- Remove headlight (2) from top section of fairing (3).



(-) Installing headlight

- Install headlight (2) in top section of fairing (3).
- Install screws (1).




(-) Installing entire top section of fairing

- Carefully place upper section of fairing in position.

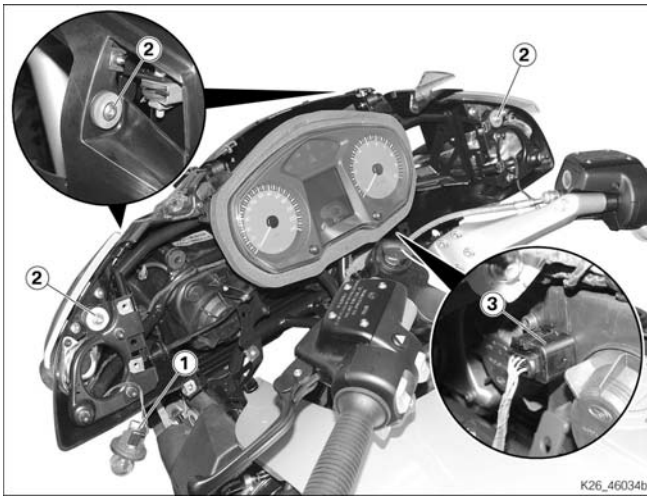
Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



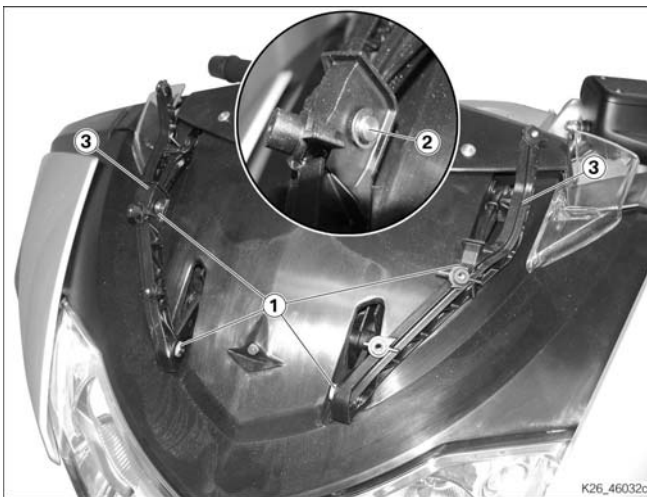
 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	

- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.



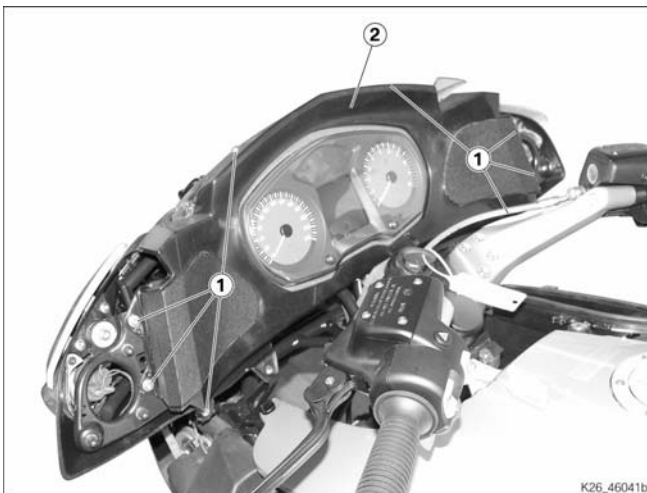
(-) Installing bracket for windscreen

- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).



(-) Installing inner trim for instruments

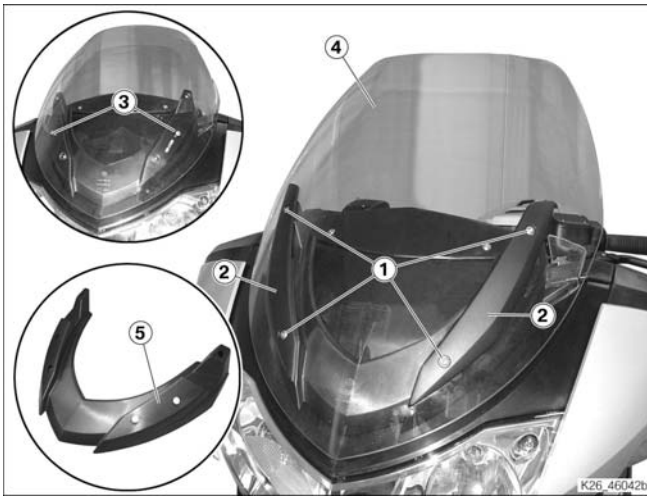
- Place inner trim (2) in position.
- Install screws (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.





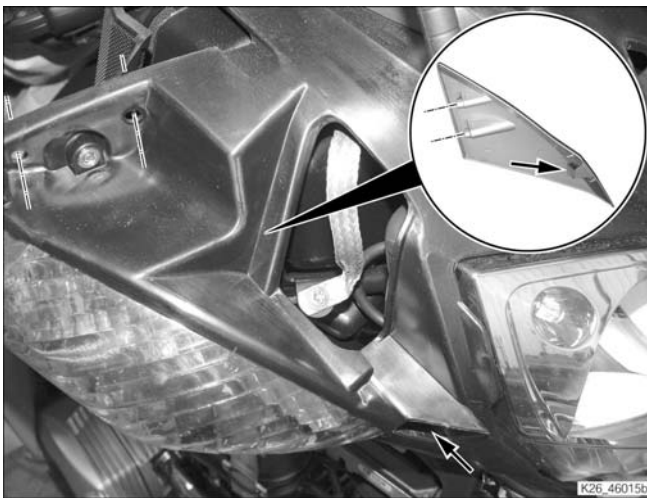
Tightening torques

Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	
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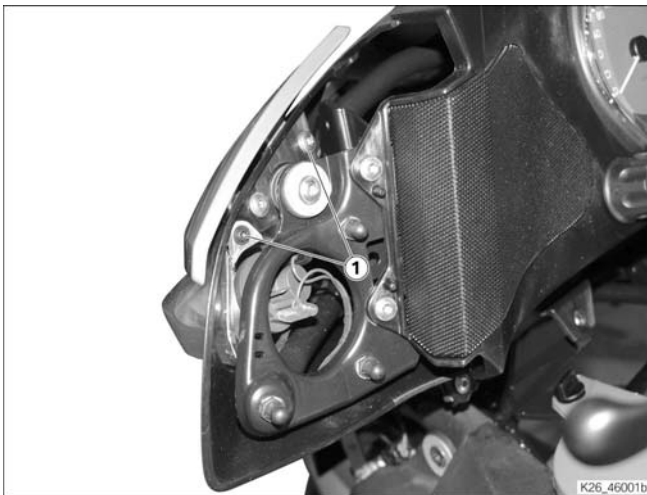
- Fit left and right trim panels (2) and secure with screws (1).

Variant, Radio with CD player

(-) Installing both left and right mirror trim panels



- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



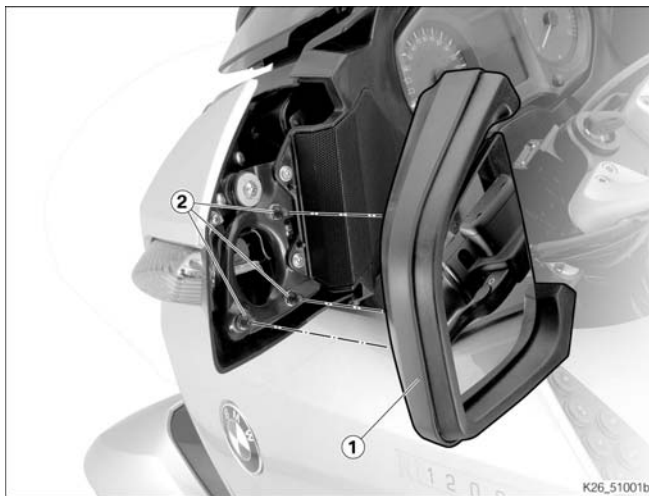
- Install screws (1).

(-) Installing mirrors



Attention

Nature: The mirrors can easily work loose from



their anchoring if the rubber holders or snap-fit studs are greased.

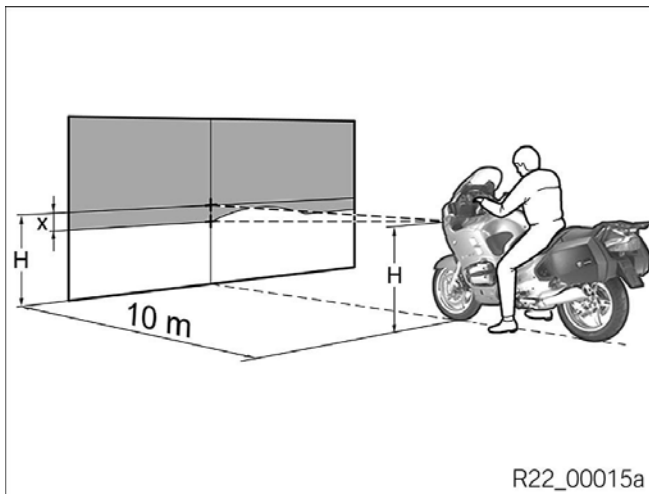
Avoidance: Do not grease the rubber holder or snap-fit stud.


- Press mirror (1) in forward direction on to snap-fit studs (2).

(-) Checking headlight beam throw

- Stop the motorcycle on a smooth, level surface.
- Set the spring preload to the basic setting.
- Apply the rider's weight to the motorcycle.
- Setting for headlight beam angle adjuster

Test




 Technical data			
Distance between headlight and vertical surface		10 m	
Distance between light/dark cut-off and mark at height of centre of headlight	Motorcycle loaded with 85 kg	-15 cm	
	ESA set for one-up riding (1 helmet) and motorcycle loaded with 85 kg	-15 cm	Variant, ESA

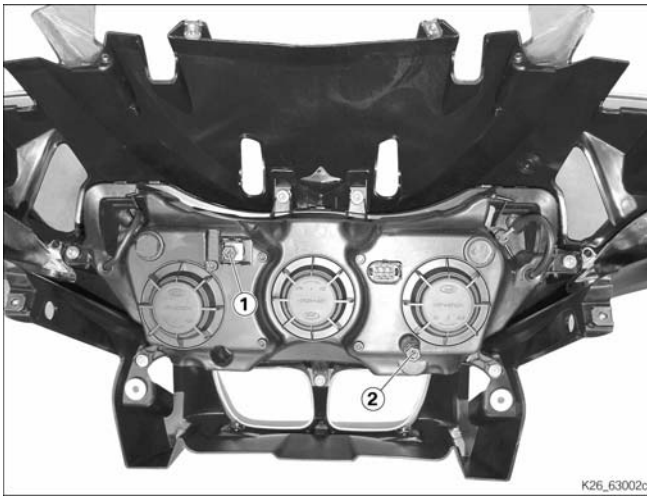
Result: Headlight beam angle not correct.

Measure:

► **Correcting headlight beam angle**

- Manually adjust the height of the beam throw by turning adjusting screw (1).

 Technical data			
Distance between light/dark cut-	Motorcycle loaded with 85 kg	-15 cm	



off and mark
at height of
centre of
headlight

ESA set
for one-up
riding (1
helmet)
and
motorcycle
loaded
with 85 kg

-15 cm

Variant,
ESA

- If necessary, adjust lateral throw by turning screws (2) with the aid of a socket wrench.



(-) Installing right-hand trim panel



- Hold the panel in position.
- Install screws (1).

(-) Installing left-hand trim panel

Variant, Radio with CD player



- Connect plug (2).
- Connect plug (1) to control unit.

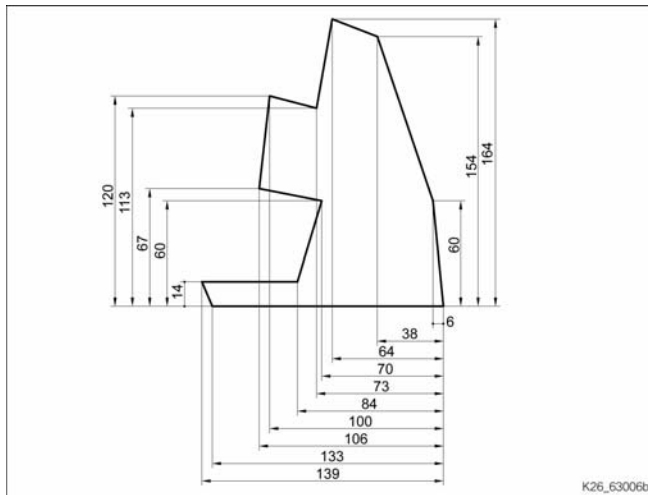
- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).

 **63 12 499 Headlight conversion, tourist solution**

(-) Affixing adhesive film for tourist solution, driving on right to driving on left conversion, to headlight

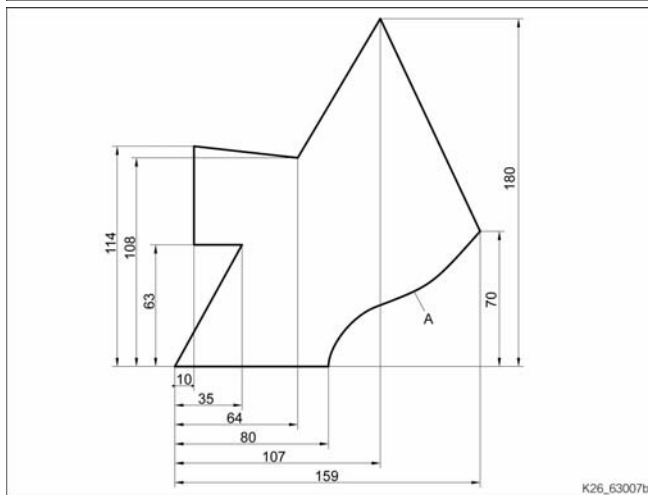


 **Attention**

Nature: Commercially available adhesive tape will damage the plastic cover over the light.

Avoidance: Use only the special, black adhesive film for bodywork applications available from trade outlets.

- Cut piece of the special adhesive film to size.



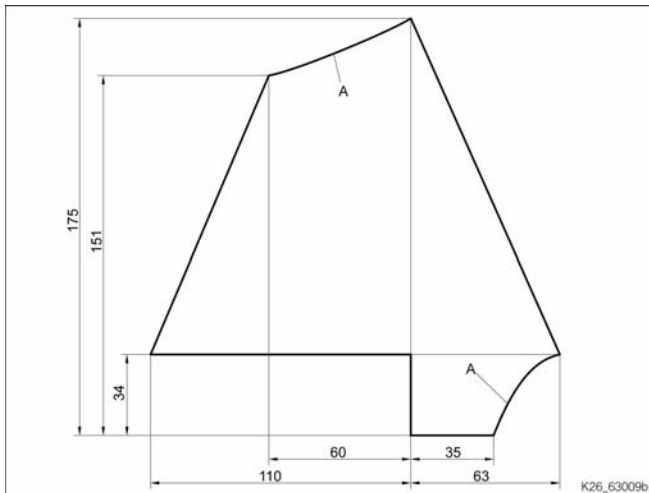
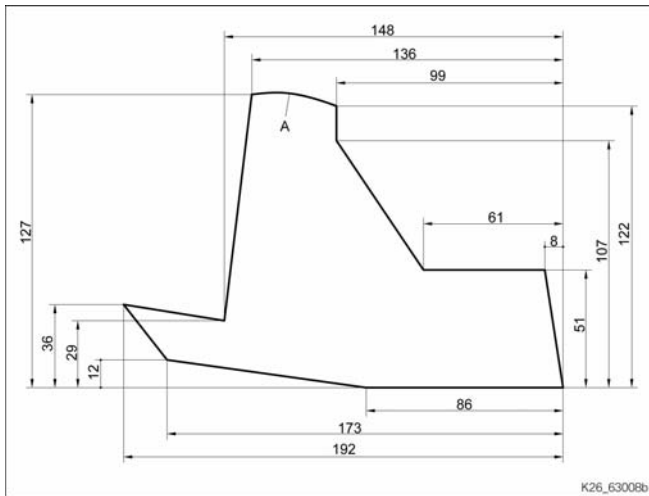
- Cut piece of the special adhesive film to size.

» A = Outline of headlight



- Affix the special adhesive film to the headlight to cover the area indicated.

(-) Affixing adhesive film for tourist solution, driving on left to driving on right conversion, to headlight



! Attention

Nature: Commercially available adhesive tape will damage the plastic cover over the light.

Avoidance: Use only the special, black adhesive film for bodywork applications available from trade outlets.

- Cut piece of the special adhesive film to size.
- » A = Outline of headlight

- Cut piece of the special adhesive film to size.
- » A = Outline of headlight

! Attention

Nature: Commercially available adhesive tape will damage the plastic cover over the light.

Avoidance: Use only the special, black adhesive film for bodywork applications available from trade outlets.

- Affix the special adhesive film to the headlight to cover the area indicated.

(-) Removing adhesive film for tourist solution, driving on right/driving on left conversion, from headlight

! Attention

Nature: Damage to the plastic cover over the light.

Avoidance: Do not use solvents such as acetone, cellulose thinners, or similar products.

Do not use cleaning agents such as scouring powder or scouring solutions, and do not use scouring pads or similar products.

- Remove the adhesive film from the headlight.
- Use only a proprietary alcohol-based windscreen cleaning fluid to remove residues of the adhesive, if necessary.

 **63 13 150 Replacing front turn indicator**

(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

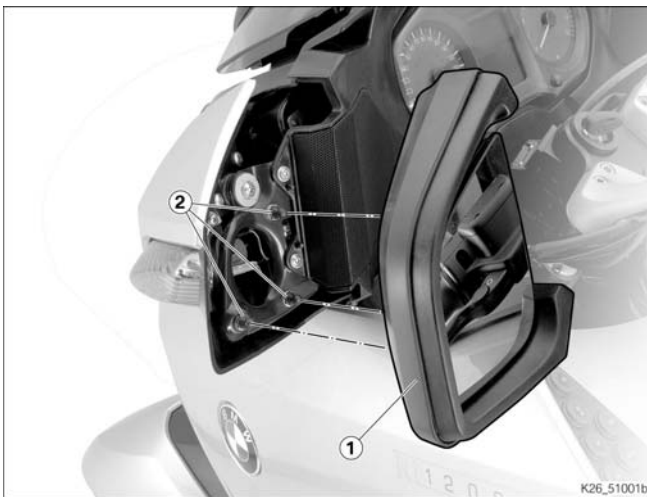
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing mirror

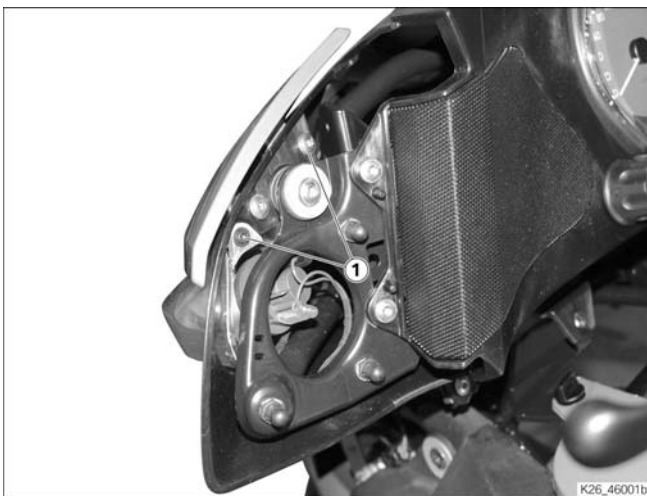
- Detach mirror (1).



Variant, Radio with CD player

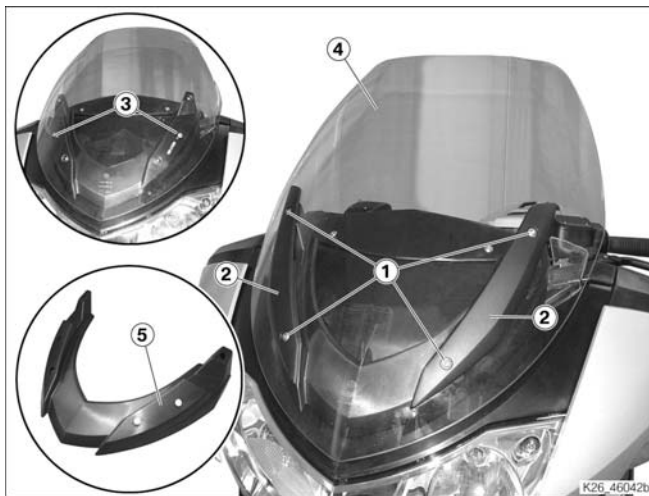
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



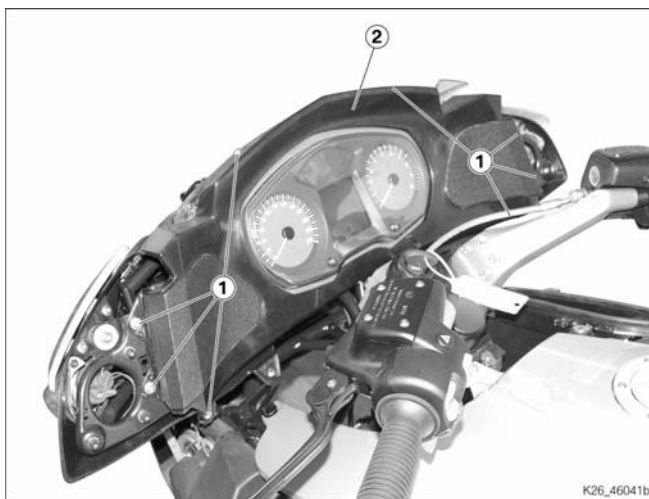
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).



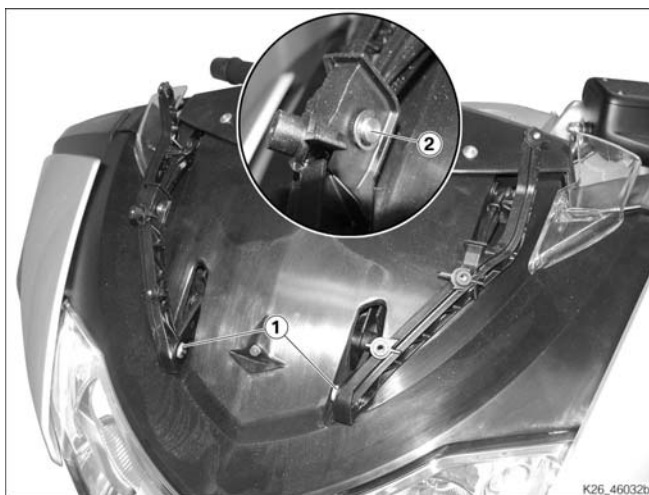
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Removing inner trim for instruments



- Remove screws (1).
- Remove inner trim (2).

(-) Partially removing holder for windscreen



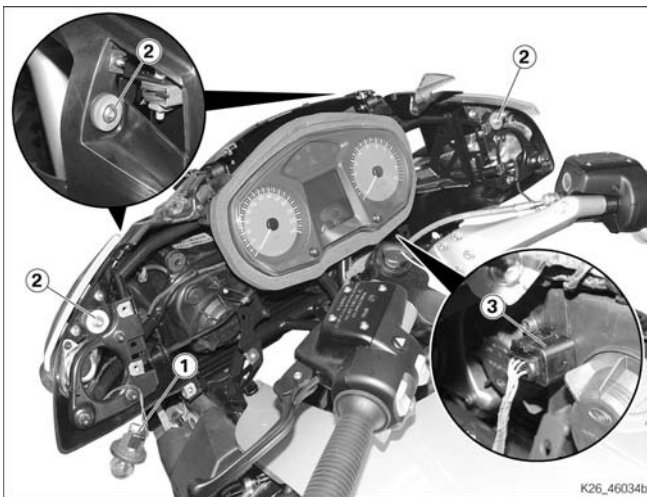
- Remove clips (1).
- Press out pin (2).

- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

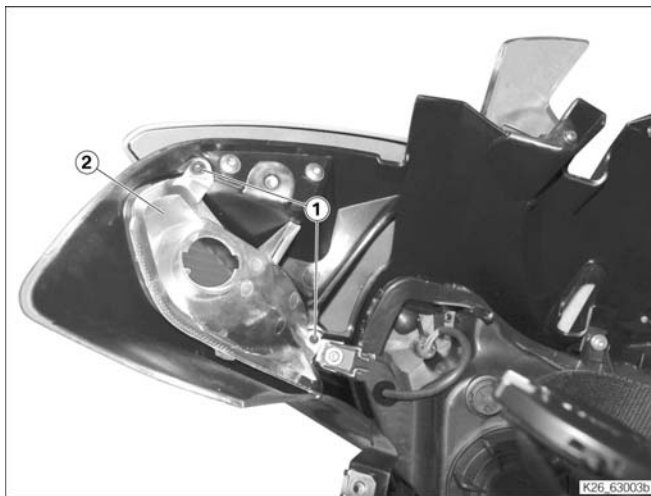
- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

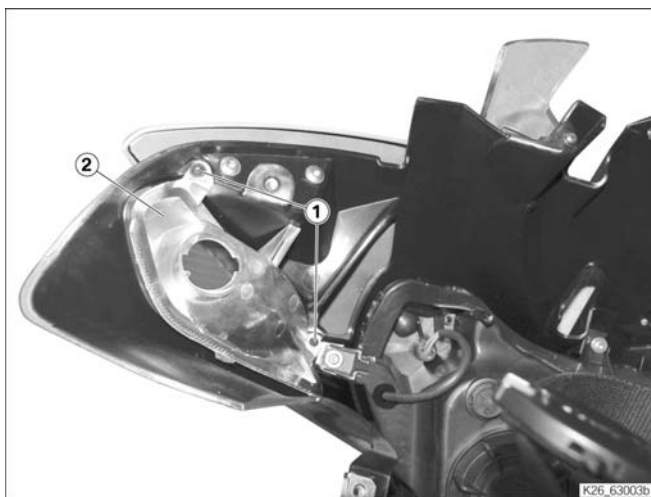
(-) Removing front flashing turn indicator

- Remove screws (1).
- Remove flashing turn indicator (2) in the direction opposite the forward direction of travel.



(-) Installing front flashing turn indicator

- Insert flashing turn indicator (2) in the forward direction of travel.
- Install screws (1).




(-) Installing entire top section of fairing

- Carefully place upper section of fairing in position.

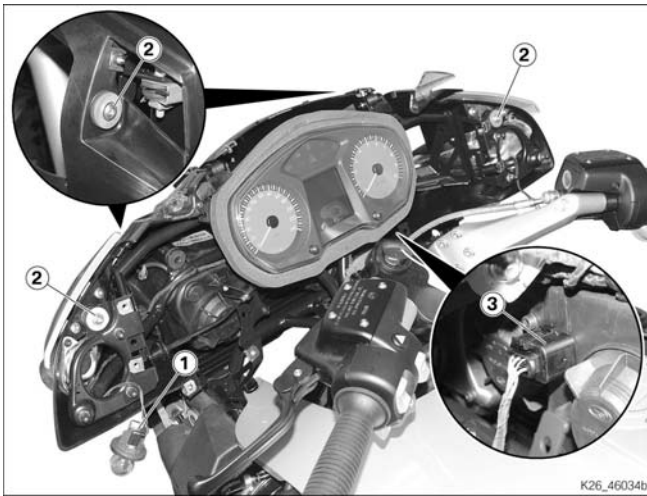
Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



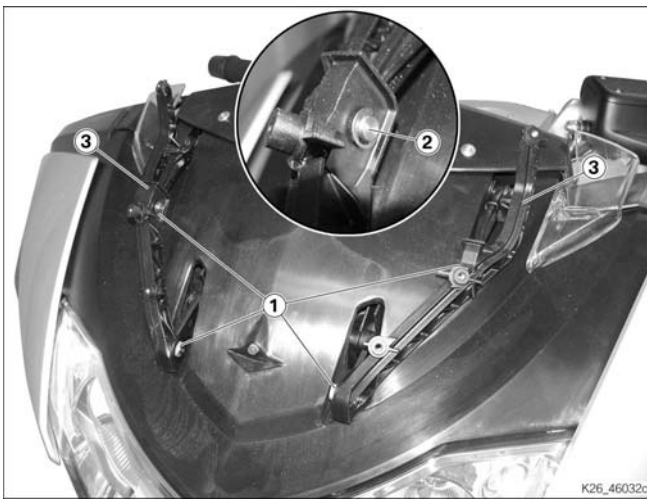
 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	

- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.



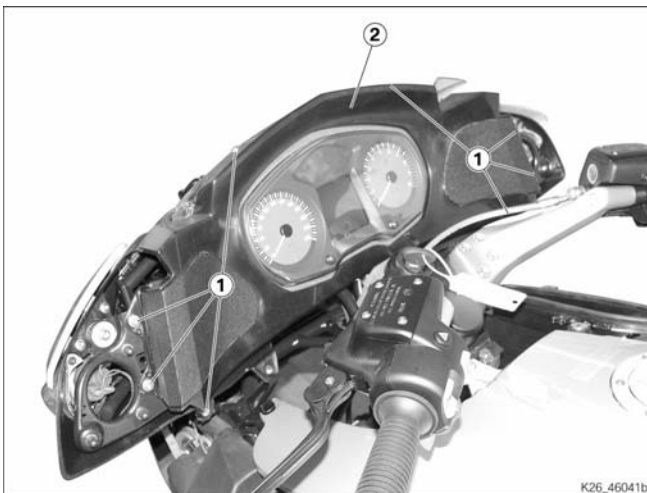
(-) Installing bracket for windscreen

- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).



(-) Installing inner trim for instruments

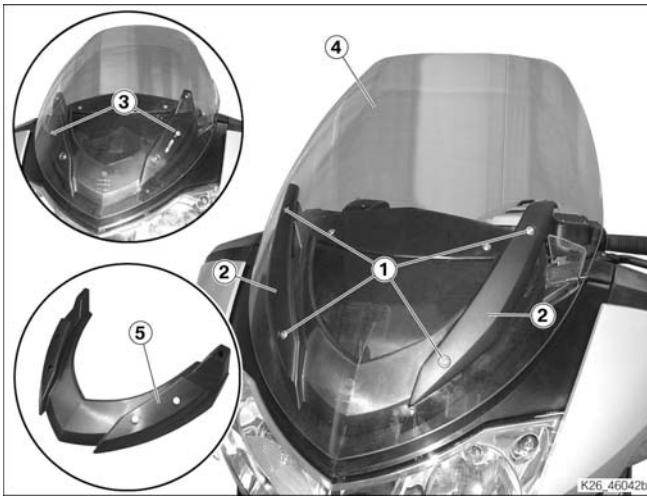
- Place inner trim (2) in position.
- Install screws (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.





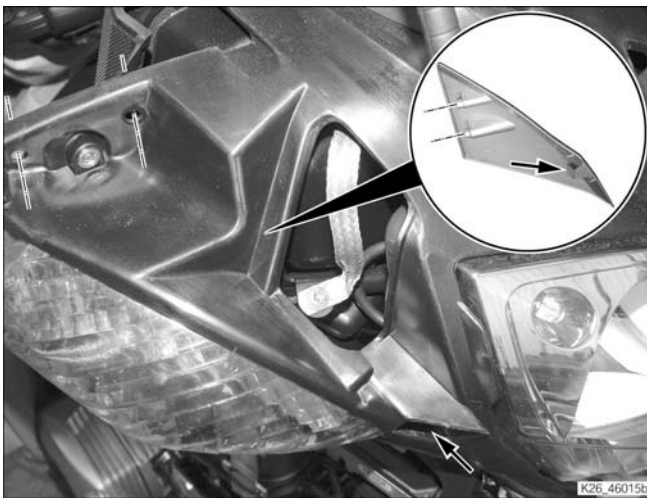
Tightening torques

Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	
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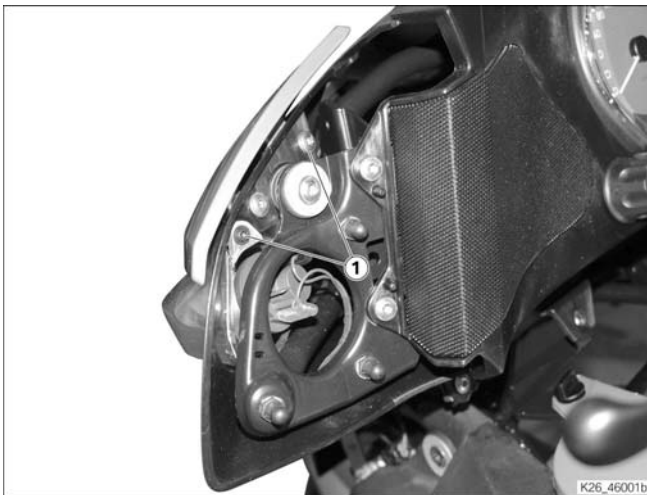
- Fit left and right trim panels (2) and secure with screws (1).

Variant, Radio with CD player

(-) Installing both left and right mirror trim panels



- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



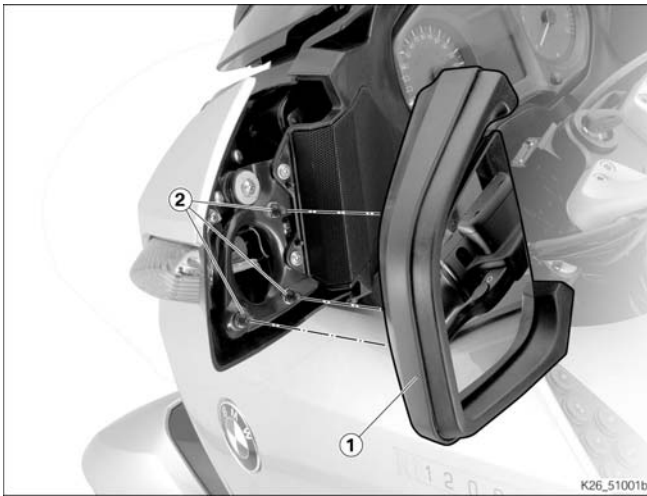
- Install screws (1).

(-) Installing mirrors



Attention

Nature: The mirrors can easily work loose from



their anchoring if the rubber holders or snap-fit studs are greased.

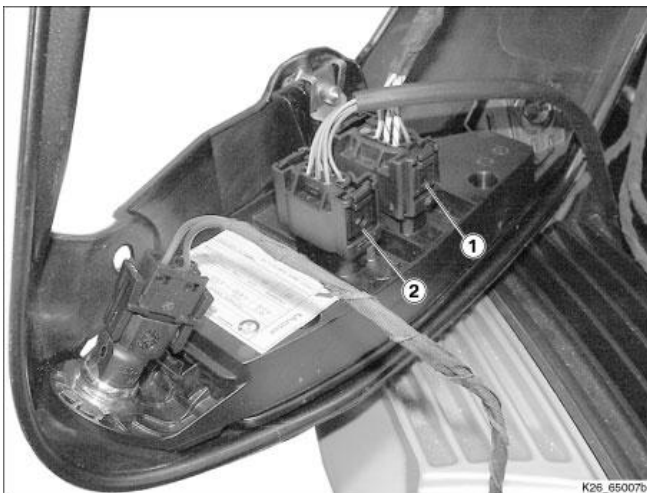
Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

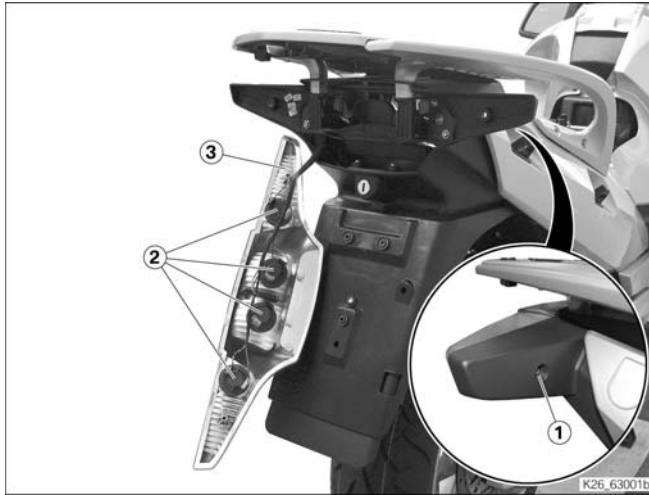
- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



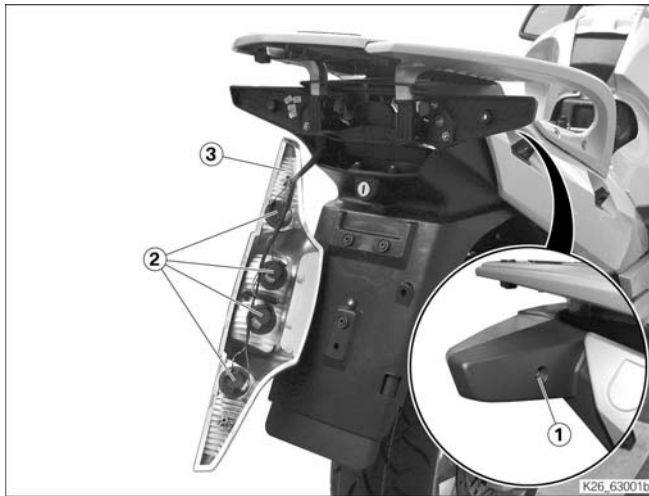
- Hold the panel in position.
- Install screws (1).

 **63 21 380 Replacing rear light**



(-) Removing rear-light unit

- Remove screws (1).
- Release bulb sockets (2).
- Remove rear-light unit (3).



(-) Installing rear-light unit

- Install bulb sockets (2).
- Hold rear light (3) in position and secure it with screws (1).

 **65 13 066 Replacing left loudspeaker box**

(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

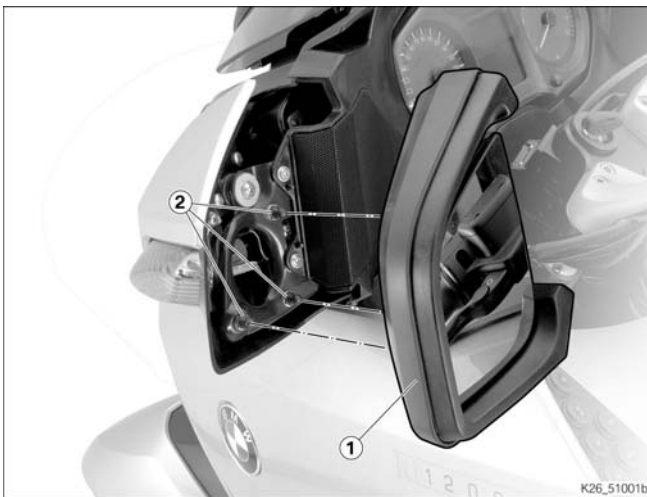
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



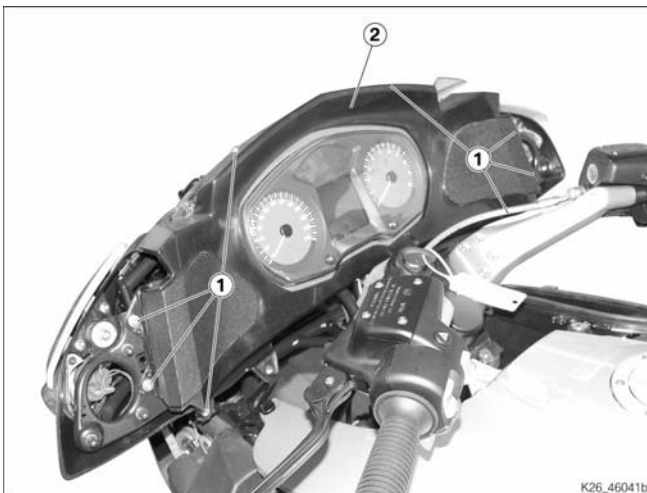
(-) Removing mirror

- Detach mirror (1).



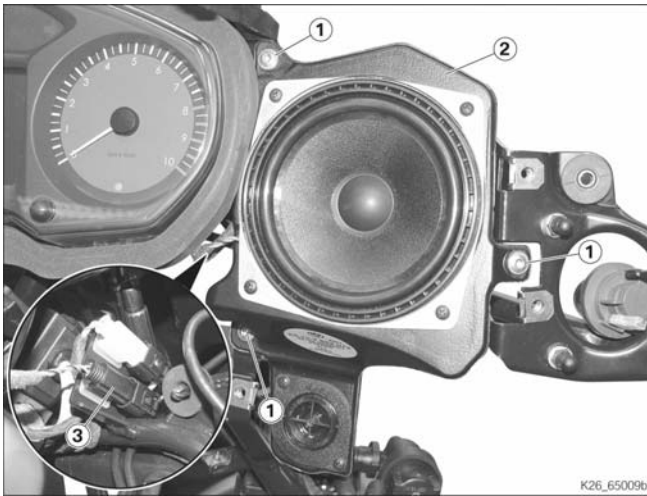
(-) Removing inner trim for instruments

- Remove screws (1).
- Remove inner trim (2).



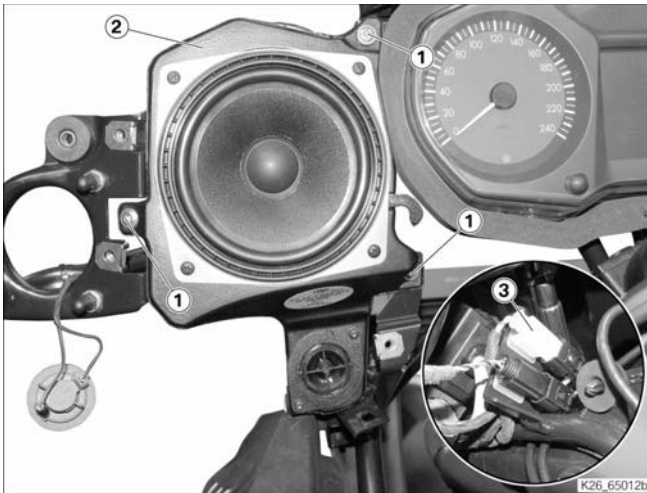
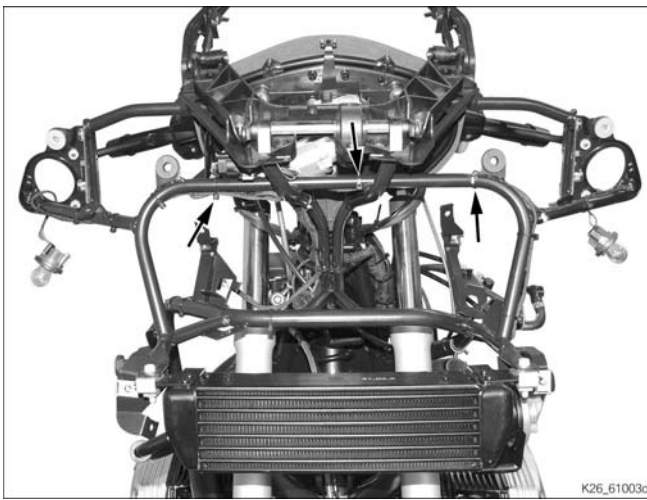
(-) Removing right loudspeaker box

- Remove screws (1).
- Remove loudspeaker box (2) from its holder.
- Disconnect plug (3) and remove from the holder.
- Remove loudspeaker box (2).



(-) Removing left loudspeaker box

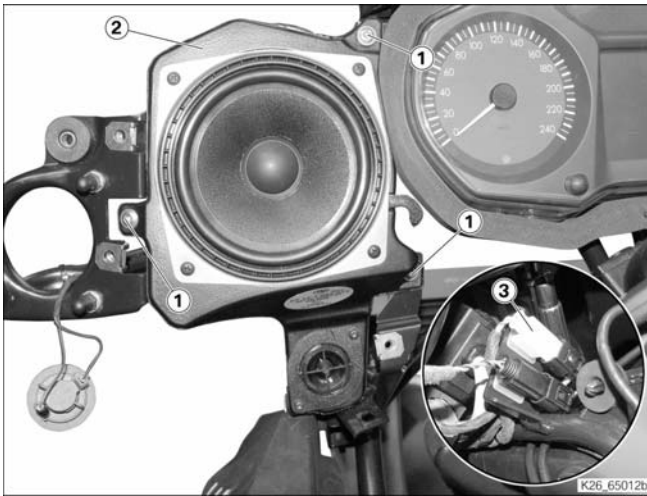
- Open cable ties (arrows).



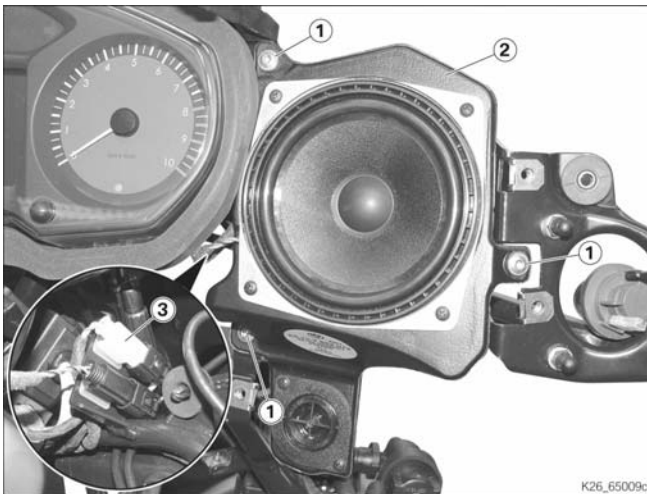
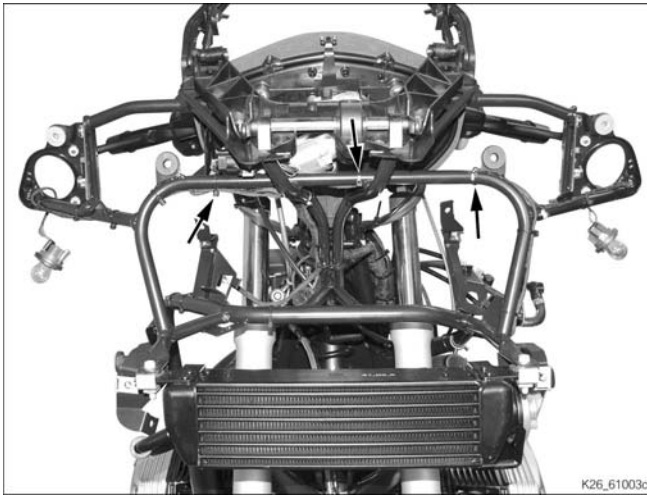
- Remove screws (1).
- Remove loudspeaker box (2) from its holder.
- Disconnect plug (3) and remove from the holder.
- Pass the cable through to the left.
- Remove loudspeaker box (2).

(-) Installing left loudspeaker box

- Seat loudspeaker box (2) in the holder.
- Install screws (1).



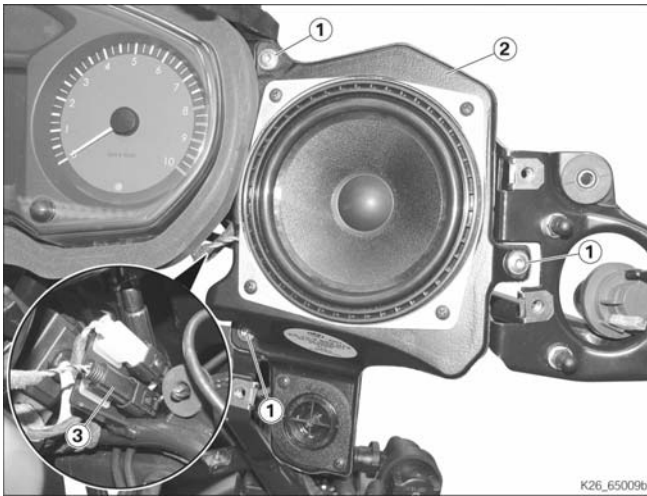
- Pass the cable through toward the right.
- Secure the cable with cable ties (arrows).



- Clip plug (3) into the holder.
- Connect plug (3).

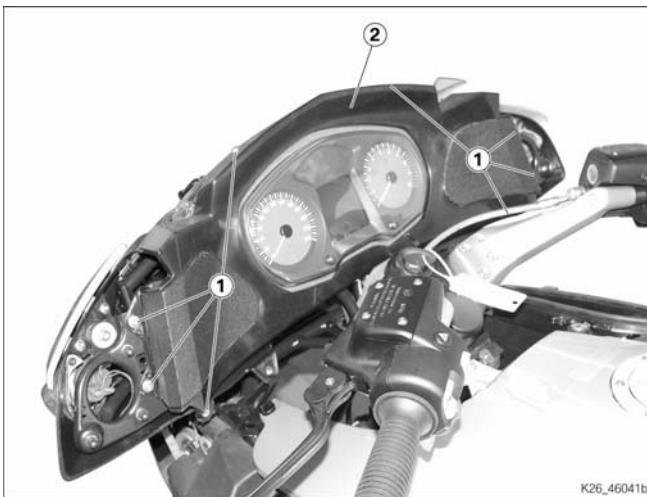
(-) Installing right loudspeaker box

- Clip plug (3) into the holder.
- Connect plug (3).
- Seat loudspeaker box (2) in the holder.
- Install screws (1).



(-) Installing inner trim for instruments

- Place inner trim (2) in position.
- Install screws (1).



(-) Installing mirrors

Attention

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.

Avoidance: Do not grease the rubber holder or snap-fit stud.



- Press mirror (1) in forward direction on to snap-fit studs (2).

(-) Installing right-hand trim panel

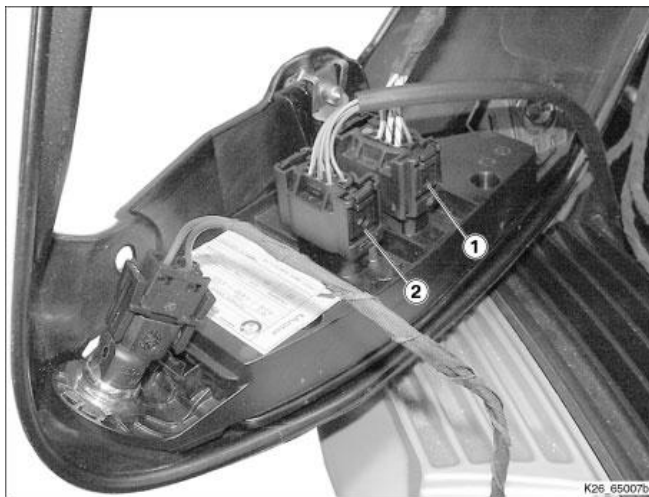
- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



 **65 13 069 Replacing right loudspeaker box**

(-) Removing left-hand trim panel

- Remove screws (1).

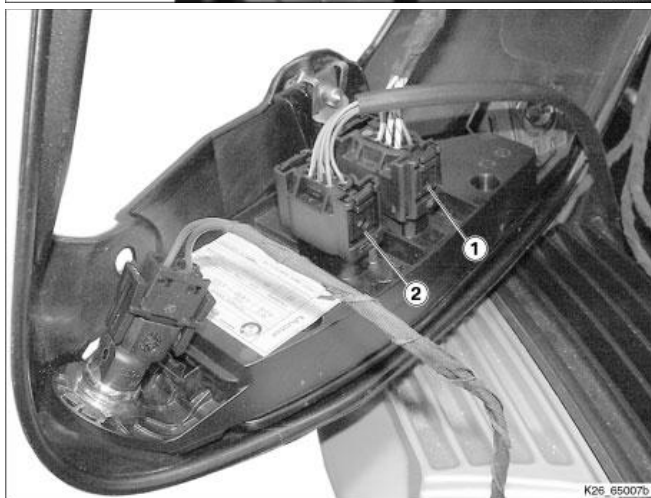


- Disconnect plug (1) from socket.



Variant, Radio with CD player

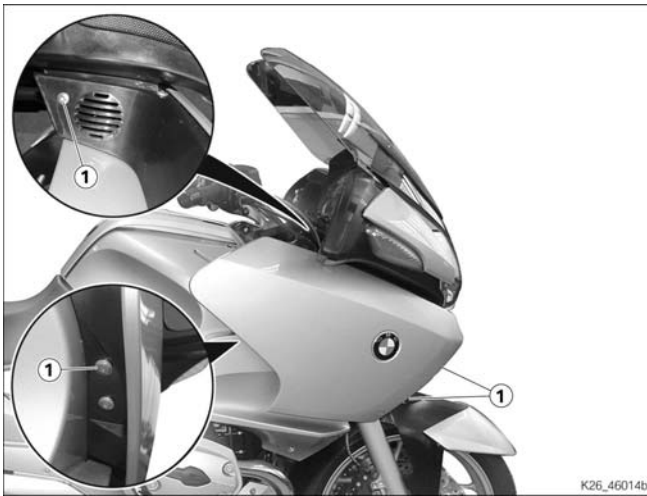
- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

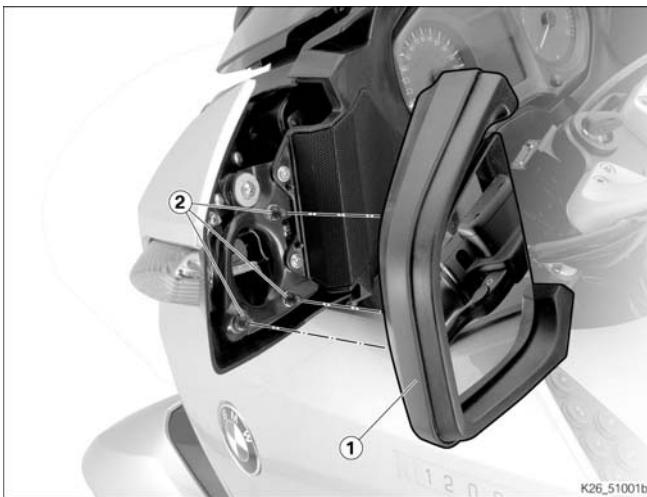
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



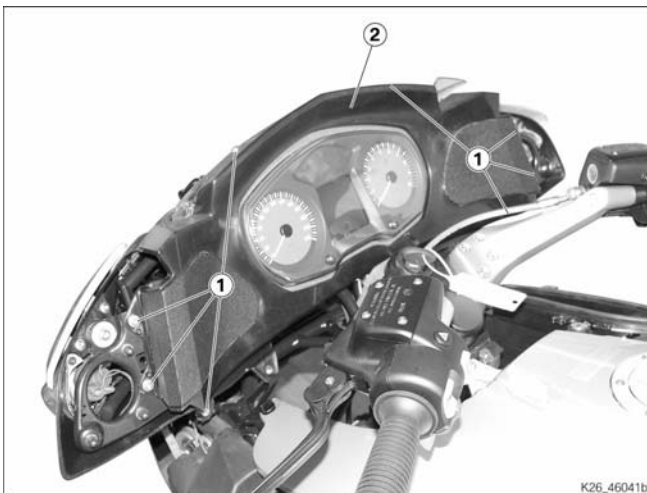
(-) Removing mirror

- Detach mirror (1).



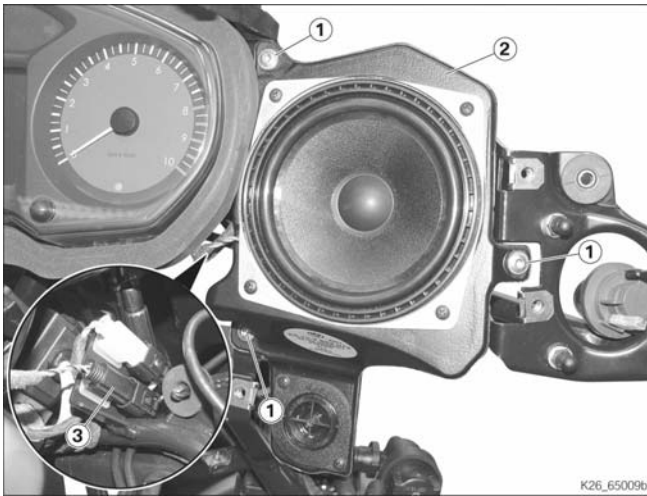
(-) Removing inner trim for instruments

- Remove screws (1).
- Remove inner trim (2).



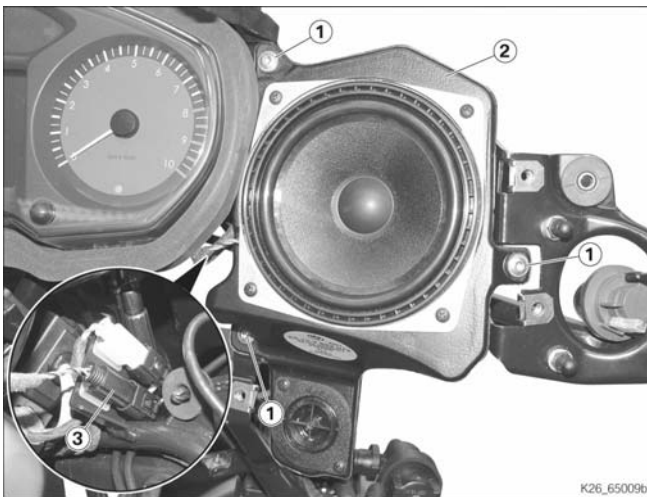
(-) Removing right loudspeaker box

- Remove screws (1).
- Remove loudspeaker box (2) from its holder.
- Disconnect plug (3) and remove from the holder.
- Remove loudspeaker box (2).



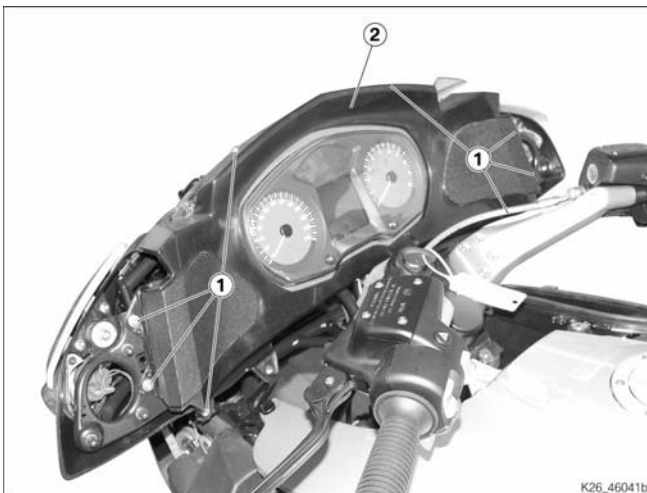
(-) Installing right loudspeaker box

- Clip plug (3) into the holder.
- Connect plug (3).
- Seat loudspeaker box (2) in the holder.
- Install screws (1).



(-) Installing inner trim for instruments

- Place inner trim (2) in position.
- Install screws (1).

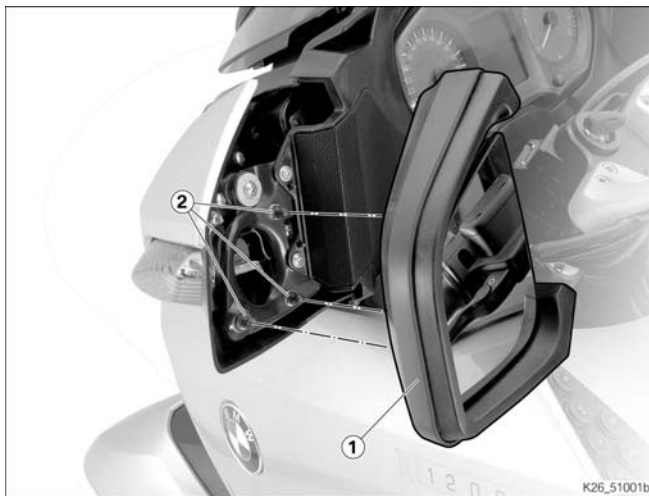


(-) Installing mirrors



Attention

Nature: The mirrors can easily work loose from their anchoring if the rubber holders or snap-fit studs are greased.



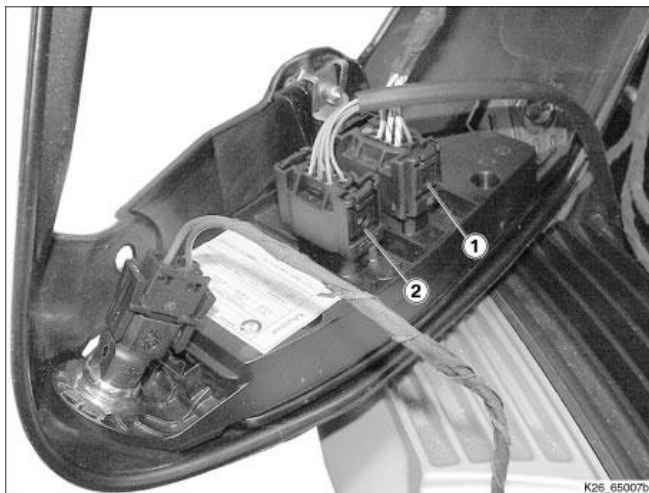
Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



K26_46017b



K26_46013b

- Hold the panel in position.
- Install screws (1).

 **65 14 000 Replacing holder for radio**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

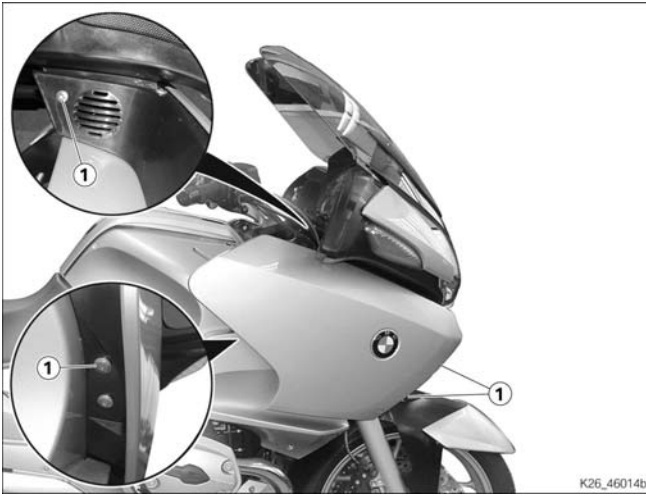


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



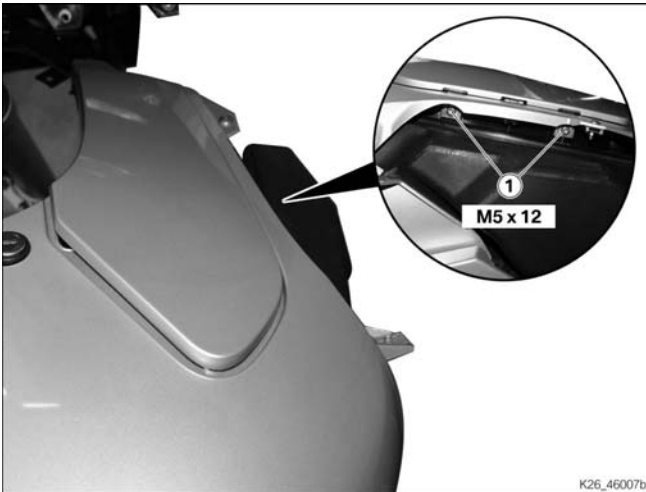
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



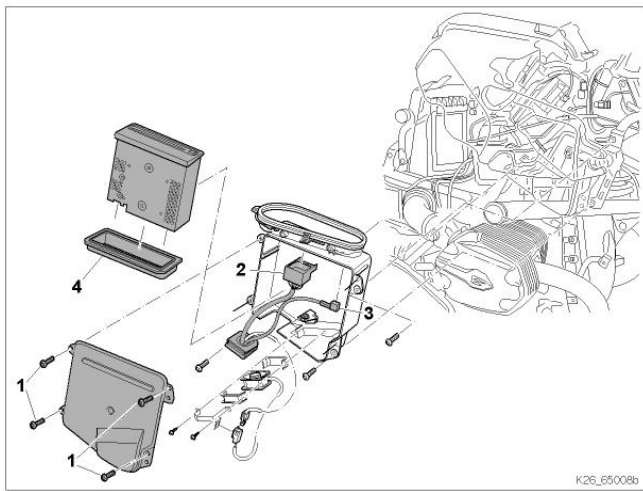
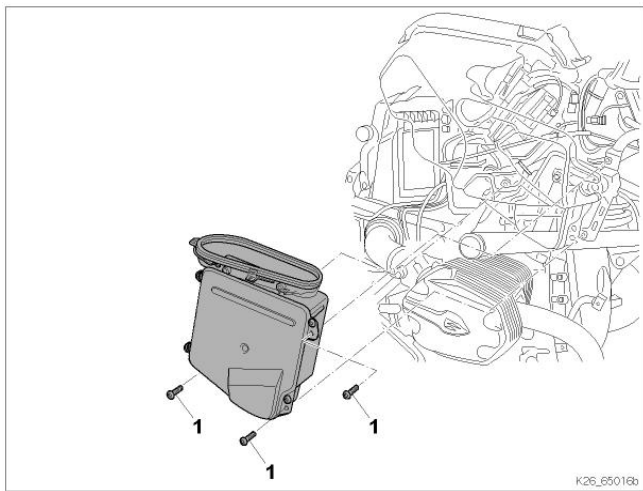
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.



(-) Removing radio

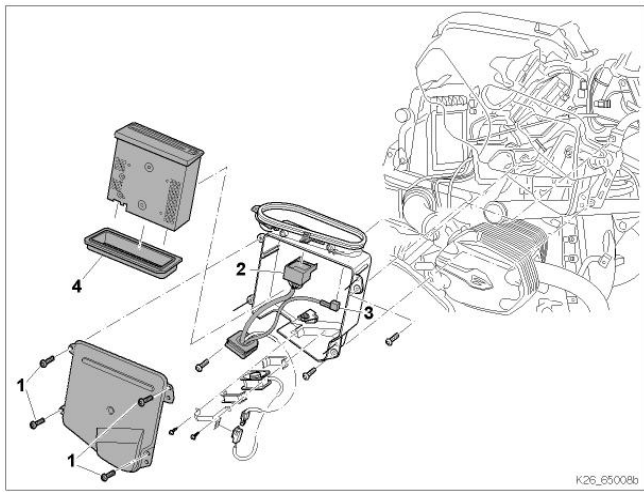
- Remove screws (1).
- Remove the stowage compartment, noting the cables.
- Unclip the cable from the holder.
- Install fuel-tank protective cloth (No. 16 1 611) .



- Remove screws (1) and remove the cover.
- Disconnect plugs (2) and (3) from the radio.
- Remove the radio with holder (4).
- Remove bracket (4).

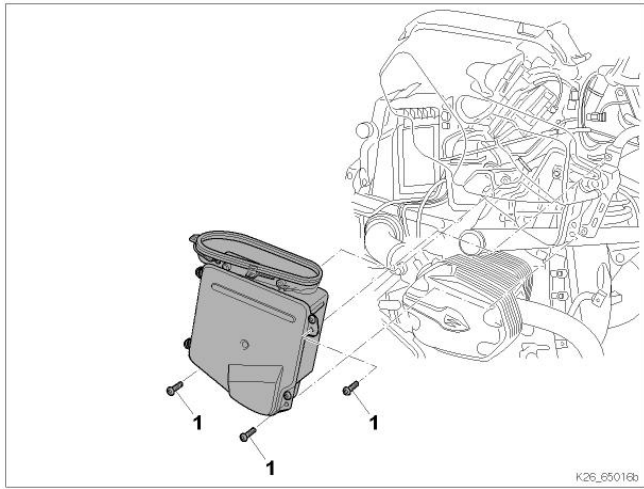
(-) Installing radio

- Install holder (4).
- Connect plugs (3) and (2) to the radio.
- Install the radio with holder (4) in the stowage compartment.
- Place the lid on the stowage compartment and secure with screws (1).



K26_65008b

- Remove fuel-tank protective cloth (No. 16 1 611) .
- Clip the cable into the holder.
- Place the stowage compartment in position and secure it with screws (1).



K26_65018b

(-) Installing entire right side tank cover

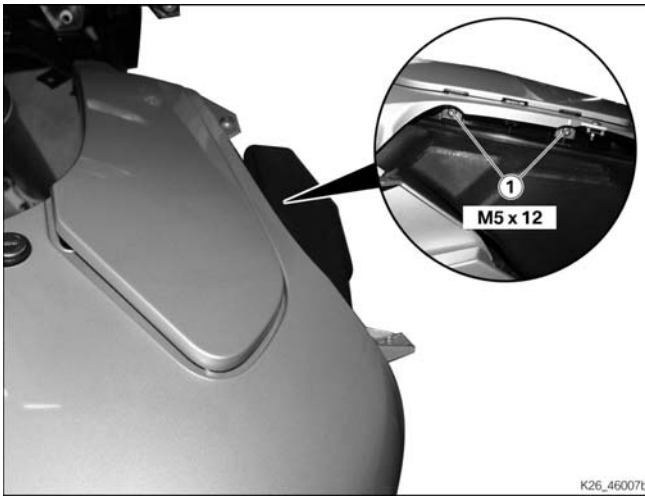
- Fit tank cover.
- Install screws (2).
- Install screws (1).



K26_46008b

(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **65 14 001 Replacing blower for radio**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



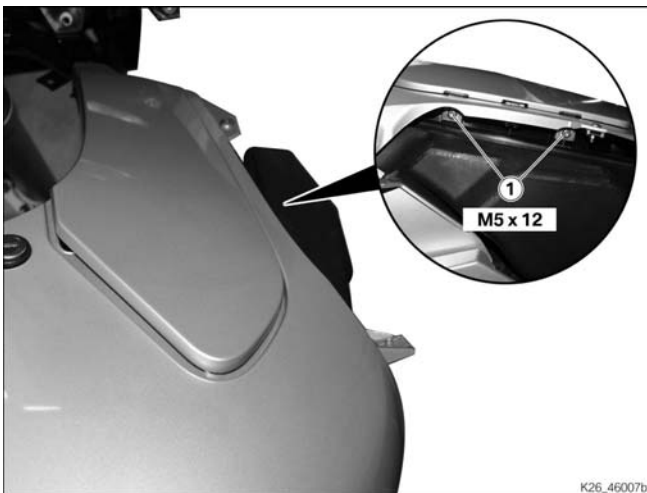
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



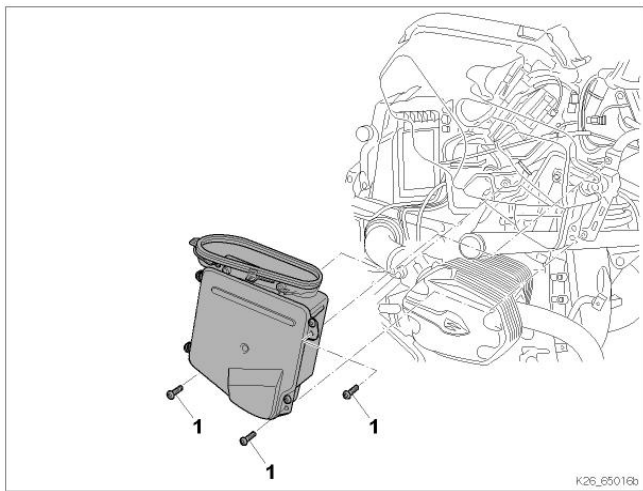
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

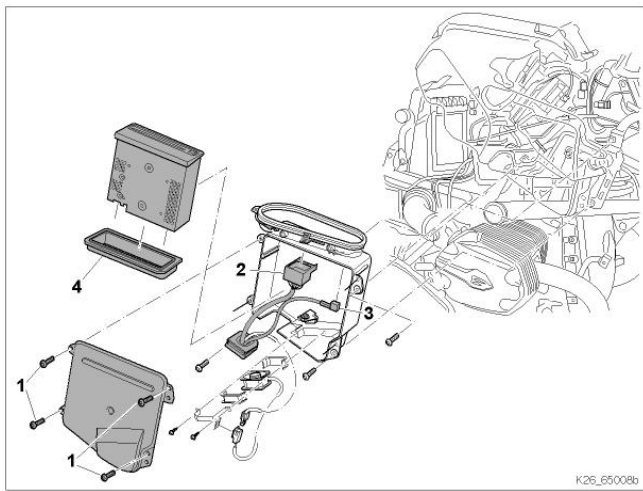


(-) Removing radio

- Remove screws (1).
- Remove the stowage compartment, noting the cables.
- Unclip the cable from the holder.
- Install fuel-tank protective cloth (No. 16 1 611) .

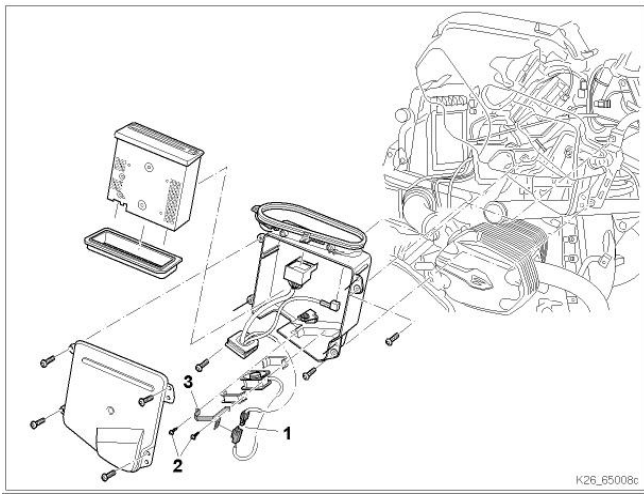


- Remove screws (1) and remove the cover.



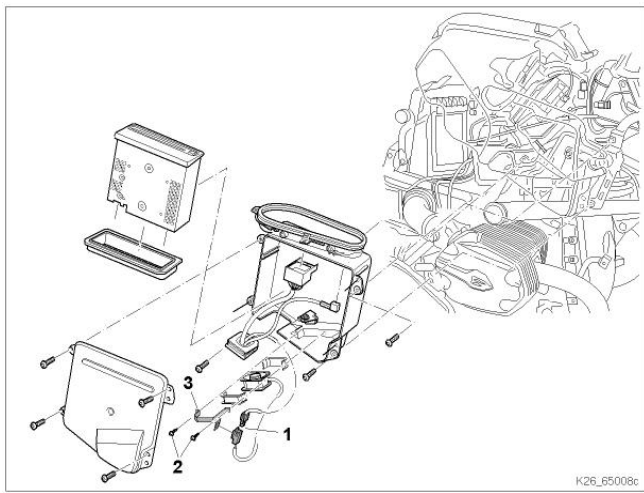
(-) Removing blower for radio

- Disconnect plug (1).
- Remove screws (2).
- Remove the fan with holder (3).
- Unclip plug (1) from holder (3).



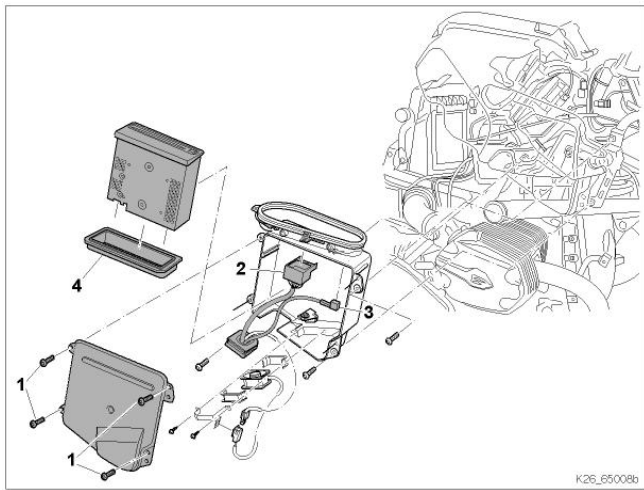
(-) Installing blower for radio

- Clip plug (1) into holder (3).
- Insert the fan holder (3) and secure with screws (2).
- Connect plug (1).

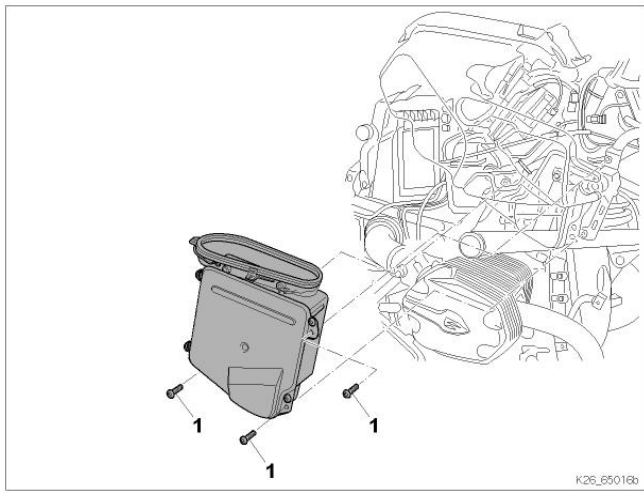


(-) Installing radio

- Place the lid on the stowage compartment and secure with screws (1).



- Remove fuel-tank protective cloth (No. 16 1 611) .
- Clip the cable into the holder.
- Place the stowage compartment in position and secure it with screws (1).



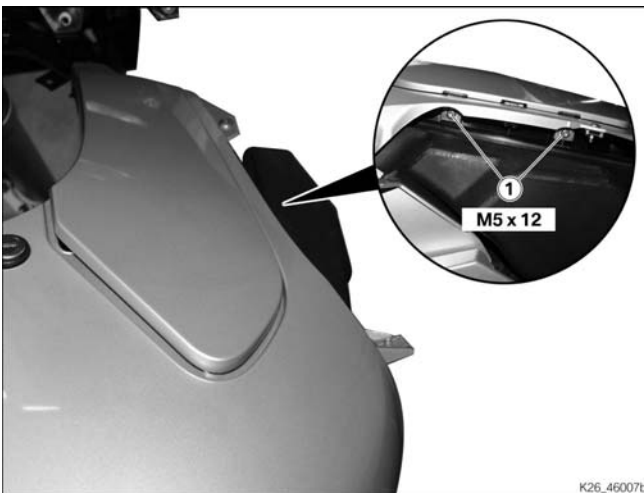
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.

 **65 14 005 Removing and installing or replacing radio**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.

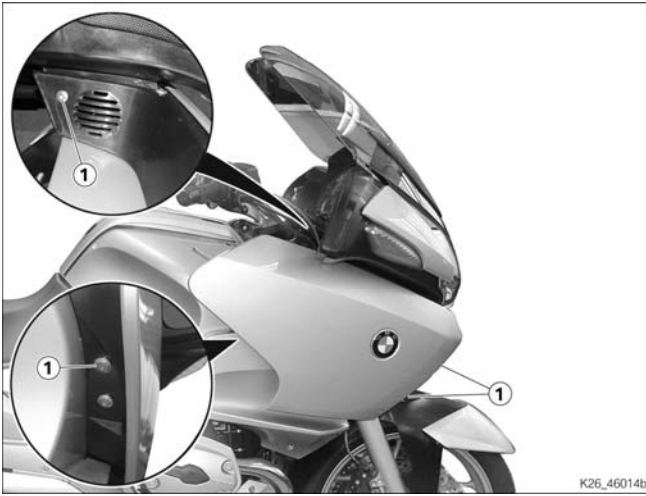


Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



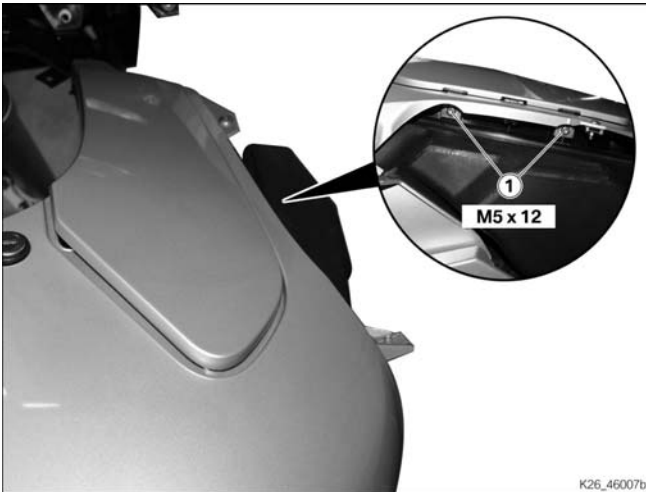
(-) Removing tank rail

- Remove screws (1).
- Remove tank rail.



(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



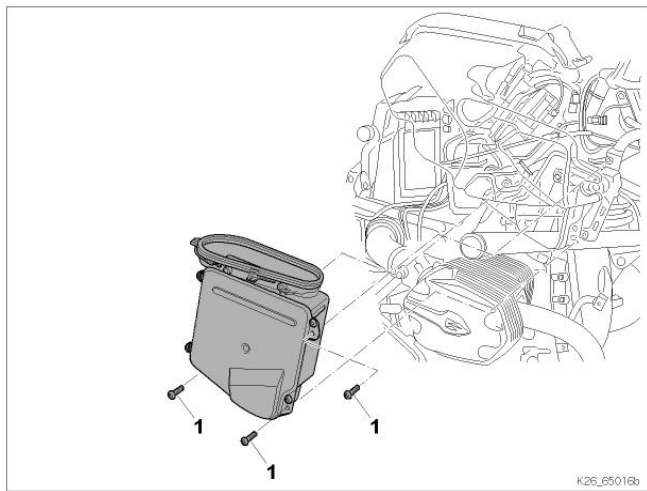
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

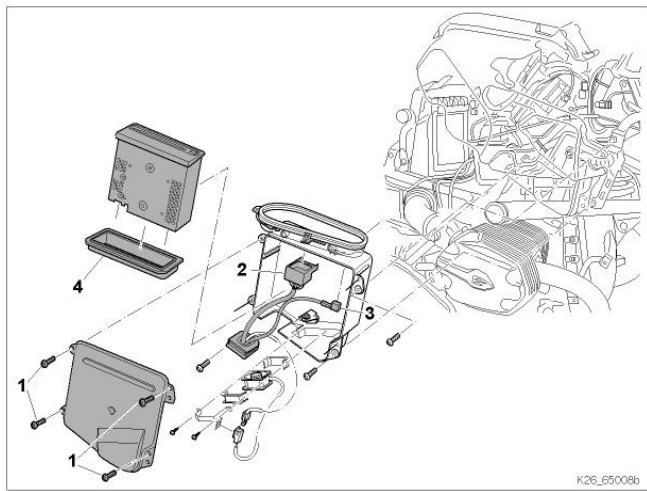


(-) Removing radio

- Remove screws (1).
- Remove the stowage compartment, noting the cables.
- Unclip the cable from the holder.
- Install fuel-tank protective cloth (No. 16 1 611) .

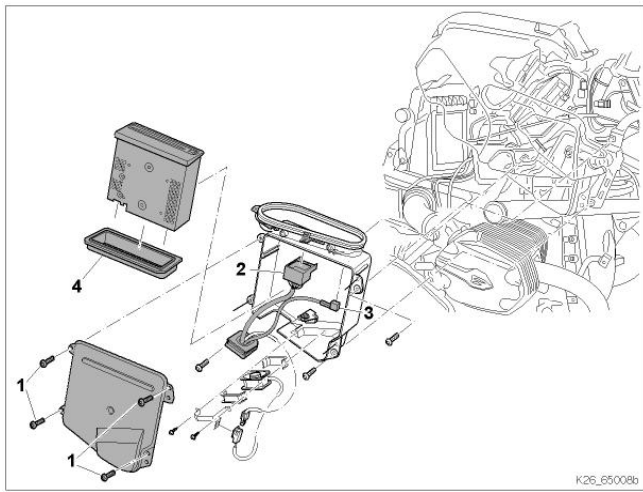


- Remove screws (1) and remove the cover.
- Disconnect plugs (2) and (3) from the radio.
- Remove the radio with holder (4).
- Remove bracket (4).



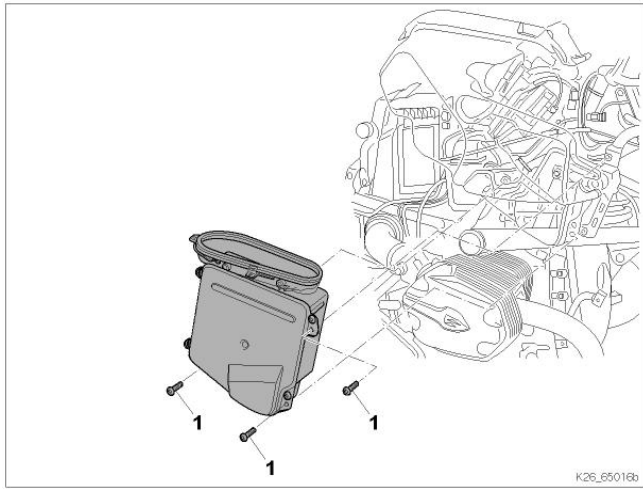
(-) Installing radio

- Install holder (4).
- Connect plugs (3) and (2) to the radio.
- Install the radio with holder (4) in the stowage compartment.
- Place the lid on the stowage compartment and secure with screws (1).



K26_65008b

- Remove fuel-tank protective cloth (No. 16 1 611) .
- Clip the cable into the holder.
- Place the stowage compartment in position and secure it with screws (1).



K26_65018b

(-) Installing entire right side tank cover

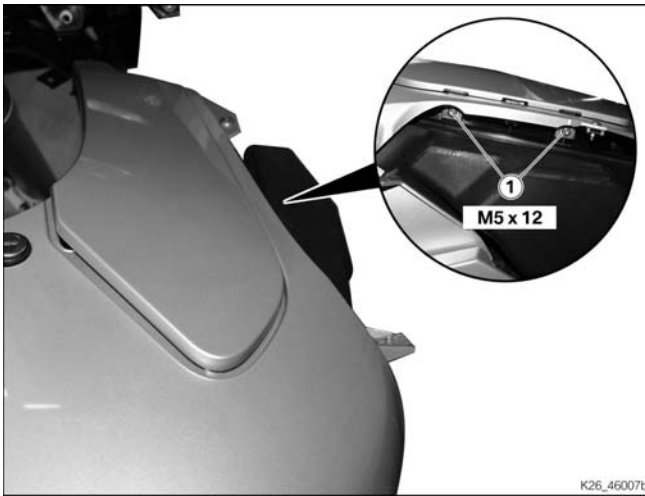
- Fit tank cover.
- Install screws (2).
- Install screws (1).



K26_46008b

(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



K26_46016a

Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



K26_52001b

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



K26_52002b

 **65 14 012 Removing and installing or replacing operating panel for radio**

(-) Removing left-hand trim panel

- Remove screws (1).



- Disconnect plug (1) from socket.



Variant, Radio with CD player

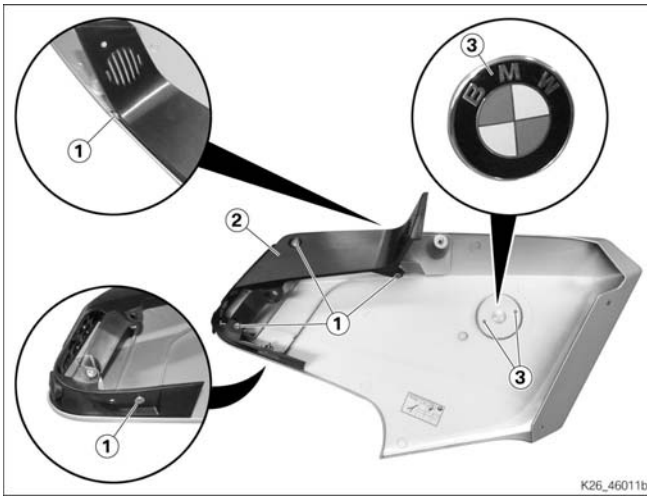
- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

(-) Disassembling left fairing panel

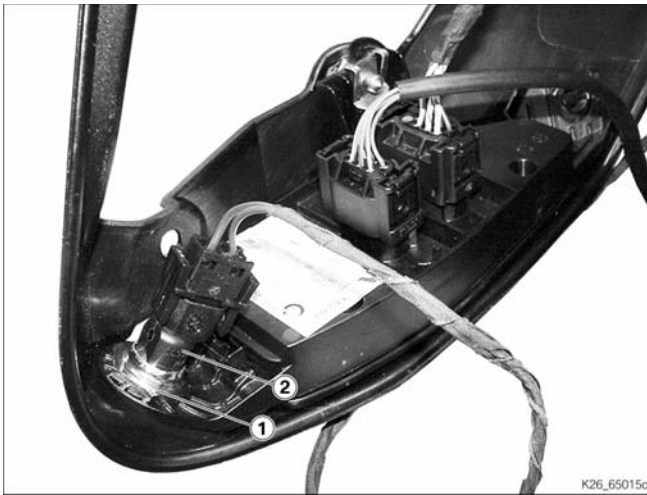
- Remove screws (1).
- Remove inner side panel (2).



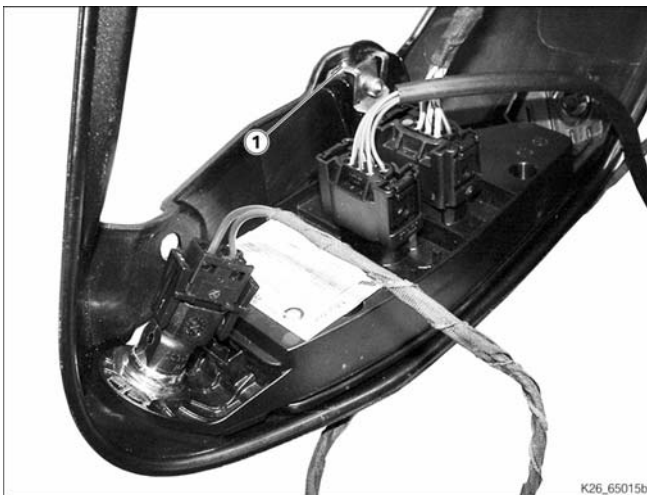
(-) Removing control unit for radio

► Removing on-board socket

- Remove nut (1).
- Remove on-board socket (2).

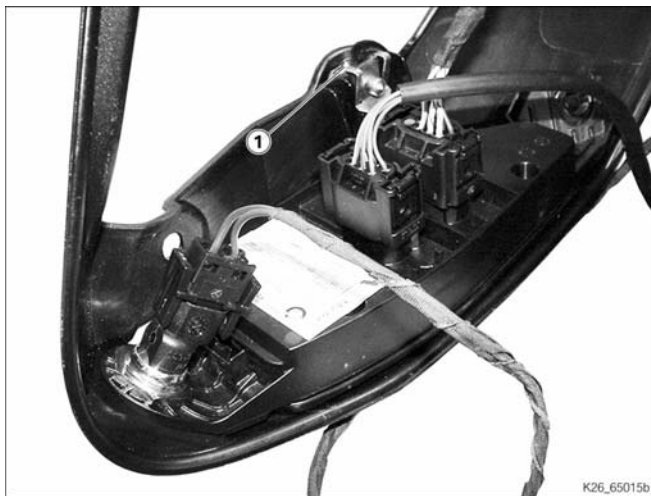


- ◄
- Remove screws (1).
 - Remove the control unit.



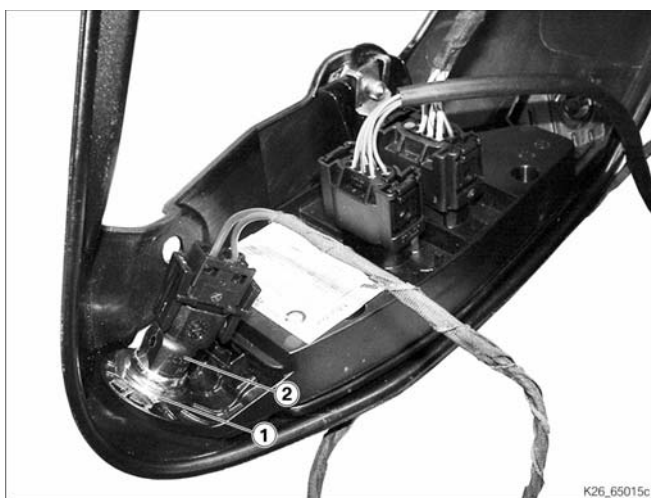
(-) Installing control unit for radio

- Install the control unit.

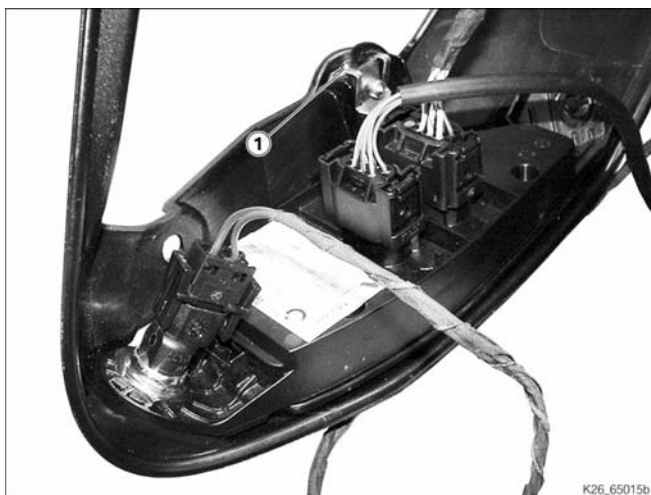


► **Installing on-board socket**

- Install on-board socket (2).
- Install nut (1).

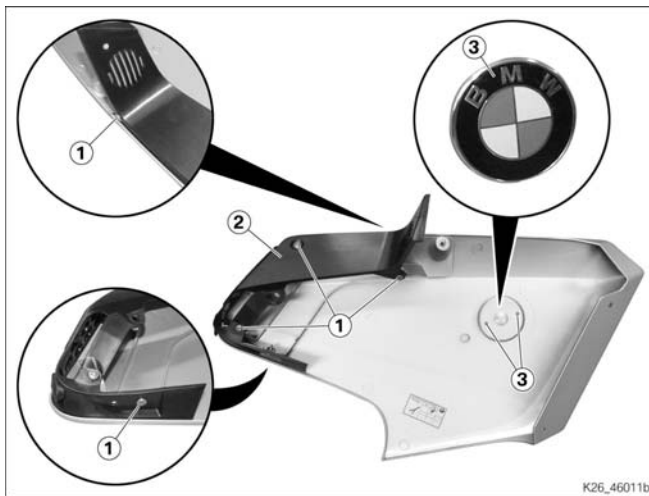


- ◄
- Install screws (1).



(-) Assembling left fairing panel

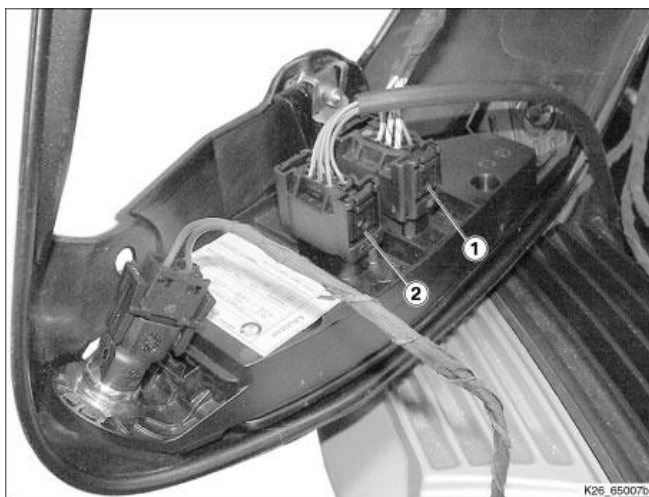
- Hold inner side panel (2) in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.



- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



 **65 14 070 Replacing front remote control unit for radio**

Variant, ESA or Radio with CD player

(-) Removing seat



- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.

(-) Removing tank rail



- Remove screws (1).
- Remove tank rail.

(-) Removing left-hand trim panel



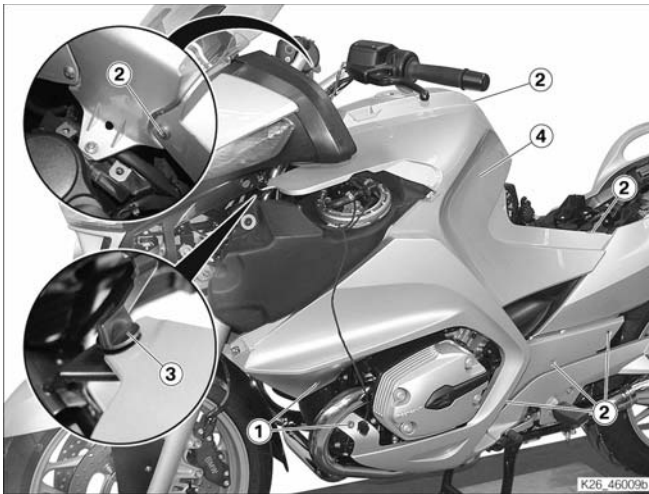
- Remove screws (1).

- Disconnect plug (1) from socket.



- Remove trim panel.

(-) Removing entire left side tank cover



- Remove screws (1).
- Remove screws (2).
- Undo quick-release catch (3).
- Remove fuel-tank cover (4).

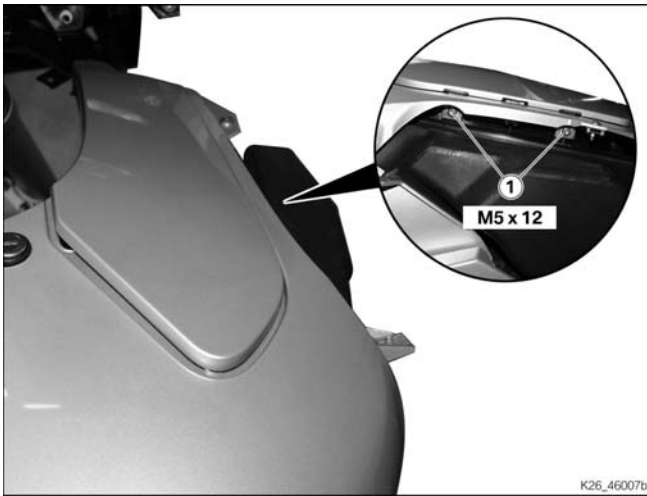
(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Removing storage compartment lid

- Remove screws (1).
- Remove storage compartment lid.



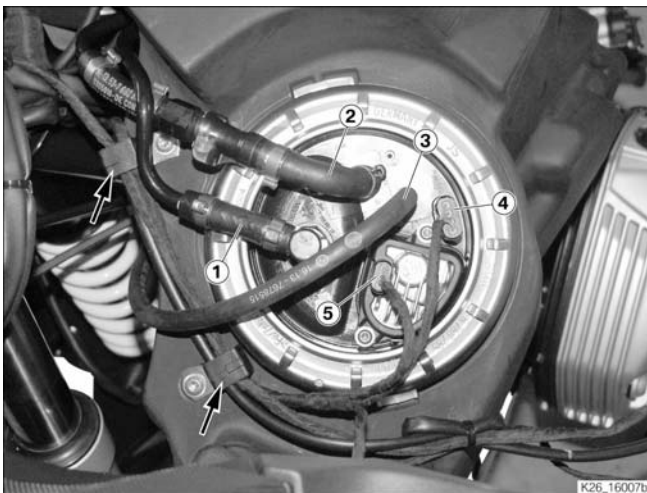
(-) Removing entire right side tank cover

- Remove screws (1).
- Remove screws (2).
- Remove fuel tank cover.

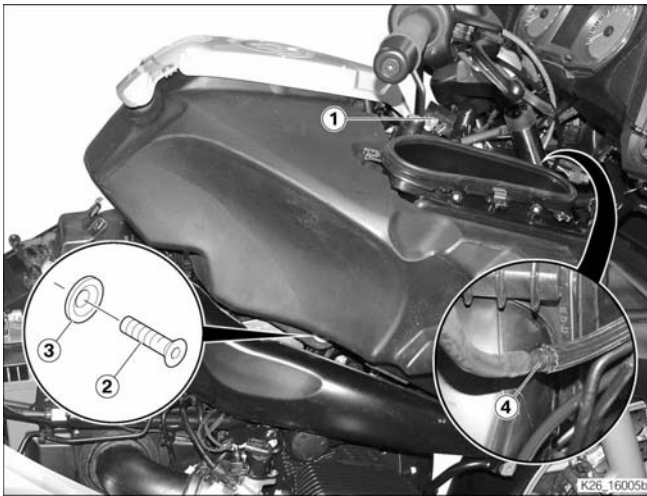


(-) Removing fuel tank

- Disconnect quick-release couplings (1) and (2) of fuel lines.
- Disconnect overflow hose (3).
- Disconnect plugs (4) and (5).
- Release all cables from retaining clips (arrows).

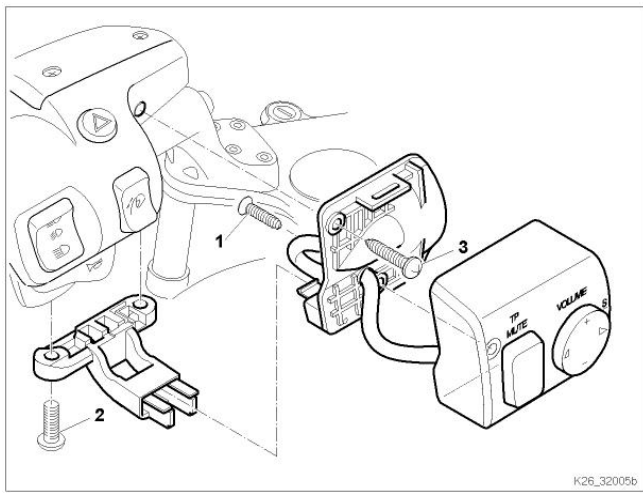


- Remove screw (1).
- Remove screws (2) together with washers (3) on left and right.
- Disconnect breather hose (4).
- Remove fuel tank.



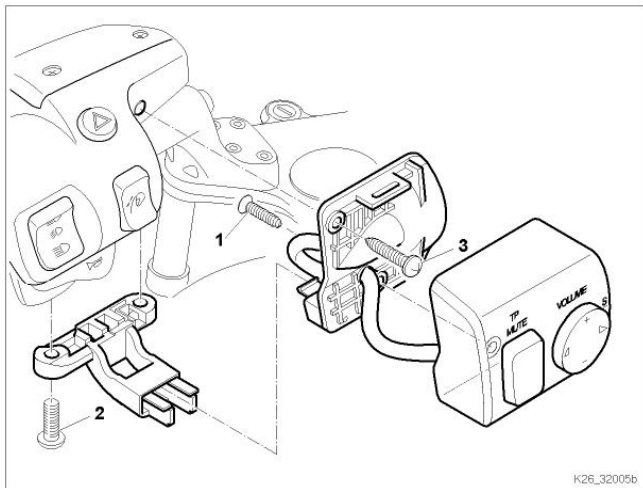
(-) Removing front remote control unit for radio

- Release screw (1) on the handlebar-mounted remote-control unit.
- Remove the housing cover of the handlebar-mounted remote control unit.
- Release screws (2) and screw (3) and remove the housing of the handlebar-mounted remote-control unit.



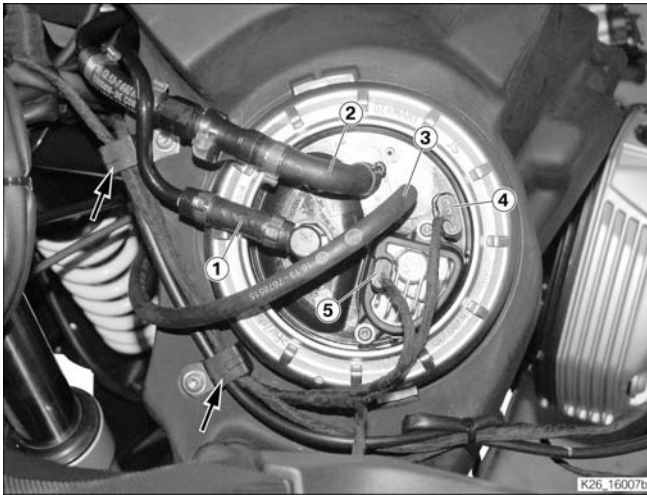
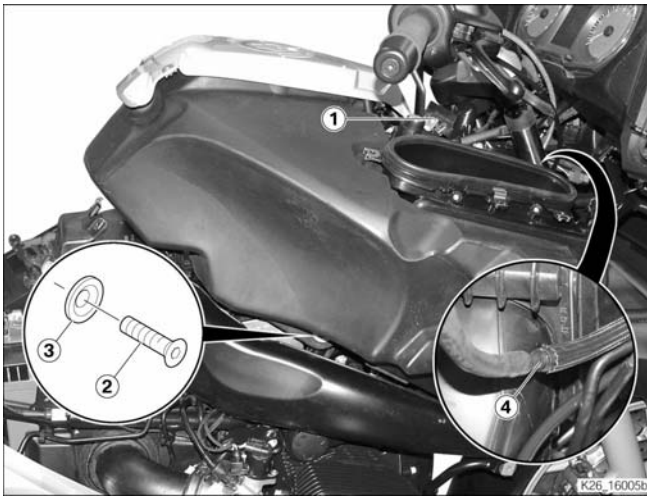
(-) Installing front remote control unit for radio

- Place the housing of the handlebar-mounted remote-control unit in position and secure it with screw (3) and screws (2).
- Engage the housing cover of the handlebar-mounted remote control unit.
- Secure the housing of the handlebar-mounted remote-control unit with screw (1).




(-) Installing the fuel tank

- Working from the rear, slide the fuel tank into the holder on the frame while paying attention to fuel lines and connection cable.
- Check that the clutch line and the throttle cable are not trapped between the fuel tank and the frame.



- Connect breather hose (4).
- Install screws (2) together with washers (3) on left and right.

 Tightening torques		
Fuel tank to front frame strut, right, M8 x 40	16 Nm	
Fuel tank to frame, rear, M8 x 40	16 Nm	

- Install screw (1).
- Secure all cables in retaining clips (arrows).
- Make sure that the plug connections (4) and (5) are dry.
- Connect plugs (5) and (4).
- Connect overflow hose (3).
- Check the O-rings in quick-release couplings and check for damage.

! **Attention**

Nature: Lightly touching the latching pin of the female connector can cause the connector to latch. If this happens and force is applied in an attempt to close the male and female elements of the quick-action coupling, damage to the O-rings can result, and the O-rings will leak.

Avoidance: Make sure that the latch is open/pressed when you connect the two elements of the quick-action couplings in the fuel lines.

- Open the latch on female coupling of the fuel line (1) and (2) and, applying light pressure, press the male adapter into the female coupling until it engages with an audible click.

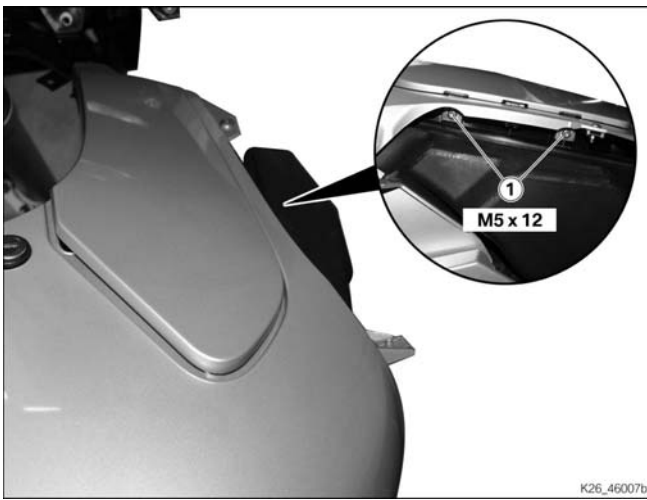
(-) Installing entire right side tank cover

- Fit tank cover.
- Install screws (2).
- Install screws (1).



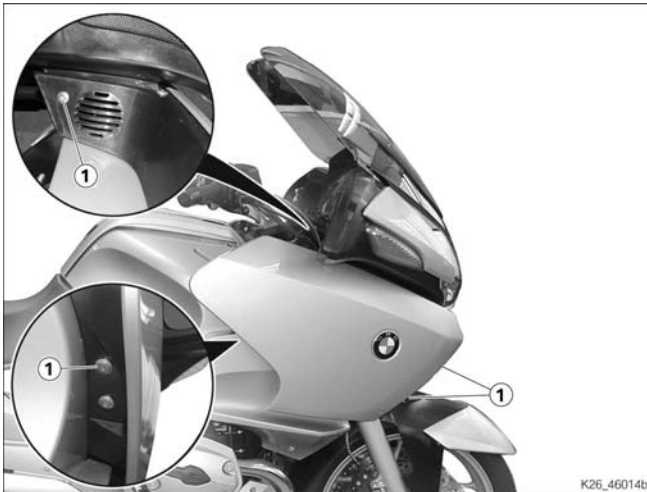
(-) Fit storage compartment lid

- Fit storage compartment lid in position, making sure that the seal is not damaged.
- Latch storage compartment lid in lock and align.
- Install screws (1).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing entire left side tank cover

- Fit tank cover.
- Install screws (2).
- Secure quick-release catch (3).
- Install screws (1).



(-) Installing left-hand trim panel

- Connect plug (1) to the socket.



- Hold the panel in position.
- Install screws (1).



(-) Installing tank rail

- Fit tank rail.
- Install screws (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



 **65 21 000 Removing and installing or replacing aerial**

Variant, Radio with CD player

(-) Removing left-hand trim panel

- Remove screws (1).

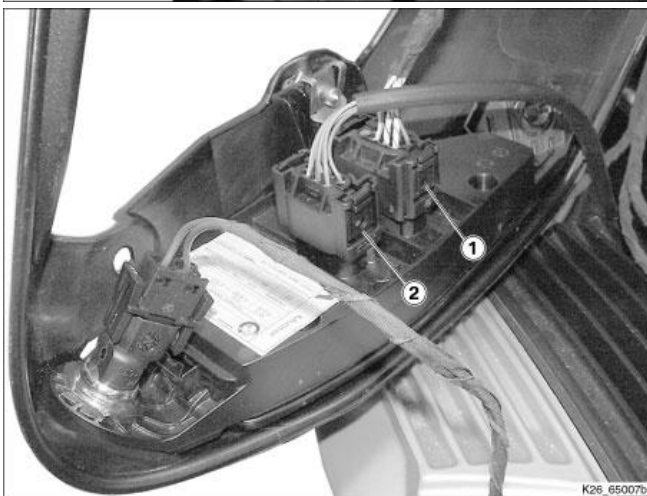


- Disconnect plug (1) from socket.



Variant, Radio with CD player

- Disconnect plug (1).
- Disconnect plug (2).



- Remove trim panel.

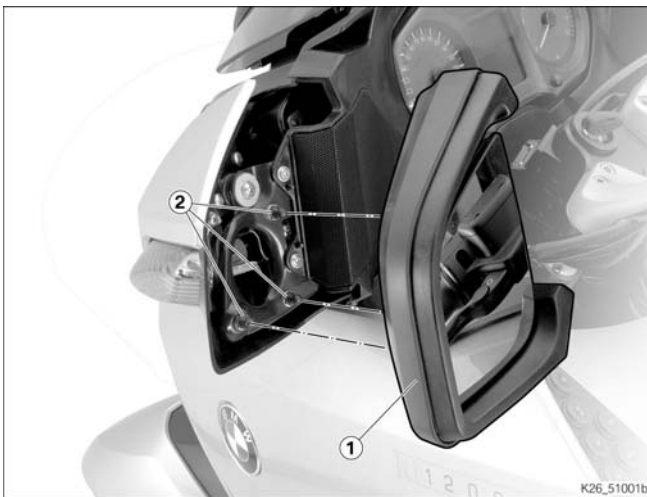
(-) Removing right-hand trim panel

- Remove screws (1).
- Remove trim panel.



(-) Removing mirror

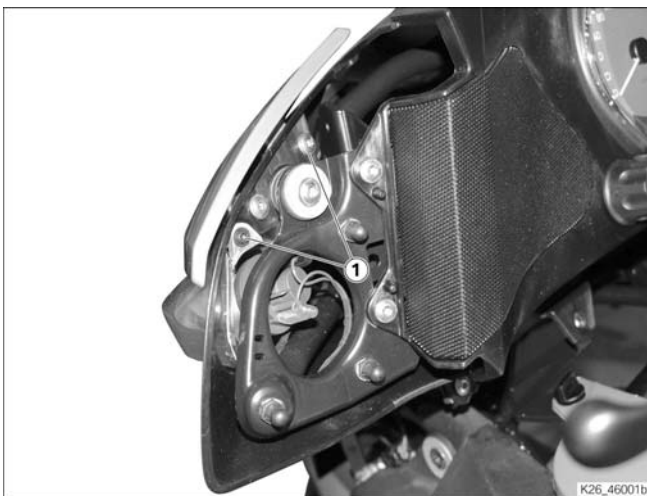
- Detach mirror (1).



Variant, Radio with CD player

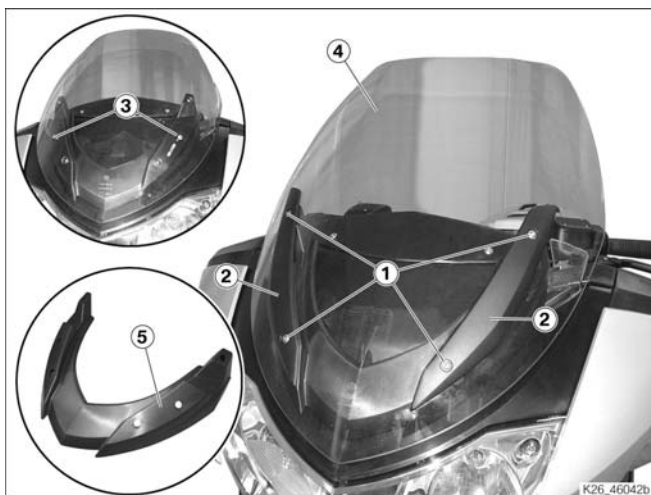
(-) Removing both left and right mirror trim covers

- Remove screws (1).
- Carefully pull covers in forward direction to remove.



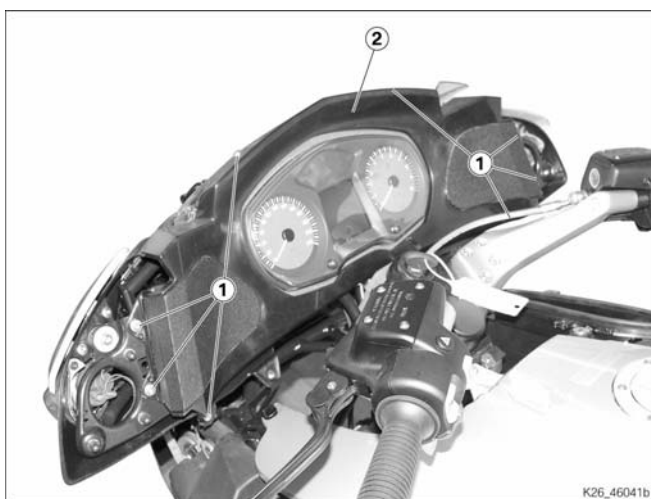
(-) Removing windscreen

- Remove screws (1), remove left and right trim covers (2).



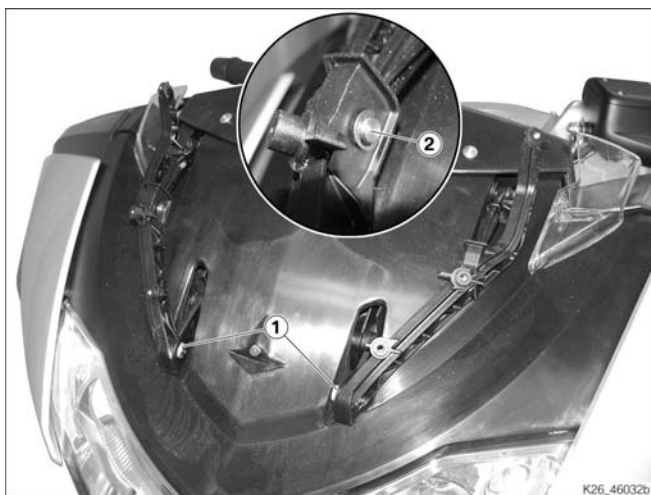
- Remove screws (3) together with washers.
- Remove windscreen (4) together with cover (5).

(-) Removing inner trim for instruments



- Remove screws (1).
- Remove inner trim (2).

(-) Partially removing holder for windscreen



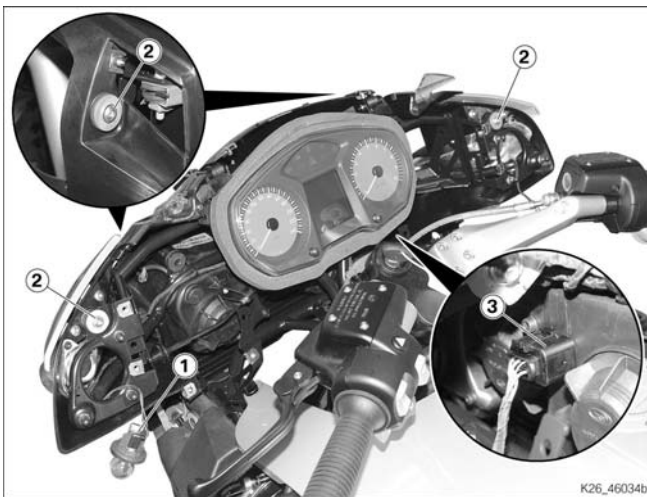
- Remove clips (1).
- Press out pin (2).

- Use a strap to keep holder (1) back out of the way.



(-) Removing entire top section of fairing

- Loosen bulb sockets (1) on left and right.
- Remove screws (2).
- Disconnect plug (3).



Variant, Radio with CD player

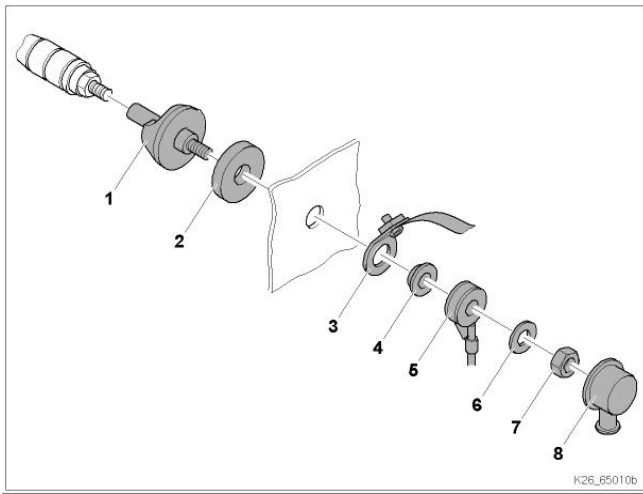
- Remove screw (4).
- Disconnect plug (5).



- Carefully pull upper section of fairing in forward direction to remove.

(-) Removing aerial

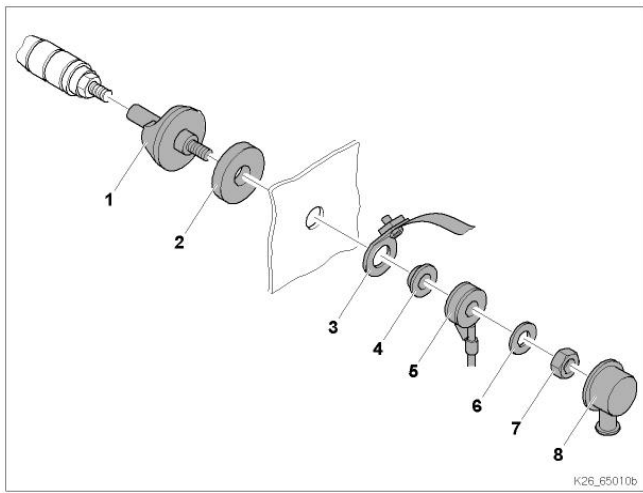
- Remove hood (8).
- Remove nut (7) and remove washer (6).
- Remove aerial cable (5), bushing (4) and ground connection (3).
-



Remove aerial with base (1) and washer (2).

(-) Installing the aerial

- Set washer (2) on aerial base (1).
- Working from the outside, insert the aerial.
- Install ground lead (3), bushing (4) and ground connection (5) and secure with washer (6) and nut (7).
- Install hood (8).




(-) Installing entire top section of fairing

- Carefully place upper section of fairing in position.

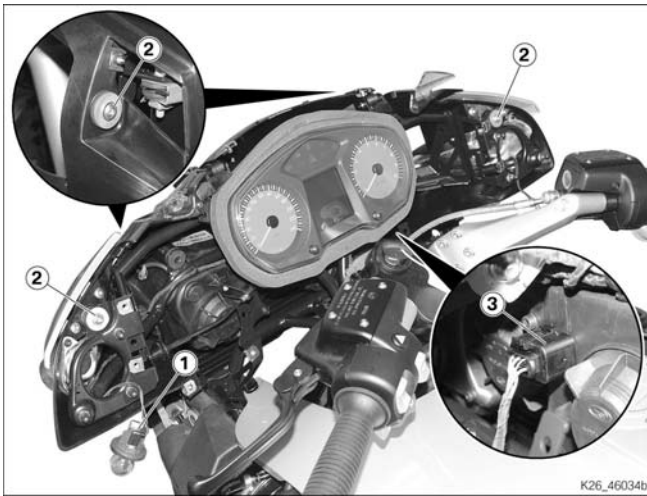
Variant, Radio with CD player

- Connect plug (5).
- Install screw (4).



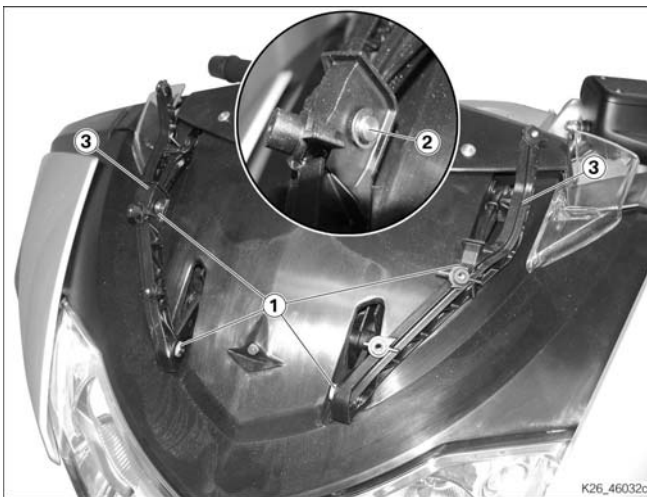
 Tightening torques		
Antenna earth strap to fairing bracket, M6 x 16	6 Nm	

- Connect plug (3).
- Install screws (2).
- Secure bulb sockets (1) on left and right.



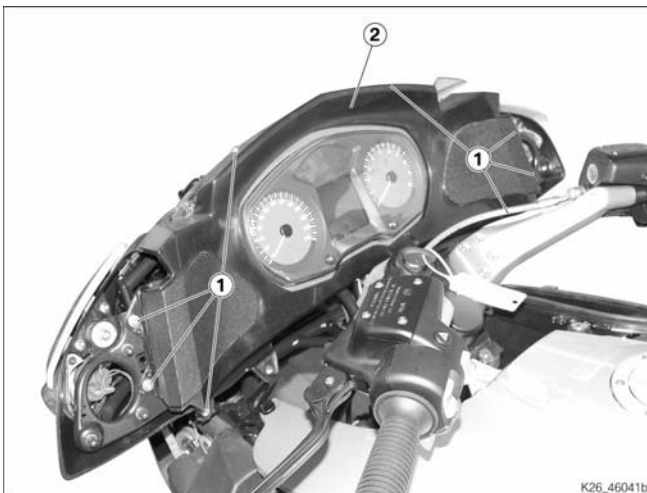
(-) Installing bracket for windscreen

- Fit bracket (3) in position.
- Install pin (2).
- Install clips (1).



(-) Installing inner trim for instruments

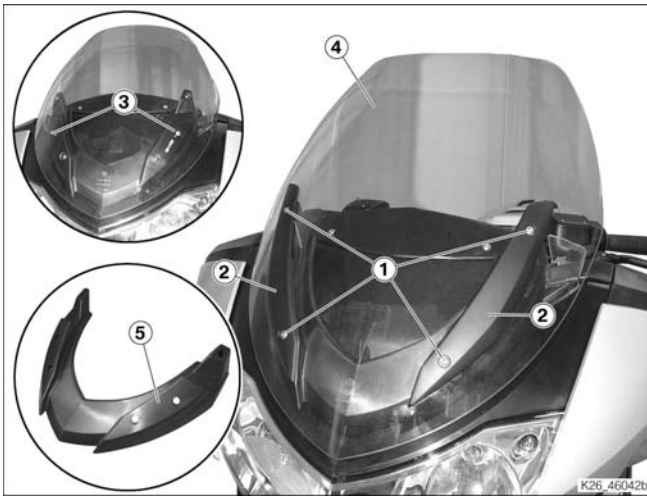
- Place inner trim (2) in position.
- Install screws (1).



(-) Installing the windscreen

- Install cover (5).
- Place windscreen (4) in position.
- Fit screws (3) with washers.





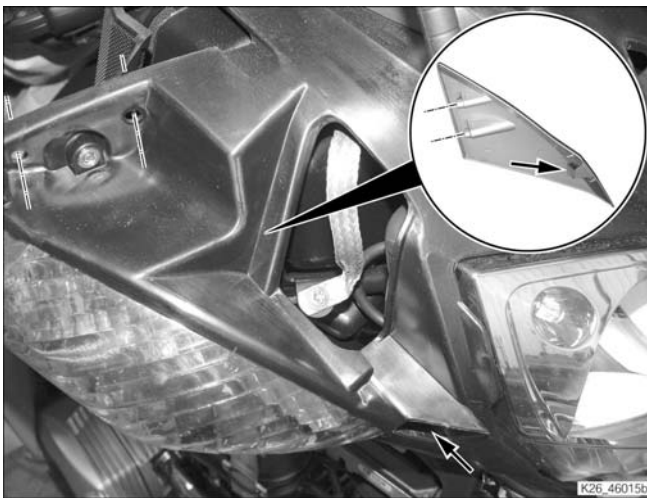
Tightening torques

Windshield with cover and support to windshield adjuster, M5 x 16	2.5 Nm	
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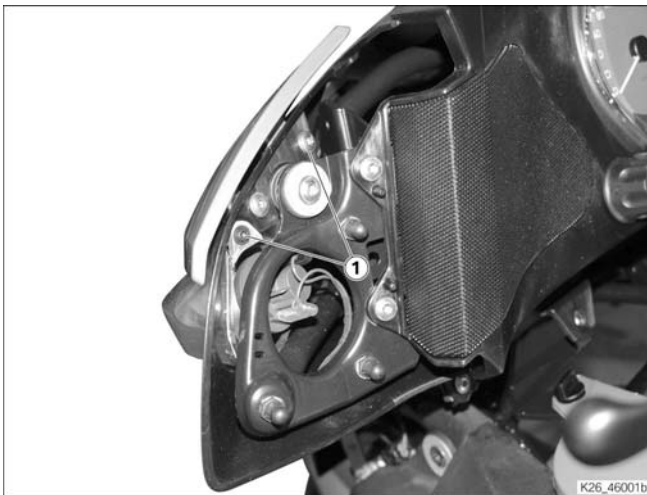
- Fit left and right trim panels (2) and secure with screws (1).

Variant, Radio with CD player

(-) Installing both left and right mirror trim panels



- Install trim panel, making sure that guide (arrows) engages correctly in the upper section of the fairing.



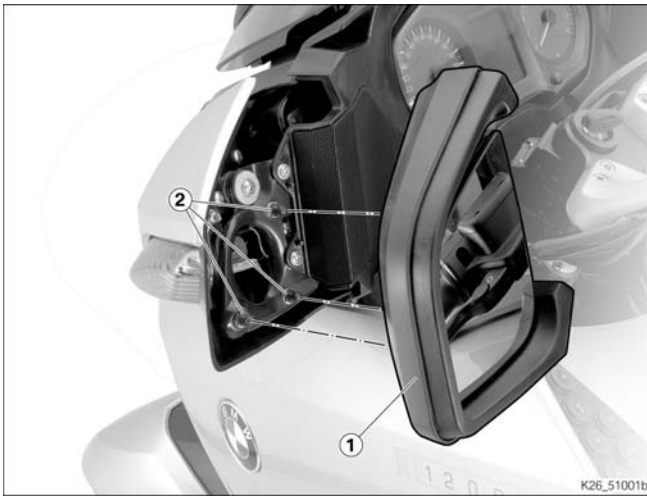
- Install screws (1).

(-) Installing mirrors



Attention

Nature: The mirrors can easily work loose from



their anchoring if the rubber holders or snap-fit studs are greased.

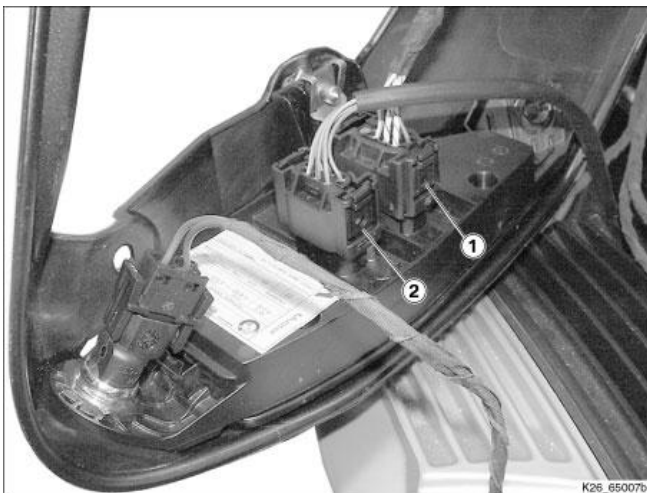
Avoidance: Do not grease the rubber holder or snap-fit stud.

- Press mirror (1) in forward direction on to snap-fit studs (2).



(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



(-) Installing left-hand trim panel

Variant, Radio with CD player

- Connect plug (2).
- Connect plug (1) to control unit.

- Connect plug (1) to the socket.



K26_46017b



K26_46013b

- Hold the panel in position.
- Install screws (1).

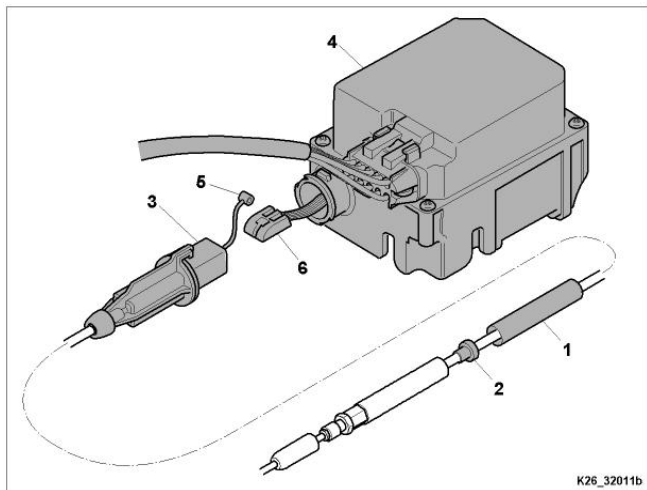
65 71 000 Replacing control unit for cruise-control system

(-) Removing right-hand trim panel



- Remove screws (1).
- Remove trim panel.

(-) Disengaging Bowden cable for cruise control



- Remove rubber sleeve (1).
- Remove sleeve (2).
- Release cable guide (3) at cruise control (4) and remove.
- Disengage Bowden cable (5) from cable assembly (6).

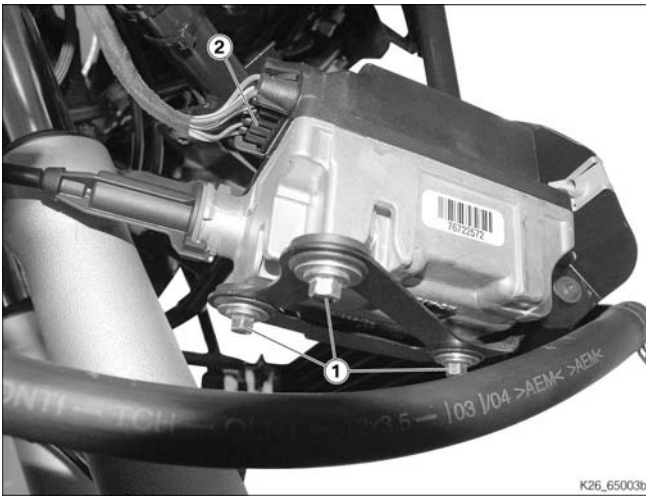
(-) Removing control unit for cruise control



- Remove screws (1).
- Disconnect plug (2).
- Use cable ties to hold the control unit out of the way.

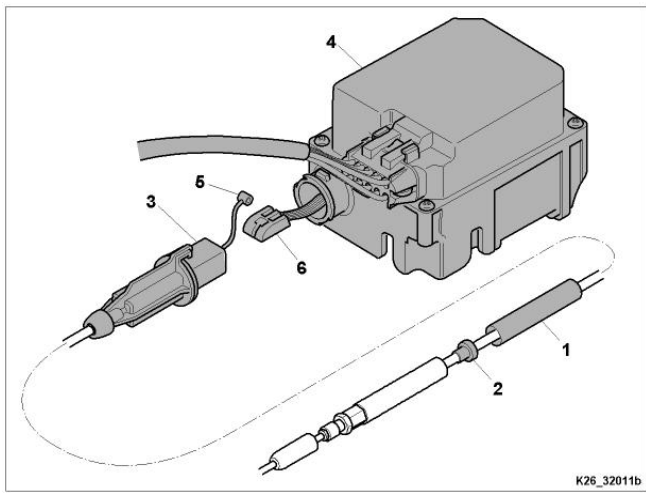
(-) Installing control unit for cruise control

- Open the cable tie at the control unit.



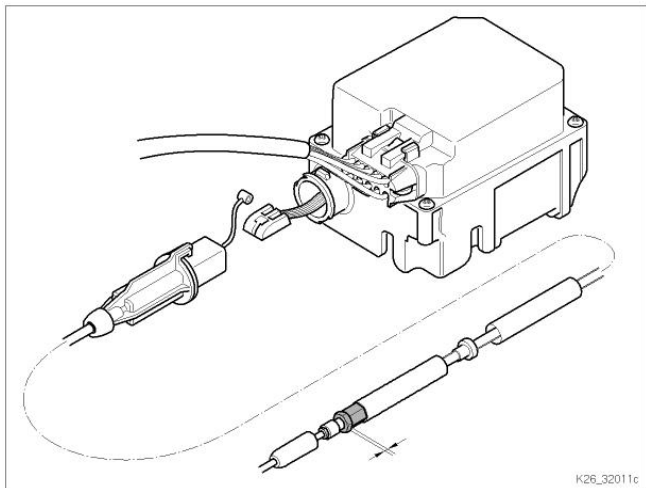
- Connect plug (2).
- Install screws (1).

(-) Securing Bowden cable for cruise control




- Thread Bowden cable (5) forwards and engage it on cable assembly (6).
- Fit cable guide (3) at cruise control (4) and lock in position.
- Install sleeve (2).
- Fit rubber sleeve (1).

(-) Adjusting Bowden cable for cruise control

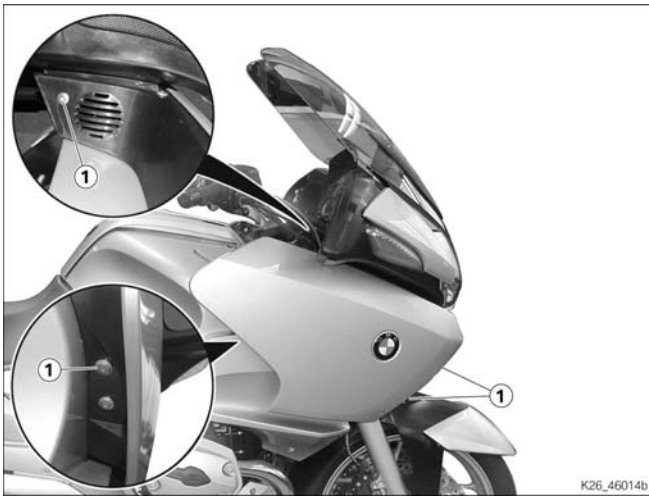


- Remove protective cap.
- Slacken lock nut.
- Adjust Bowden cable at adjusting screw to specified value.

 Technical data			
Setting for Bowden cable, cruise control		2 - 3 mm	Variant, cruise control

(-) Installing right-hand trim panel

- Hold the panel in position.
- Install screws (1).



 **65 75 000 Replacing control unit for anti-theft alarm**



(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



Variant, Seat heating

- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.

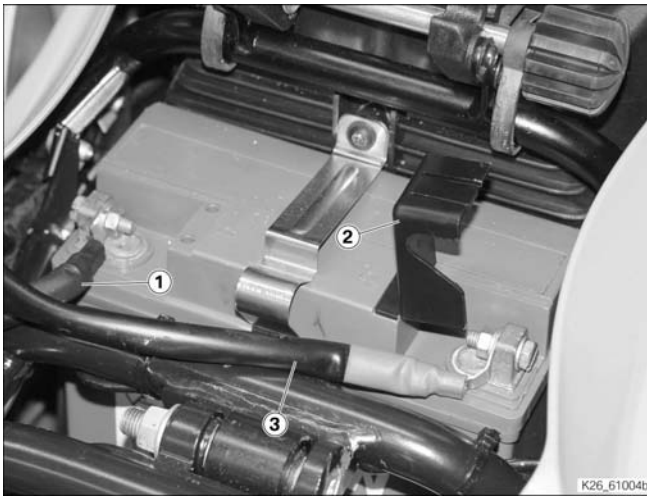
(-) Disconnecting battery

- Switch off the ignition.



Attention

Nature: Disconnection in the wrong sequence



increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.

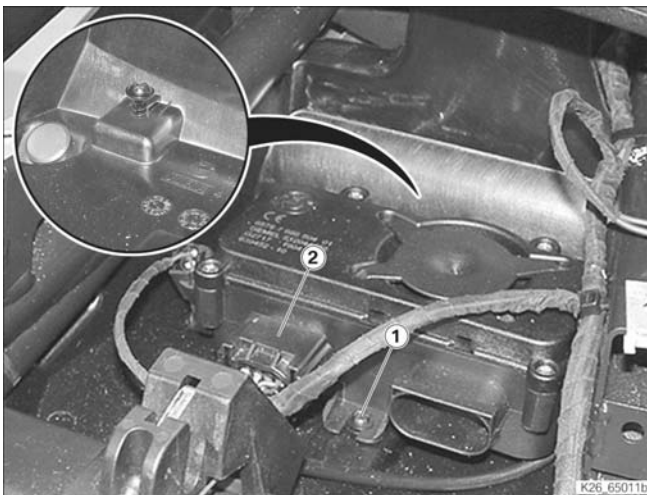
- Disconnect the negative lead from the battery's negative terminal (1).
- Open protective cap (2).
- Disconnect the positive lead from the battery's positive terminal (3).

(-) Removing control unit for anti-theft alarm



- Remove screw (1).
- Disconnect plug (2).
- Ease the anti-theft alarm forward to remove.

(-) Installing control unit for anti-theft alarm



- Push anti-theft alarm (3) into the guides from the front.
- Install screw (1).
- Connect plug (2).

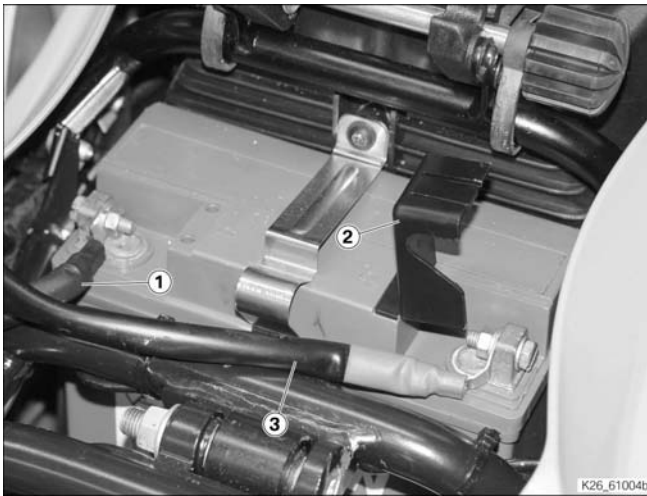
(-) Connecting battery



Attention

Nature: Connection in the wrong sequence increases the risk of short-circuits.

Avoidance: Always proceed in the correct sequence.



Never install the battery without the protective cap.

- Connect positive lead (3) of battery.
- Install protective cap (2).
- Connect negative lead (1) of battery, making sure that the connection cable is routed correctly.
- Switch on the ignition.
- Without starting the engine, **fully** open the throttle once or twice so that the control unit of the BMW engine management system can register the throttle-valve positions.
- Switch off the ignition.

(-) Installing seat



- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.

Variant, Seat heating



- Introduce the front seat into the front latching mechanism.
- Connect plug (1).

Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.



 **65 75 520 Replacing batteries for DWA control unit**

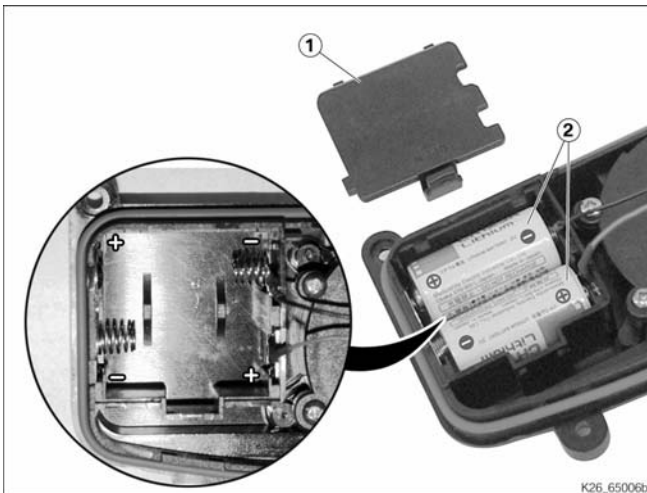
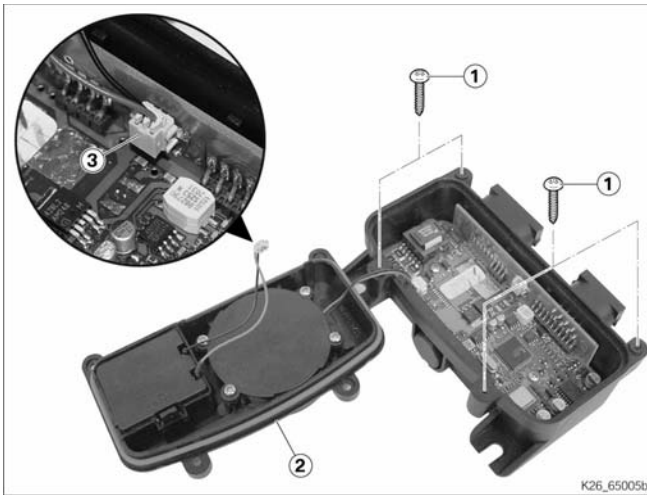
Variant, Anti-theft alarm

(-) Changing batteries in control unit for anti-theft alarm system (DWA)

► Removing batteries in control unit for anti-theft alarm system (DWA)

Variant, Anti-theft alarm

- Remove screws (1) and lift off upper section (2).
- Disconnect plug (3) and place upper section (2) on the outside.



- Remove cover (1).
- Remove batteries (2).



Warning

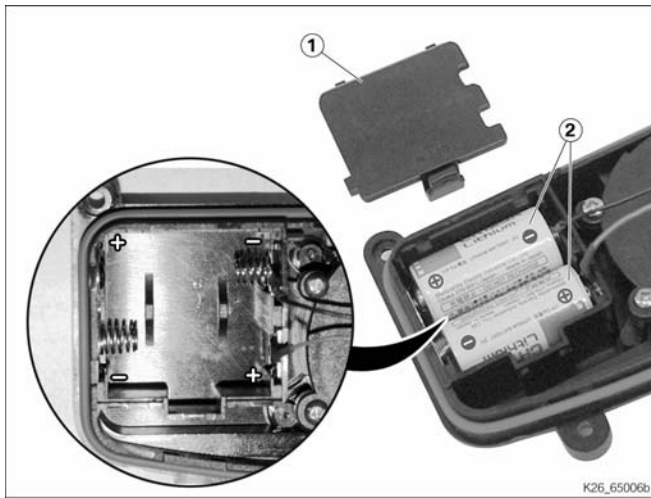
Nature: An attempt to charge dry batteries can result in overheating and explosion.

Avoidance: Batteries must not be recharged.


- Dispose of batteries conforming to national regulations.

► Installing batteries in control unit for anti-theft alarm system (DWA)

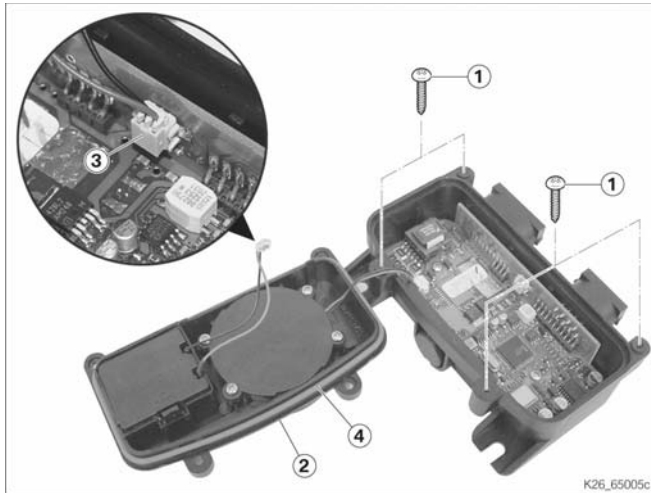
Variant, Anti-theft alarm



- Install batteries (2).

 Technical data			
Type, battery		CR123A lithium	Variant, Anti-theft alarm
Battery rated voltage		3 V	Variant, Anti-theft alarm

- Install cover (1).



- Check seal (4) for damage and replace if necessary.
- Connect plug (3).
- Install upper section (2) and secure with screws (1).



 **65 81 050 Replacing outside temperature sensor**

(-) Removing seat

- Release seat lock at rear with key and remove rear seat.
- Pull the seat to the rear to remove.



K26_46016a

Variant, Seat heating

- Release seat lock at rear with key.
- Raise rear seat and disconnect plug (1).
- Remove rear seat.



K26_52002b

Variant, Seat heating

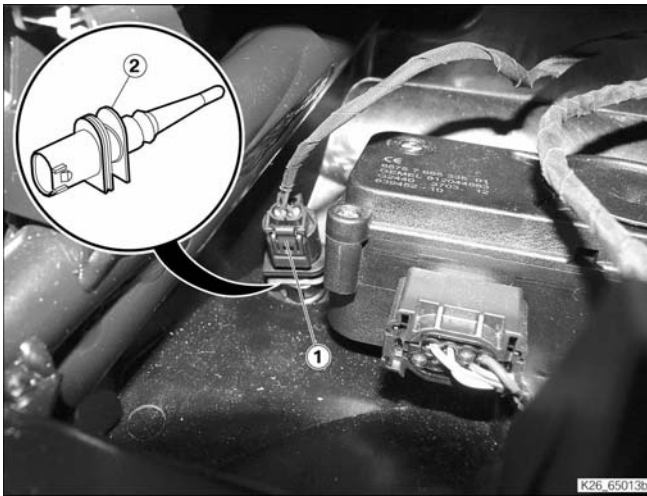
- Raise front seat and disconnect plug (1).
- Pull the seat to the rear to remove.



K26_52001b

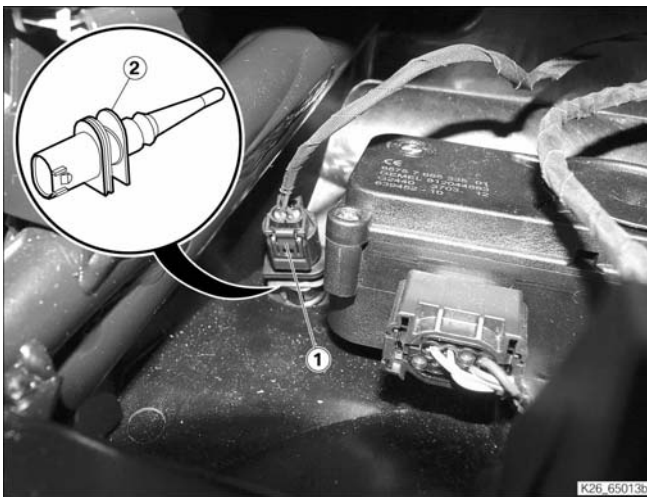
(-) Installing ambient-temperature sensor

- Disconnect plug (1).
- Remove ambient-temperature sensor (2).



(-) Installing ambient-temperature sensor

- Clip ambient-temperature sensor (2) into position.
- Connect plug (1).



(-) Installing seat

- Introduce the front seat into the front latching mechanism.
- Install rear seat and press down until it engages in the lock.



Variant, Seat heating

- Introduce the front seat into the front latching mechanism.
- Connect plug (1).



Variant, Seat heating

- Connect plug (1).
- Install rear seat and press down until it engages in the lock.