

Repair Manual



K 1200 LT

**BMW AG Motorcycle Division
After Sales**

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After Sales
UX-VS-2

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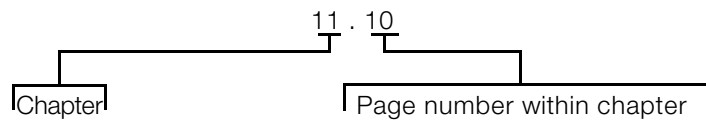
Introduction

This repair manual will help you to perform all the main maintenance and repair work correctly and efficiently. If it is consulted regularly by workshop personnel it will form a useful addition to the theoretical and practical knowledge acquired at the BMW Training Centre. It is a contribution towards achieving even higher Service quality.

A new issue of this repair manual will be published if amendments or additions (supplements) are needed.

All information in both text and illustrations refers to motorcycles in standard condition or with genuine BMW accessories installed, and not to motorcycles which have been modified in any way to depart from the manufacturer's specification.

- The repair manual is structured in the logical sequence of the work to be performed: Removal, Disassembly, Repair, Assembly, Installation.
- The entire contents are divided into individual chapters, corresponding to the Construction Groups.



An arrow symbol followed by the chapter and page numbers is a reference to another chapter, e.g. See Group 46

- Work to be performed during an Inspection is described in Group "00". The various inspection routines are numbered I, II, III and IV. This numbering is repeated in the work descriptions which follow, so that work can take place without interruption.
- Use of the BMW special tools needed for certain tasks is described in the work instructions.

If the need arises, repair instructions are also issued in the form of Service Information. This information is of course incorporated into the next issue of the repair manual. We also recommend, as an additional source of information, the Electronic Parts Catalogue (ETC), which contains clear and easy-to-follow illustrations.

If the work described here is restricted to a particular equipment specification, for instance if a specific optional extra (OE) is fitted, this is stated in square brackets at the start of the item concerned, e.g. **[With heated handlebar grips]**.

Please refer to the following pages as well for a description of other symbols used and how to work with it.

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After Sales

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Usage

Each chapter starts with the list of contents.

The list of contents is followed by the Technical Data table.

Chapter 00 "Maintenance and general instructions" details the handover checklist and lists all tightening torques and operating fluids.

Key to symbols

In this Workshop Manual for the K 1200 LT model, the following symbols are used; their meanings are explained in the table.

Special instructions aimed at improving the work procedures



Note:

Specific information on operating, inspecting and adjusting work for the motorcycle as well as maintenance procedures.



Caution:

Instructions and precautions specifically intended to prevent damage to the motorcycle. Failure to comply with them could invalidate the warranty.



Caution:

This symbol stands for precautions and measures which are essential in order to protect the rider or other persons from possibly severe or fatal injury.

Contents

Headlines for the work described in the chapter..... with the relevant page number

Activities

- Activities
- The bullet symbol means that work steps are described in greater detail under another headline
- Preceding activities
- A line indicates work steps described in greater detail under another headline or in another chapter

If the term "release" or "remove" is used:

the fastener (e.g. screw) must be slackened off and taken out

or

a component (e.g. fuel rail) must be removed to the extent that other components which it conceals (e.g. throttle-valve rail) are accessible

If the term "loosen" or "slacken" is used:

the fastener (e.g. screw) must only be slackened off but not taken out



Tightening torques:

Values are stated if they differ from DIN EN 24 014 or DIN 912 ISO industrial standards.

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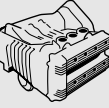
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00.1



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11.1



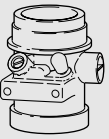
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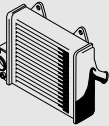
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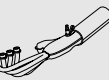
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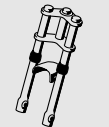
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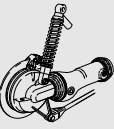
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62 Instruments

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63 Lights

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65 Radio and optional extras

65.1



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Maintenance schedule

K 1200 LT



		BMW Inspection at 1,000 km (600 miles)	BMW Service every 10,000 km (6,000 miles)	BMW Inspection every 20,000 km (12,000 miles)	BMW Annual Service
Customer	Licence plate No.				
Order No.	Mechanic's signature				
Read out the fault memory with the BMW MoDiTeC unit		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check throttle cable play, adjust if necessary		<input type="checkbox"/>		<input type="checkbox"/>	
Change engine oil while at operating temperature If the motorcycle is ridden only for short distances or at outside temperatures below 0°C (32 °F), this work must be done every 3 months or at least every 3,000 km (1,800 miles) *)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change oil in gearbox while at operating temperature at least every 2 years *)				<input type="checkbox"/>	<input type="checkbox"/> every 2 years
Change oil in rear wheel drive while at operating temperature at least every 2 years *)		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/> every 2 years
Examine brake pads and discs for wear, replace if necessary *)			<input type="checkbox"/>	<input type="checkbox"/>	
Check the front/rear brake fluid level		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Check operation of brake system and freedom from leaks; repair/replace items if necessary *)				<input type="checkbox"/>	
Replace the brake fluid at least once a year					<input type="checkbox"/>
Check clutch operating fluid level		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Change clutch fluid every 40,000 km (24,000 miles) or at least every 2 years *)				<input type="checkbox"/> 40,000	<input type="checkbox"/> every 2 years
Replace fuel filter *) generally every 40,000 km (24,000 miles), if the fuel is of poor quality, every 20,000 km (12,000 miles)				<input type="checkbox"/> 40,000	
Check and top up, where necessary, coolant level and concentration		<input type="checkbox"/>		<input type="checkbox"/>	
Replace the coolant at least every 2 years*)					<input type="checkbox"/> every 2 years
Check battery acid level, if necessary add distilled water Clean/grease battery terminals if necessary				<input type="checkbox"/>	<input type="checkbox"/>
Replace intake air cleaner element If severe dirt and dust are encountered, replace the intake air cleaner every 10,000 km (6,000 miles) or even more frequently *)				<input type="checkbox"/>	
Check function of side stand contact switch		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Grease side stand bearing, check that the centre stand moves freely, and grease it if necessary *)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the steering damper			<input type="checkbox"/>	<input type="checkbox"/>	
Check tightness of rear wheel studs		<input type="checkbox"/>			
Check rear wheel bearing play by rocking wheel				<input type="checkbox"/>	
Check swinging arm bearings (free of play), adjust if necessary *)		<input type="checkbox"/>		<input type="checkbox"/>	
Clean the inductive sensor on the rear wheel every 40,000 km (24,000 miles) or at least every 2 years *)				<input type="checkbox"/> 40,000	<input type="checkbox"/> every 2 years
Check valve clearances, adjust if necessary				<input type="checkbox"/>	
Replace the lining of the chain tensioning rail and chain guide rail every 60,000 km (36,000 miles)*)				<input type="checkbox"/> 60,000	
Replace spark plugs				<input type="checkbox"/>	
Final inspection with road safety and functional check: – Condition of tires and wheels, tyre pressure – Clutch, gearshift mechanism, hand and foot brake, ABS, steering system – Lighting and signalling equipment, telltale lights, instruments, horn – Reversing aid, radio with remote contro, optional equipment fitted – Trial run if necessary		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
*) Charged as an additional item					

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Pre-delivery check

K 1200 LT



<p>Customer _____</p> <p>Order No. _____</p>	<p>Licence plate No. _____</p> <p>Mechanic's signature _____</p>	<p>BMW Pre-delivery check</p>
<p>Check the shipping crate for damage</p>		
<p>Unpacking the motorcycle</p> <ul style="list-style-type: none"> - unpack - inspect for damage - check that delivery is complete <p>Motorcycle keys Top case lock cylinder Toolkit and helmet lock Documentation Top case (packed separately) Optional extras</p>		<input type="checkbox"/>
<p>Installing remaining items on motorcycle</p> <ul style="list-style-type: none"> - Fit front wheel and mudguard - Fit the mirror - Fit the right-hand side footrest and passenger footrest plate - Fit engine spoiler, reversing aid actuation, bumpers - Install the top case 		<input type="checkbox"/>
<p>Fill and charge the battery (mark with charging date)</p>		<input type="checkbox"/>
<p>Check the front/rear brake fluid level</p>		<input type="checkbox"/>
<p>Check clutch fluid level</p>		<input type="checkbox"/>
<p>Check tyre pressures</p>		<input type="checkbox"/>
<p>Check rear wheel studs for tightness (note correct tightening torque)</p>		<input type="checkbox"/>
<p>Fit antenna, windshield</p>		<input type="checkbox"/>
<p>Checking and adjusting the motorcycle</p> <ul style="list-style-type: none"> - Check function of side stand contact switch - Seat - Top case - Headlight, spring strut 		<input type="checkbox"/>
<p>Add fuel</p>		<input type="checkbox"/>
<p>Final inspection and function check</p> <ul style="list-style-type: none"> - Check engine oil when engine is cold - Clutch, gearshift mechanism, reversing aid - Lighting and signalling equipment, telltale lights, instruments - Check radio for operation - Hand brake and foot brake, ABS - Check optional equipment for operation CD player, on-board computer, cruise control - Trial run if necessary 		<input type="checkbox"/>
<p>Confirm pre-delivery check in Service and Technical Booklet</p>		<input type="checkbox"/>
<p>Final cleaning</p>		<input type="checkbox"/>
<p>Motorcycle handed over on:</p>		

00 Maintenance and general instructions

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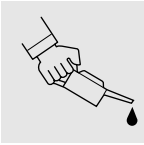


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Tightening torques

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Model	K 1200 LT	
Connection	Nm	
11 Engine		
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Model	K 1200 LT
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Model	K 1200 LT
Connection	Nm
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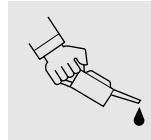
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Model	K 1200 LT
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Frame	
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Model	K 1200 LT
Connection	Nm
46 Frame	
Footrests	
Footrest system front to frame	21
Footrest system rear to frame	21
Footrest rubber to footrest	4
Shift lever to footrest plate	41 (clean thread + Loctite 243)
Footbrake lever to footrest plate	41 (clean thread + Loctite 243)
Stop, footbrake lever	7
Stop screw, return spring for footbrake lever	5
Rear section, side cases and top case	
Rear carrier to rear frame	9
Cover, rear carrier to rear frame	9
Cover, rear carrier to case	1
Side case to rear frame	9
Strap to top of case	2 (clean thread + Loctite 243)
Case trimmer to rear frame	5
Case trimmer to case	2
Top case to rear frame	9
Armrest to top case	1
Stands	
Pivot mount to gearbox	41
Main stand to pivot mount	41 (clean thread + Loctite 243)
Side stand to pivot mount	41 (clean thread + Loctite 243)
Fairing	
Fairing screws	2
Windscreen to windscreen adjuster	2 (clean thread + Loctite 243)
Cover of fork bridge.	2
Front mudguard, front, to fork slider bridge M 6	4
Front mudguard, front section, to sliding tube M 6	6
Front mudguard, rear section, to fork slider bridge M 6	3 (clean thread + Loctite 243)
Miscellaneous	
Intake air pipe to fairing bracket	10
Intake air pipe to radiator holder	10

Model	K 1200 LT
Connection	Nm
51 Equipment	
Non-removable screw for ignition/steering lock	21
Lock, tank cover to bridge	5
Locking mechanism, front seat to rear frame	5
52 Seat	
Bridge, seat to frame M 6	9
Bridge, seat to frame M 8	21
Front hinge, seat to bridge	9
Seat, front, to carrier plate	5
Gas-filled strut to carrier plate for seat, front	21
Seat, rear, to rear frame	9
Backrest, rear, to top case	5
61 General electrical equipment	
Retaining plate for fanfare horn to fairing bracket	21
Ignition lock to fork bridge	21
Wiring harness to main frame	6
Electronics box to main frame	9
Holder for plug and socket connections behind battery panel, left	9
Attachment, side-stand switch	7 (clean thread + Loctite 243)
Holder, stop-lamp switch to footrest plate	5 (clean thread + Loctite 243)
Locknut for stop screw, foot brake lever	7
Temperature sensor, cylinder head	30
Attachments, battery holder	4
Speed sensor, rear wheel	4
Socket to engine spoiler	4
Socket to top case	4



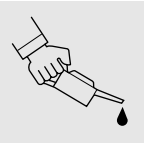
Model	K 1200 LT
Connection	Nm
62 Instruments	
Instrument cluster to fairing bracket	6
63 Lights	
Headlight to upper section of fairing	2
Rear light cluster to case trimmer	5
65 Radio and optional extras	
Clamping nut, stub aerial	3
Aerial holder to frame	9
Retaining plate for cruise control system to fairing bracket	8
Holder for temperature sensor to upper section of fairing	2



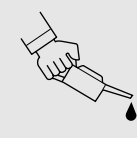
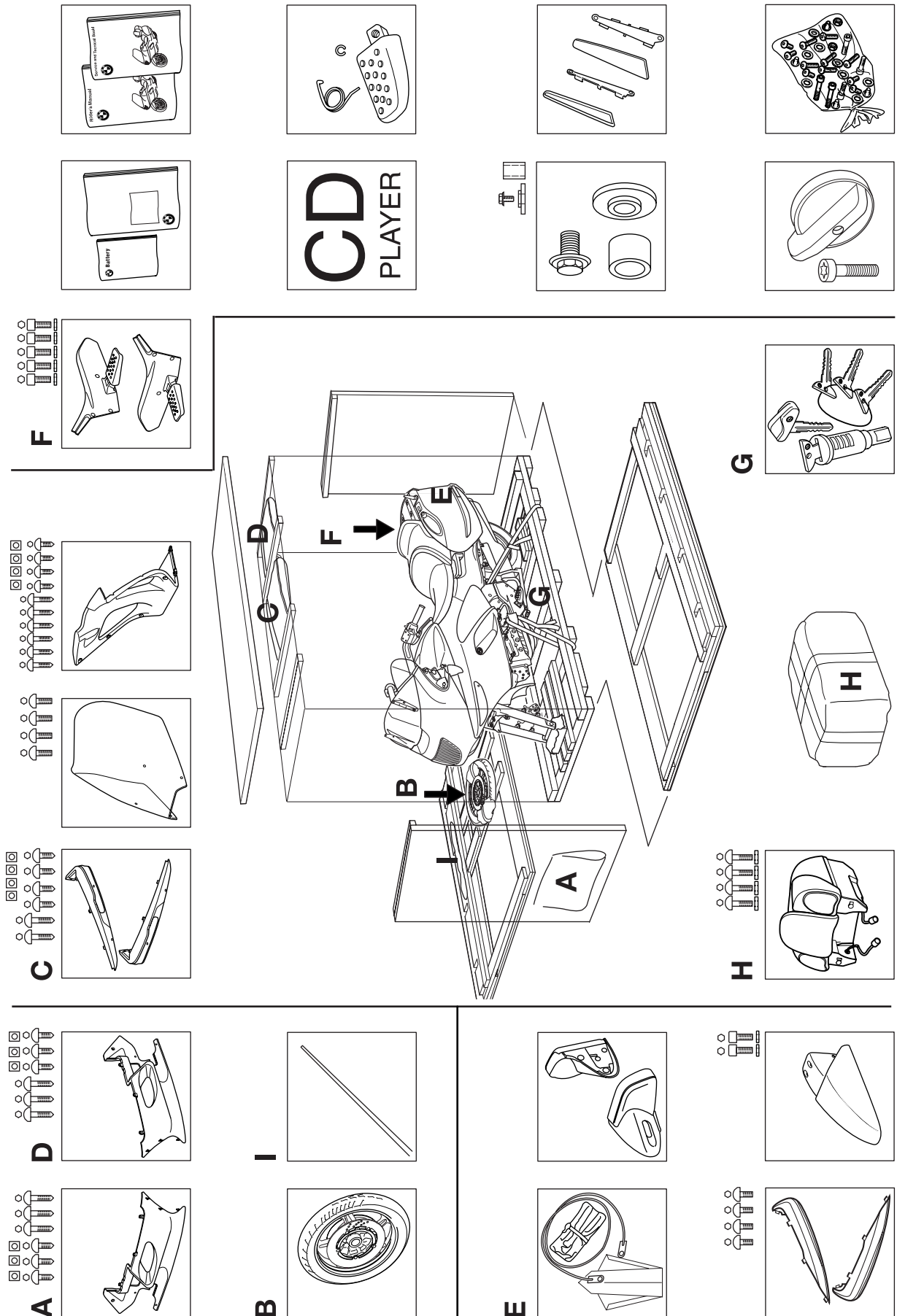
Table of operating fluids

Item	Use	Order number	Quantity
Lubricant			
Staburags NBU 30 PTM	High-performance lubricating paste	07 55 9 056 992	75 g tube
Optimoly MP 3	High-performance lubricating paste	07 55 9 062 476	100 g tube
Optimoly TA	High-temperature assembly paste	18 21 9 062 599	100 g tube
Silicone grease 300, heavy	Damping grease	07 58 9 058 193	10 g tube
Retinax EP2	Wheel, steering head and taper roller bearing grease	83 22 9 407 845	100 g tube
Contact spray	Contact spray	81 22 9 400 208	300 ml spray
Chain spray	Drive chain	72 60 2 316 676 72 60 2 316 667	50 ml spray 300 ml spray
Sealants			
3-Bond 1110 B	Surface sealant	07 58 9 056 998	5 g tube
3-Bond 1209	Surface sealant	07 58 9 062 376	30 g tube
omni VISC 1002	Surface sealant (max. 200 °C/392 °F)	07 58 1 465 170	90 g tube
Loctite 574	Surface sealant	81 22 9 407 301	50 ml tube
Curil K 2	Heat-conductive sealant	81 22 9 400 243	250 g can
Hylomar SQ 32 M	Permanently elastic sealant	81 22 9 400 339	100 g tube
Adhesives and retainers			
Loctite 648	Surface sealant (narrow gap)	07 58 9 067 732	5 g bottle
Loctite 638	Surface sealant (wide gap)	07 58 9 056 030	10 ml bottle
Loctite 243	Thread retainer, medium-strength	07 58 9 056 031	10 ml bottle
Loctite 270	Thread retainer, strong	81 22 9 400 086	10 ml bottle
Loctite 2701	Thread retainer, strong	33 17 2 331 095	10 ml bottle
Loctite 454	Cyanacrylate adhesive (gel)	07 58 9 062 157	20 g tube
Cleaners			
Brake cleaner	Brake cleaner	83 11 9 407 848	600 ml spray
Metal Polish	Polish for parts	82 14 9 400 890	100 g tube
Testing agents			
Penetrant MR 68	Crack testing agent for aluminium housings	83 19 9 407 855	500 ml spray
Developer MR 70	Crack testing agent for aluminium housings	81 22 9 407 495	500 ml spray
Installation aid			
BMW chilling spray	Chilling components before assembly	83 19 9 407 762	300 ml spray





Overview: K1200LT packing materials



Checking the shipping crate for damage

- When the motorcycle arrives, check the crate immediately for damage and, if necessary, examine the contents for consequential damage.

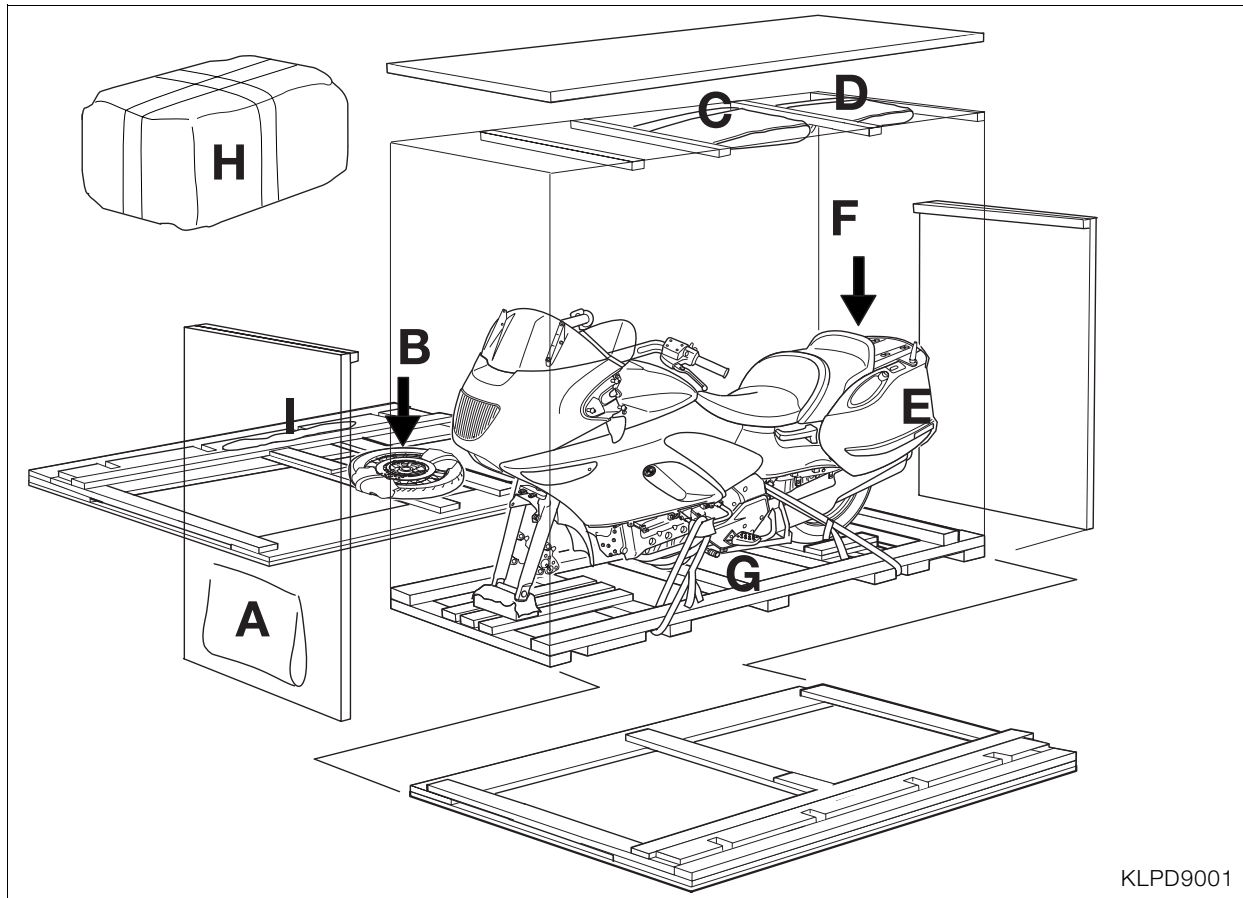


Damage discovered in Germany

- Note the damage on the delivery slip.
- Read the information sheet on damage in transit.
- Notify the supplier without delay (e.g. freight company or DB) and also
Bavaria Wirtschaftsagentur GmbH
Abteilung ZW - 12
80788 München
Tel. 089/14327-632
Fax. 089/14327-709

Damage discovered in importer markets

- Note the damage on the delivery slip.
- Comply with specific national market procedures. If in doubt, please refer your queries to:
Bavaria Wirtschaftsagentur GmbH
Abteilung ZW - 12
D - 80788 München
Tel. +49 (0)89 14327 632
Fax. +49 (0)89 14327 709
- Notify the supplier (e.g. freight company) without delay.



KLPD9001

Unpacking the motorcycle

- Lever off the cover.
- Cut the plastic sheet open and pull it off.
- Take out the separate packs of items:
 - windscreen, skirt, centre engine spoiler - C
 - left-hand side engine spoiler - D
- Use a crowbar to pry off the cross-struts.

Caution:

Do not knock the cross-struts out or the motorcycle may be damaged.

- Remove the end-walls.
- Remove the side-walls.
- Take out the separate packs of items:
 - right-hand side engine spoiler - A
 - front wheel - B
 - mirror, front mudguard, trim panel skirt - E
 - motorcycle tool kit, helmet carrier, engine oil filler funnels remain on the motorcycle - E
 - rear footrest plates, documentation, front right-hand footrest - F
 - front wheel fastener, windscreen cover, reverser, small parts/fastener materials - F
 - top case lock cylinder, key - G
 - top case - H
 - antenna - I.
- Remove protective materials from the motorcycle such as the protective film (green) covering the lamp cluster and radio operating unit.

Caution:

Remove nails projecting from the base of the crate or lying on the base or on the floor.

- Dispose of the packing materials in an environmentally responsible manner as described in Service Information 23/91 - Sales.

Installing the front wheel

Caution:

Protect trim panel parts with a material such as foam to prevent damage from straps and hoists.



Caution:

Do not scrape the wheel – mask it off if necessary.
Do not tilt the brake calliper.
There is a risk of damage to the brake pads.

Note:

Do not apply handbrake lever with brake callipers removed/front wheel removed.

- Remove left and right brake callipers.
- Remove the wood used to support the quick-release axle.

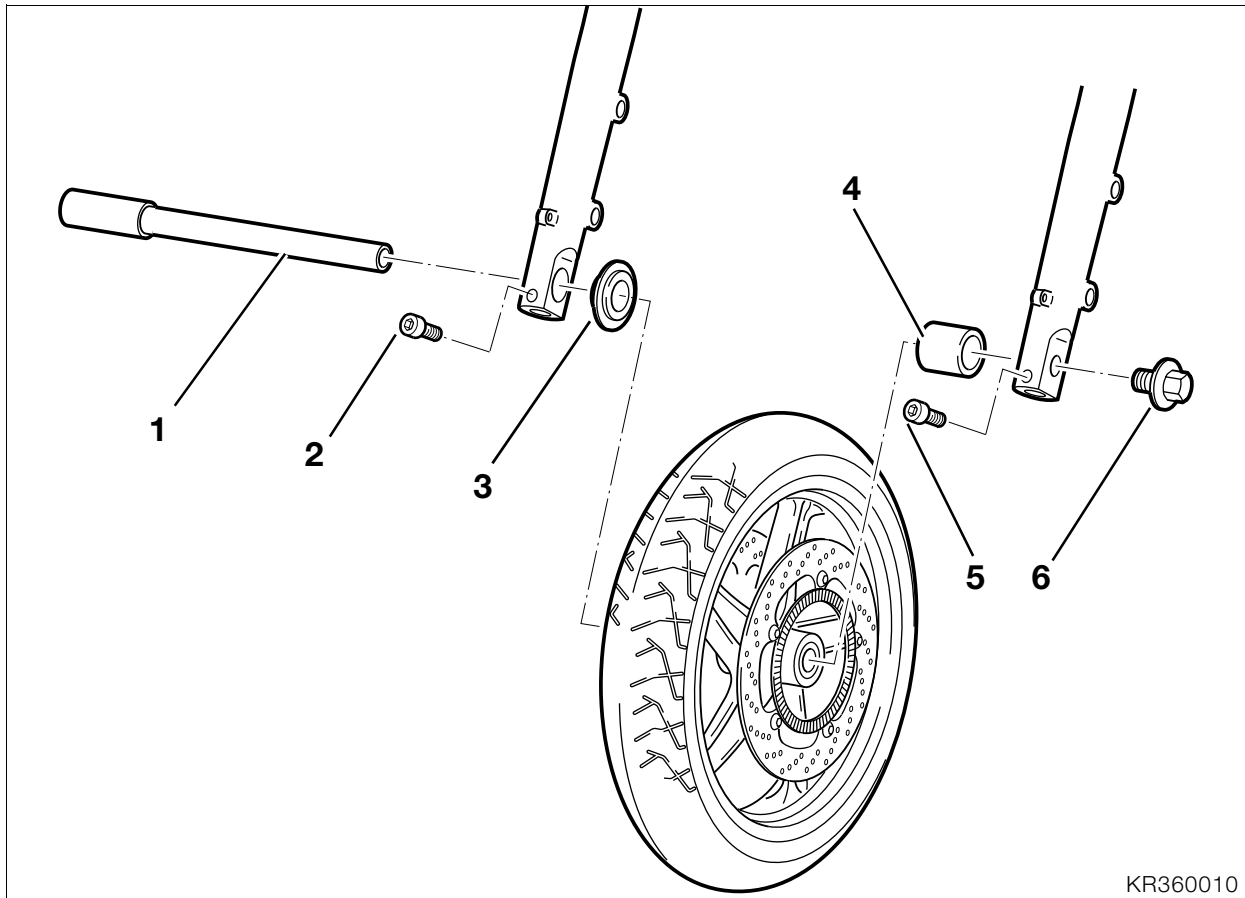
Caution:

Support the motorcycle to prevent it toppling sideways. Fit straps to the ends of the handlebars. Do not use the tensioning belts included with the packaging for lifting. Check that for lifting the crash bar is securely fastened to the skirt bracket and tighten if necessary.

Tightening torques:

Crash bar to skirt bracket..... 9 Nm

- Secure the crossbar belts, **BMW No. 46 5 650**, to the crash bars (see arrow) close to the motorcycle.
- Secure the motorcycle in an assembly crane, **BMW No. 46 5 640**, by the crossbar, **BMW No. 46 5 650**.
- Loosen the clamping bolt on the quick-release axle before you lift the motorcycle.
- Release the anchorage points at the front of the crate and loosen those at the rear of the crate.
- Lift the motorcycle in the assembly crane, **BMW No. 46 5 640**, by the crossbar, **BMW No. 46 5 650**.



KR360010

- Remove quick-release axle (1).
- Lightly grease the quick-release axle (1) and bearing cage (3) and spacer bushes (4) with **Shell Retinax EP2**.
- Fit the bearing cage (3) and spacer bushes (4) on the front wheel.
- Tighten the retaining screw (6).
- Clean the brake discs.
- Install the brake callipers.
- Check the ABS sensor gap and adjust if necessary.

ABS

sensor gap: 0.45...0.55 mm (0.018...0.022 in)



Tightening torques:

Quick-release axle threaded connection 30 Nm
 Quick-release axle clamp screws 21 Nm
 Brake calliper to fork slider tube 40 Nm

- Lower the motorcycle.
- Support the motorcycle to prevent it toppling sideways.
- Remove the tensioning straps from the motorcycle.
- Roll the motorcycle off the pallet.
- Compress the front fork firmly several times.
- Place the motorcycle on its centre stand if you are carrying out any further assembly work.
- Tighten the clamping screws (2, 5).

General instructions

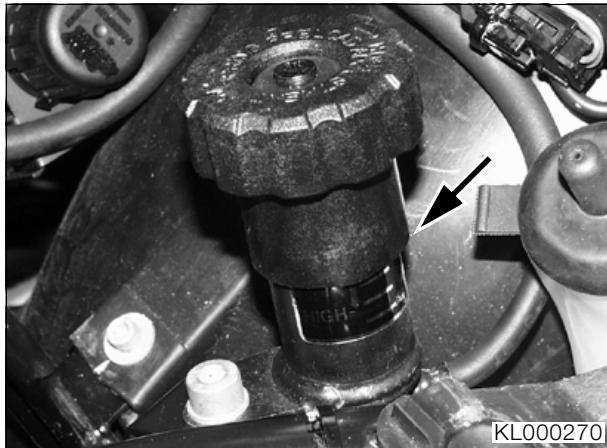
Pushing the motorcycle onto a workshop platform



Warning:

The springs securing the side stand in position can catch as you are pushing the motorcycle onto a workshop platform. This could cause damage to the motorcycle and the workshop platform, or the motorcycle could topple to the side opposite the side stand.

- Lift the seat at the front.



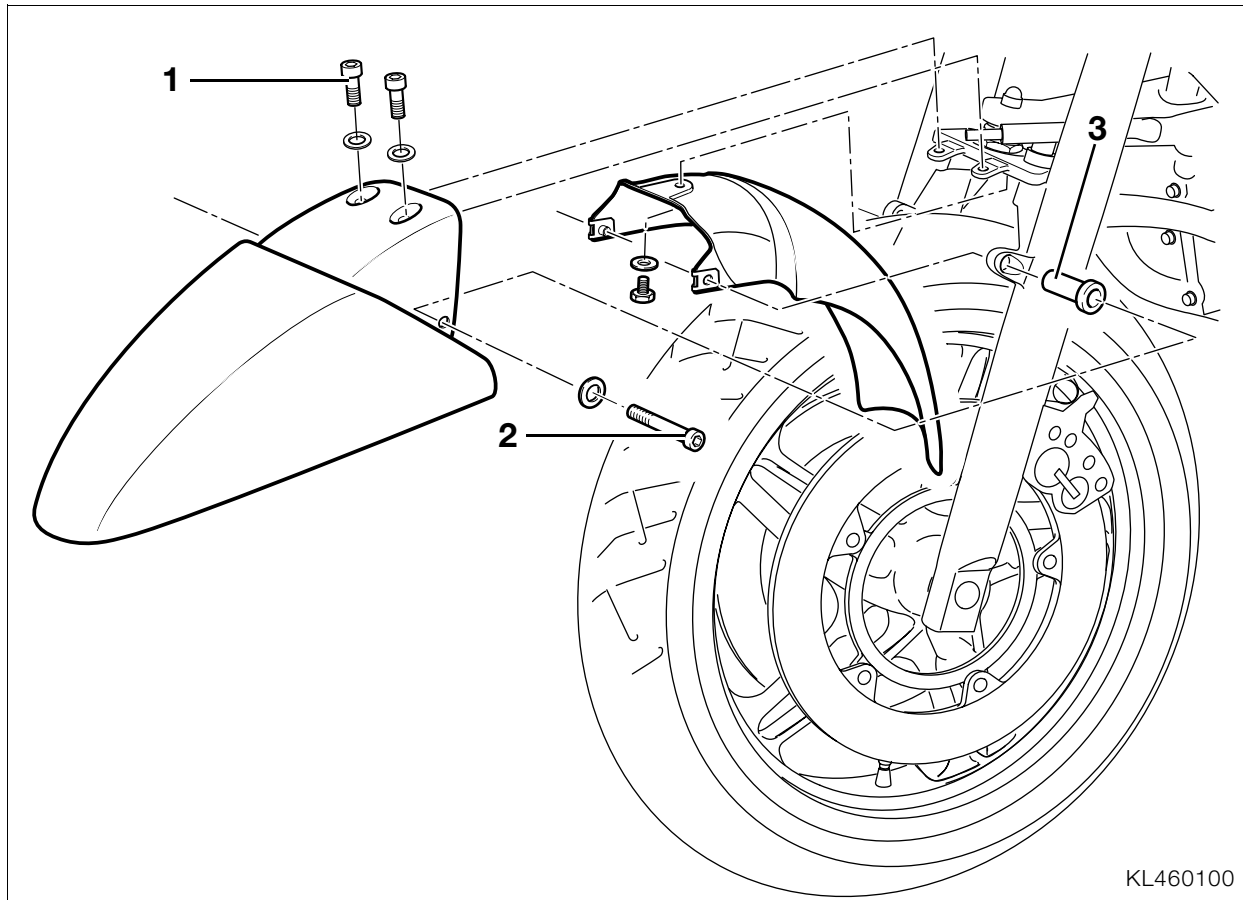
- Note the preload setting of the adjustment wheel (see arrow).
- Set the spring preload to High.
- Push the motorcycle carefully onto the workshop platform, tilting it as little as possible.
- Do the same when pushing it off the workshop platform.
- Return the spring preload to its original setting.

Inspecting motorcycle for damage

- Examine the motorcycle for faults.
- Use the “express handling service” to notify BMW AG Sparte Motorrad, UX-VS-1
Fax: +49 (0)89 382 33220
- Rectify the fault.
- If parts are needed, order them by using the electronic parts catalogue.
- Costs are to be processed by the warranty claim system (stage 4). Defect codes:
 - Parts missing 10 01 00 00 00
 - Parts damaged 10 02 00 00 00
 - Incorrect parts delivered 10 03 00 00 00
- Please consult our parts department if you cannot find the part you require in the electronic parts catalogue.

Checking that delivery is complete

- Separate pack of items
- All optional extras
- Top case
- Motorcycle tool kit, helmet carrier, engine oil filler funnels
- Documentation



KL460100

Installing remaining items on motorcycle

Installing the front mudguard

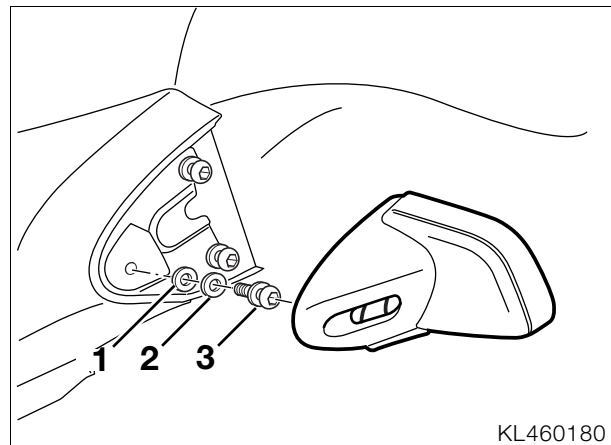
- Release the fastener (2).
- Insert the bushes (3).
- Fit the front wheel mudguard.
- Screw in the fastener (2).
- Tighten the fasteners (1).
- Tighten the fastener (2).



Tightening torques:

Front mudguard to slider tube bridge M6 9 Nm
 Front mudguard to sliding tube M6 9 Nm

Installing the mirrors



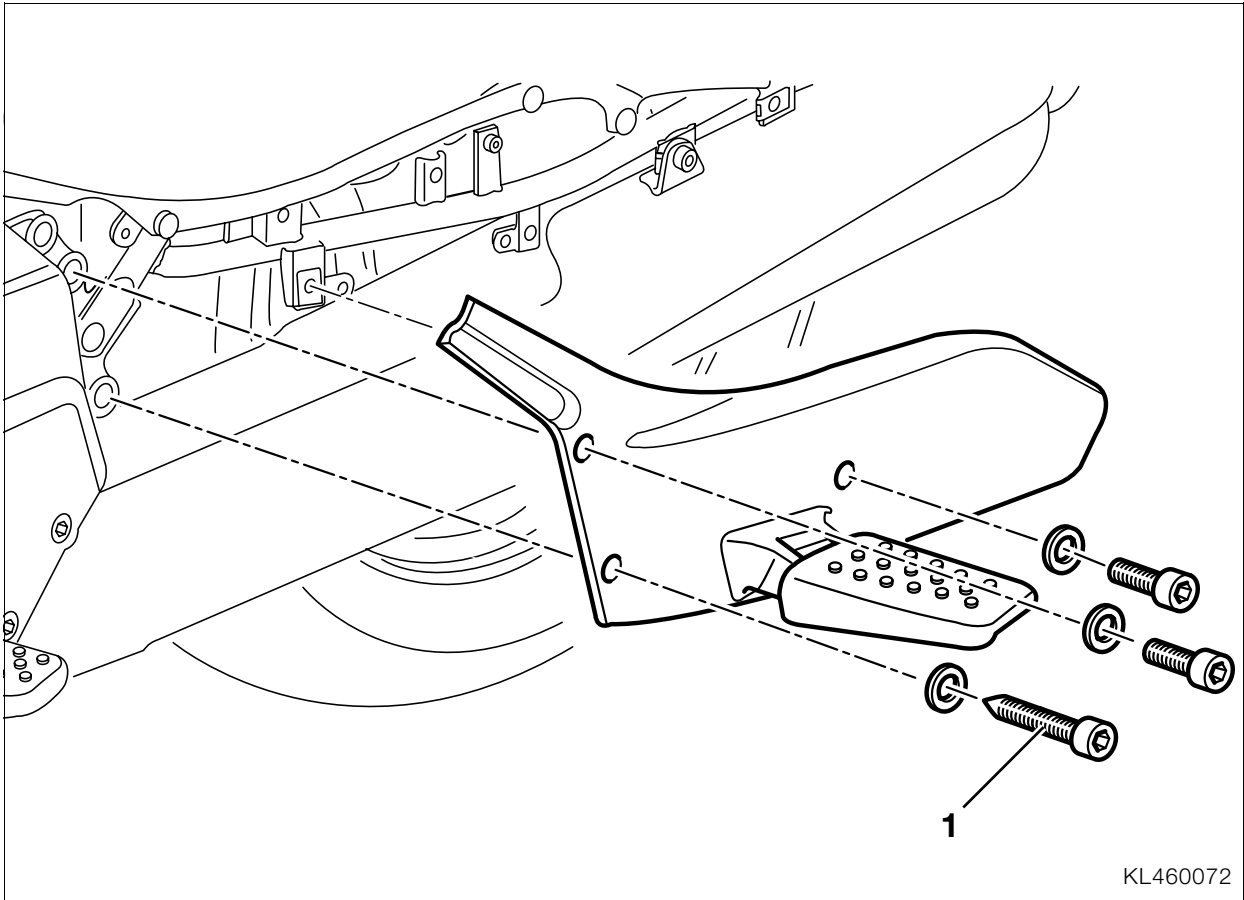
KL460180



Note:

The gap at the mirror can be evened out by means of washers on the front bolt (3).
 A 1 mm (0.04 in) washer (1) is fitted as standard.

- Hold the mirror casing with one hand and install it by gently tapping/pressing with the other.
- Check that the gap around the mirror is uniform.
- If necessary, use washers (0.5mm/1mm (0.02 in/0.04 in) in separate pack of items) to adjust the gap.



KL460072

Installing the footrests

Installing the rear left footrest plate



Note:

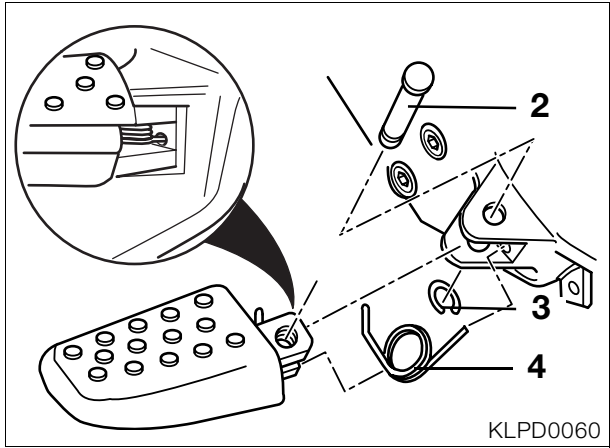
The front fastener (1) (long pointed-top screw) on the left-hand footrest plate also serves as the anchorage point for the battery bracket.

- Release the front fastener (1).
- Install the footrest plate using three mounting bolts.

Tightening torque:

Footrest plate to frame 21 Nm

Installing the rear right footrest and footrest plate

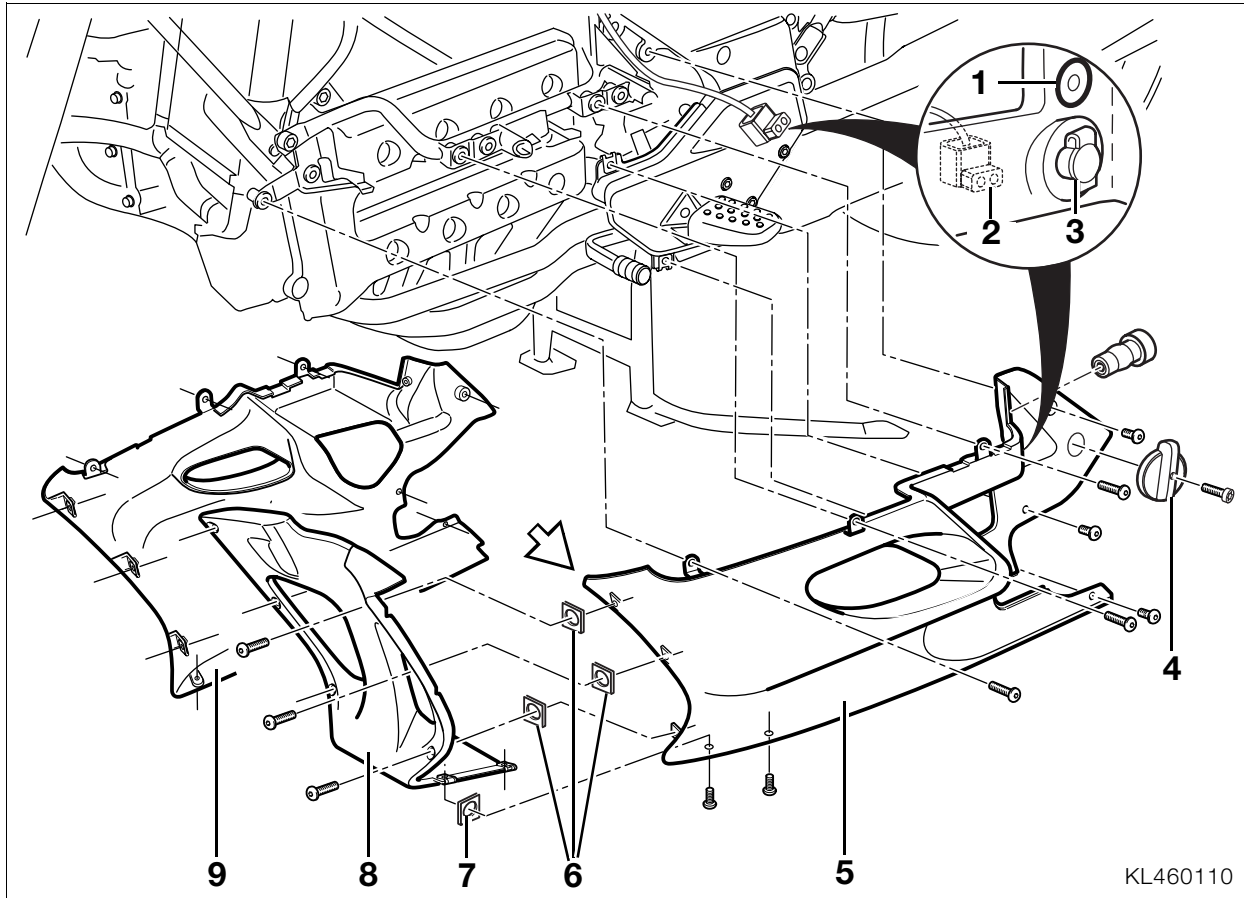


KLPD0060

- Install the front right footrest with torsion spring (4) and pin (2) with **Optimoly MP3**.
- Install circlip (3).
- Install the rear right footrest plate using three mounting bolts.

Tightening torque:

Footrest plate to frame 21 Nm



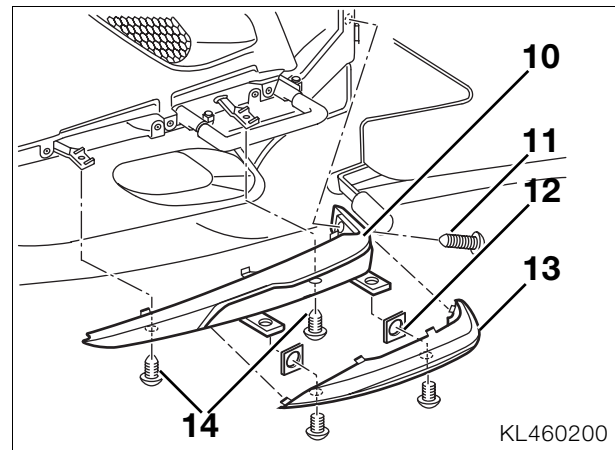
KL460110

Installing the engine spoilers

- Install the socket (3) with nut in the left-hand engine spoiler.
- Install rubber clip-on nuts (1) at rear of each side spoiler.
- Install three clip-on nuts (6) in each side spoiler (5, 9).
- Position four clip-on nuts (7) in the centre engine spoiler (8).
- Install the left engine spoiler (5).
- Insert the connector (2) for the socket (3) into the left engine spoiler.
- Install the right engine spoiler (9).
- Install the centre engine spoiler (8) paying particular attention to the corner (see arrow).

Tightening torque:
 Spoiler sections 2 Nm

Installing the skirts



KL460200

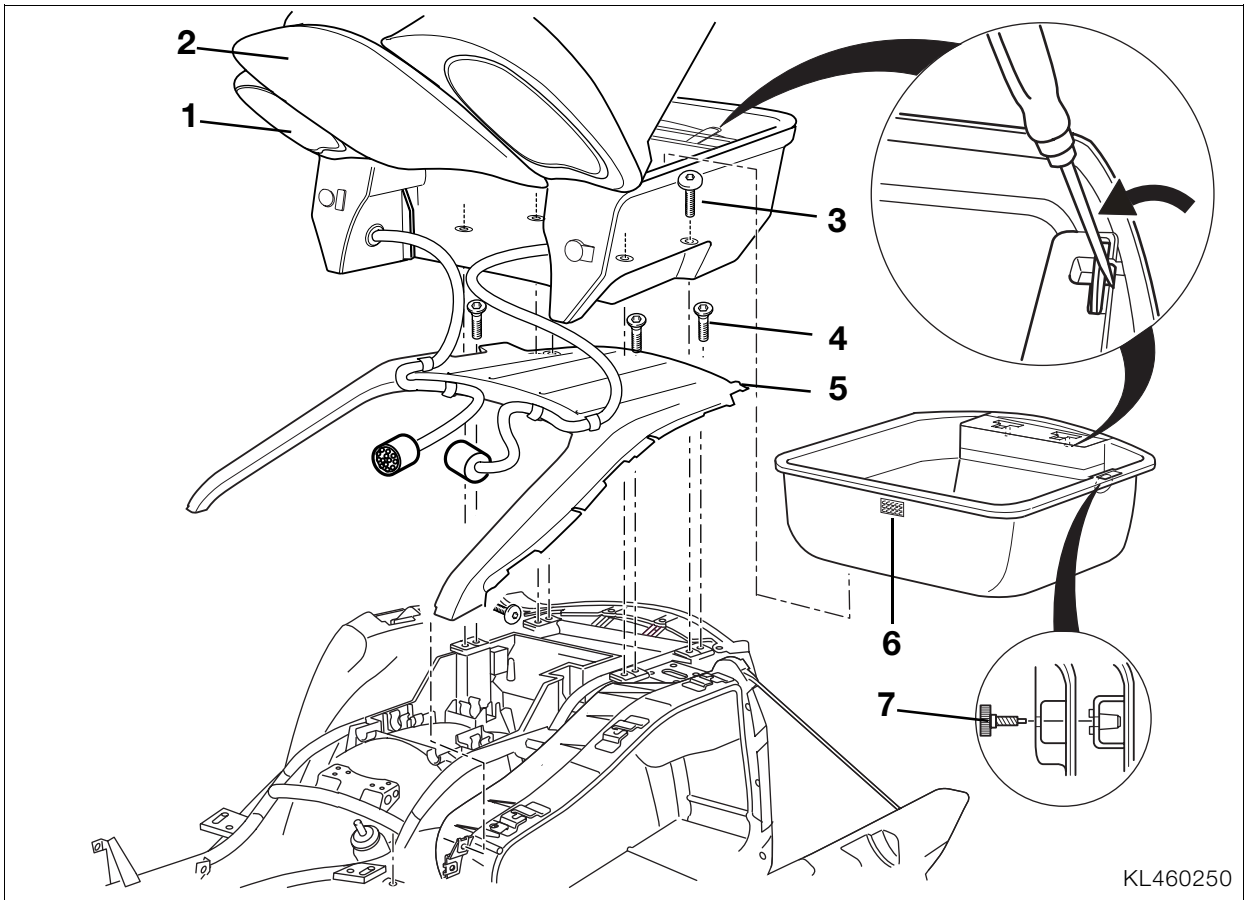
- Position two plug-in nuts (12) on the skirt (10).
- Install the skirt to the skirt bracket.
- Tighten the three screws (11, 14).
- Install the skirt cover (13).

Tightening torques:
 Fairing 2 Nm

Installing the reverser control

- Install actuating control for reverser (4) in left spoiler; install the control in the drive position, in other words with projection at top.
- Install Torx screw (T 25) to secure actuating lever for reverser.

Tightening torque:
 Actuating control
 for reverser 6 Nm (+ Loctite 243)



Installing the top case

- Fit the lock cylinder.
- Raise the seat.
- Remove the rear seat.
- Open the top case.
- Release the knurled screw (7).



Warning:

Support the lid to prevent it falling closed.

- Support the cover (1).
- Detach the control cable from the underside of the case.
- Use a screwdriver to unclip the removable lining from the lock.
- Detach the Velcro strip (6) from the rear panel.
- Remove the lining.
- Use the four fasteners (3) to secure the top case in the required position.

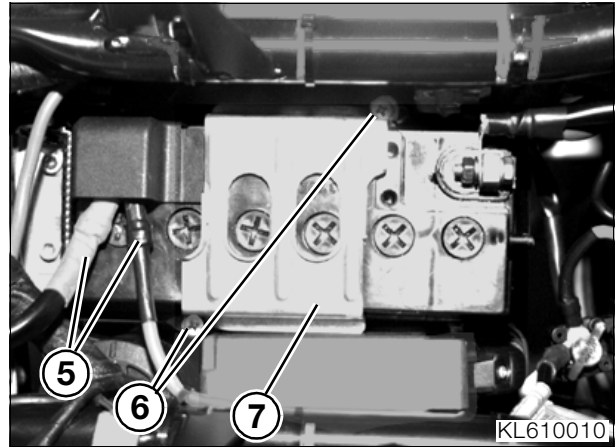
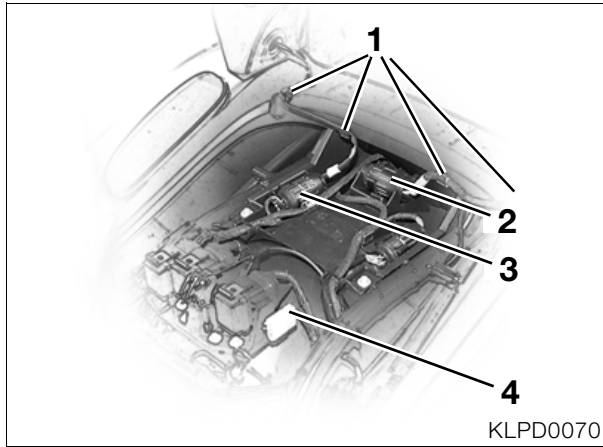


Note:

The backrest can be adjusted by shifting the top case to either the front or rear position. Adjust by swapping the anchorages for cover of rear carrier (5) and top case. Always use the long screws to secure the top case.

Additional instructions for moving the backrest

- Remove four screws (4) for cover of rear carrier (5).
- Move the four screws (4) for the rear carrier cover forwards.
- Use long fasteners to secure the top case in its new position.



- Clip the cables for the radio remote control and the loudspeaker into the holders (1).
- Insert the top case plug connectors for the radio remote control (3) and the loudspeaker (2).
- Insert the removable lining and snap into place.
- Fit the knurled screw with the control cable.
- Plug in the connector (4) for rear seat heating, if applicable.
- Install the rear seat.

 **Tightening torque:**

Top case to rear frame	9 Nm
Rear carrier to frame	9 Nm
Rear seat to frame.....	9 Nm

Filling and charging the battery



Warning:

Battery acid is highly caustic. Protect your eyes, face, hands, clothing and the paintwork.

- Open the left-hand side case.
- Release the seat at the front and open.

- Release the fasteners (6) securing the battery tray (7) and remove the battery tray.
- Lift the battery off the holder together with the battery breather hose.
- Set the battery down on a level surface.

Battery acid..... Density 1.28

- Top up the battery acid to the "MAX" mark.
- Allow the battery to stand for at least an hour.
- Shake the battery slightly to allow the remaining air bubbles to escape.
- Top up with acid to the "MAX" mark if necessary.
- Recharge the battery or allow it to stand for 24 hours.

Charge current (amps)

.....10% of the nominal capacity (Ah)

- Check the acid level and, if necessary, top up with distilled water to the "MAX" mark.
- Replace the battery caps securely.
- Make a note of the charging date on the battery.



Caution:

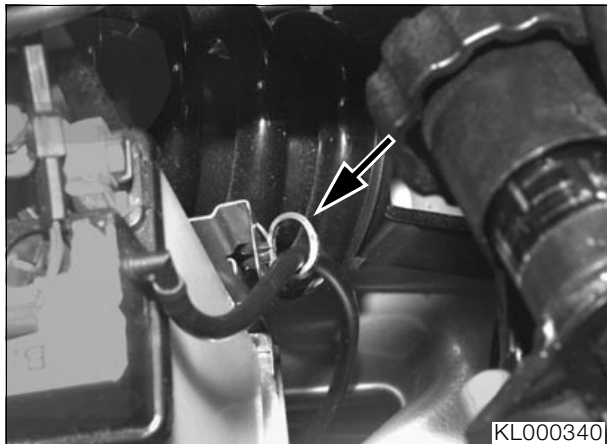
Only reconnect the battery with the ignition switched off to avoid short-circuiting. Connect the **positive** battery lead (+) first, close the protective cap over the positive battery terminal, then connect the **negative** battery lead (-). Make sure that the battery breather hose is not kinked or blocked. Battery acid is highly caustic. Do not permit escaping acid vapour to contact motorcycle components.

- Grease the battery terminals with acid-proof grease.

Acid-proof battery terminal grease

.....e.g. Bosch Ft 40 V1

- Install the battery.
- Reconnect the two positive battery cables (5).



Caution:

The motorcycle may only be ridden with the protective cap fitted on the positive battery terminal.

- Close the protective cap on the positive battery cable.
- Reconnect the negative battery cable.
- Install the battery tray.
- Guide the breather hose through the eyelet (see arrow) in the battery holder to the outside.

Note:

Disconnecting the battery clears all entries (such as errors, adaptations) from the Motronic control unit memory.

The loss of the adaptations may sometimes lead to engine performance being temporarily impaired when the engine is restarted.

Motronic restores the lost adaptations itself over the following operating hours.

- Switch on the ignition.
- Fully open the throttle once or twice with the engine off. Motronic registers the throttle valve position.

Tightening torque:
Battery tray to battery holder 4 Nm

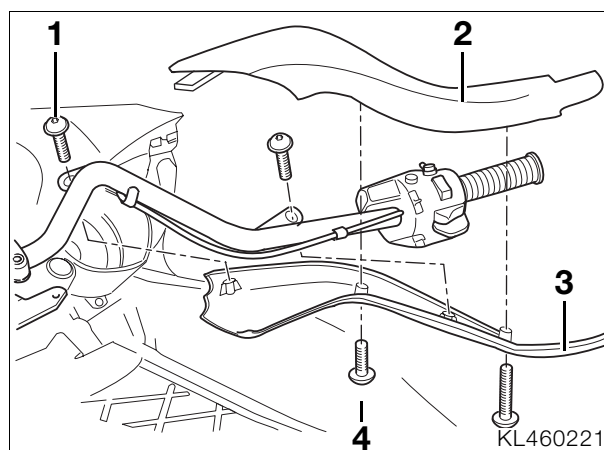
Checking brake fluid level

Caution:

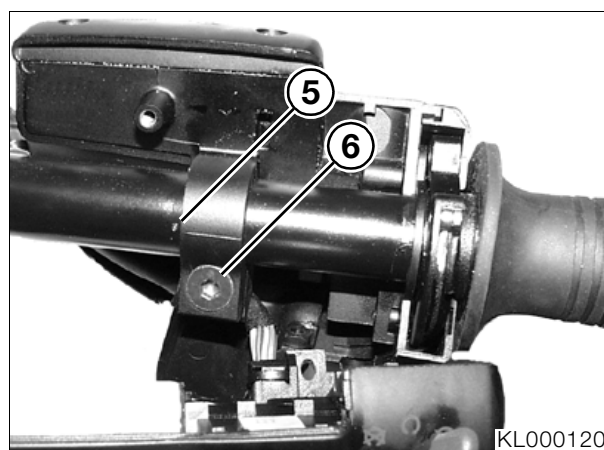
Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint.

Front brake

- Place the motorcycle on its centre stand so that it is level.



- Release the fastener (4) and remove the top handlebar trim (2).
- Release the fastener (1) and remove the bottom handlebar trim (3).
- Unscrew the combination switch.
- Turn the handlebars to full left lock.

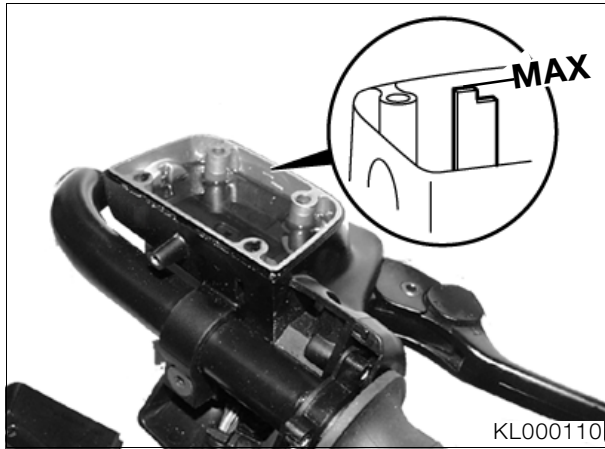


Note:

The punch mark (5) on the handlebar indicates the installed position.

- Loosen the clamping screw (6).
- Rotate the brake fluid reservoir so that the sealing surface on the reservoir cap is horizontal when viewed from the side.
- Tighten the clamping screw (6).

- Remove the reservoir cap together with the diaphragm.



- Check brake fluid level.
- Top up the fluid level and, if necessary, check the brake system for leaks if the brake fluid level is below the “MAX” mark with new brake pads.

Required level:..... MAX

- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

Wipe the rim of the reservoir, the rubber gaiter and the cover to remove brake fluid, and carefully re-assemble the components.

- Hand-tighten the screws securing the reservoir cap.
- Return the brake fluid reservoir to the marked position.



Note:

Take care with the routing of the wires and cables when fitting the handlebar trim.

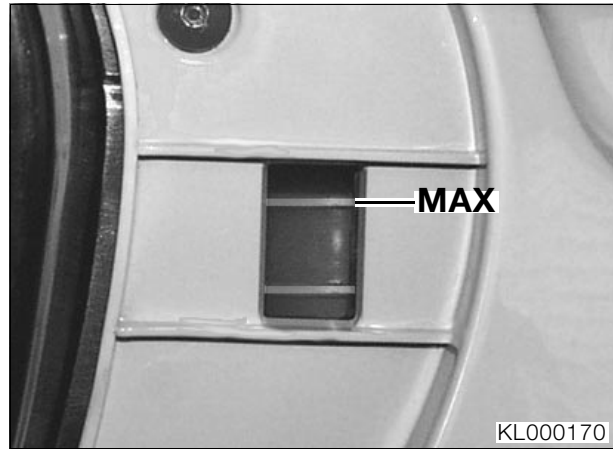


Tightening torque:

Clamping screw 5 Nm
Trim panels 2 Nm

Rear brake

- Place motorcycle on its centre stand.
- Open the right-hand side case.



Caution:

The fluid level in the brake fluid reservoir must be at the “MAX” mark with new brake pads.

Read off the level of brake fluid in the reservoir on the inspection glass at the front of the case. You may need to use a torch to light up the reservoir from behind.

Required level:..... MAX

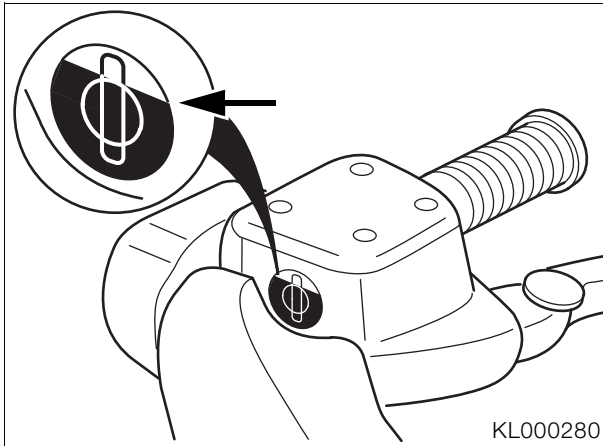
Checking clutch fluid level

- Place the motorcycle on its centre stand so that it is level.
- Turn the handlebars to full right lock.



Note:

The level of fluid in the expansion tank rises as the clutch lining wears.



- Check the level of clutch fluid at the inspection glass.



Warning:

Safe operation of the clutch is not guaranteed if the fluid level is below the centre of the inspection glass.

- Do not permit the clutch fluid to drop below the level for initial filling (see arrow); if necessary, check clutch system for leaks.

Required level with new clutch lining:

.....Upper ring marking

Checking tyre pressures

- Check/correct tyre pressures.

Tyre pressures:

One-up..... front 2.5 bar (35.6 psi)
One-up..... rear 2.9 bar (41.2 psi)

Two-up front 2.5 bar (35.6 psi)
Two-up rear 2.9 bar (41.2 psi)

Two-up with luggage..... front 2.5 bar (35.6 psi)
Two-up with luggage..... rear 3.2 bar (46.4 psi)

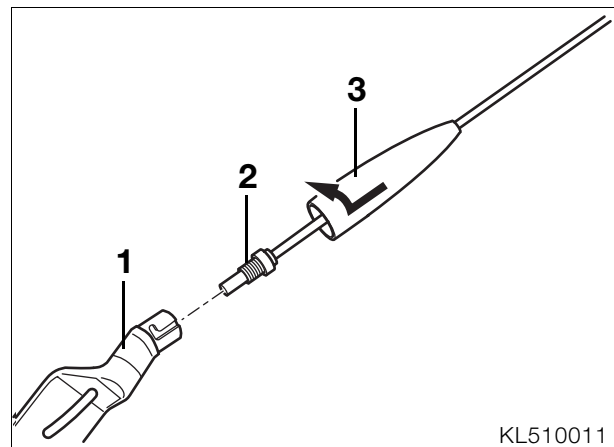
Checking tightness of rear wheel studs



Tightening torques:

Rear wheel studs 105 Nm

Installing the aerial

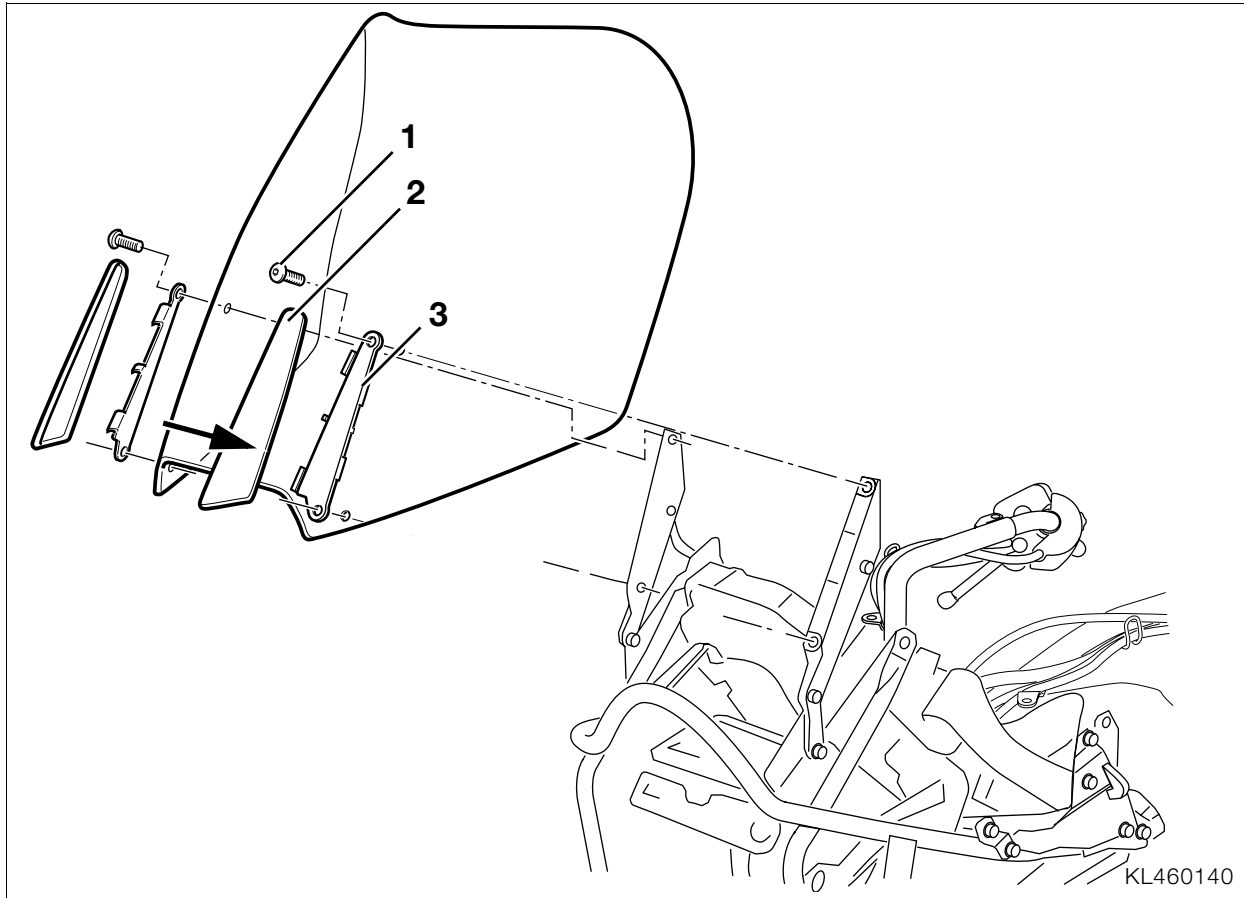


- Place cap (3) on aerial.
- Tighten stub aerial (2) to aerial bracket (1)
- Cap (3) has a bayonet fitting: turn it clockwise 1/8 of a turn to secure.



Tightening torques:

Nut, stub aerial 3 Nm



Installing the windscreen

- Slightly raise the windscreen linkage.
- Install windscreen and retaining plate (3).
- Tighten the four screws (1) (micro-encapsulated).



Note:

It may be necessary to bend the inner clips (2) to ensure that the plate retains the windscreen properly.

Installing the windscreen cover

- Clip the windscreen cover (2) from the outside (arrow) inwards.



Tightening torques:

Windscreen to windscreen adjuster 2 Nm

Checking and adjusting the motorcycle

Checking the function of side stand contact switch

- Switch off the engine.
- Place motorcycle on its centre stand.
- Select a gear and switch on the ignition.
 - Temperature gauge warning light lights up.
- Extend the side stand, observing the temperature gauge warning lamp.
 - Temperature gauge warning light goes out (engine control unit switches off).

Adjusting the seat

- Open the left-hand side case.
- Open the seat.
- Adjust the rider's position by means of the bracket.

Adjusting the top case

➡ See Installing the top case

Checking headlight beam angle, adjusting if necessary

Vertical adjustment

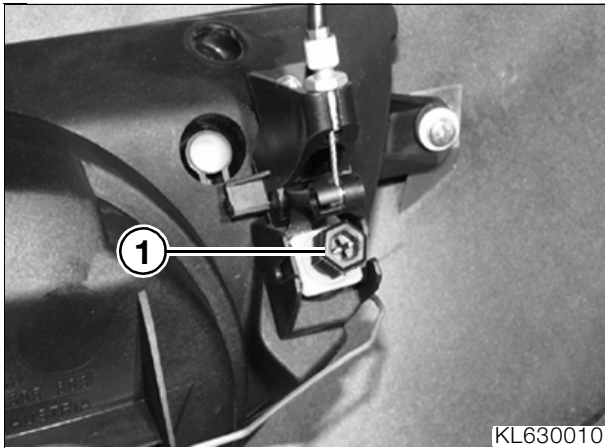
- Set suspension preload to "LOW" (turn counter-clockwise).



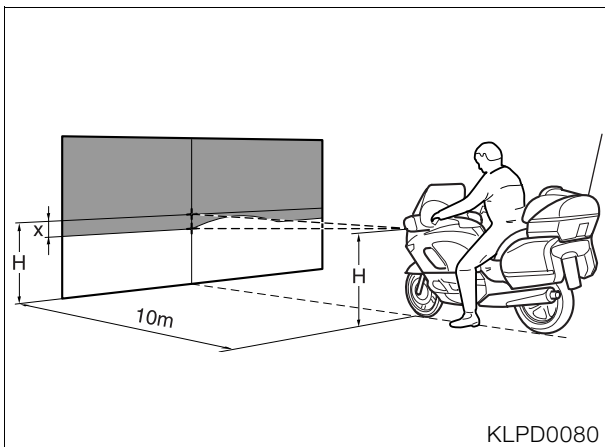
Note:

Make sure that the adjuster on the instrument-panel cover is at the "UP" position (turned counter-clockwise as far as it will go).

- If necessary, turn the adjuster on the instrument panel counter-clockwise as far as it will go.



- Using the headlight beam aiming device, manually adjust the beam throw by turning adjusting screw (1) beneath the upper fairing.



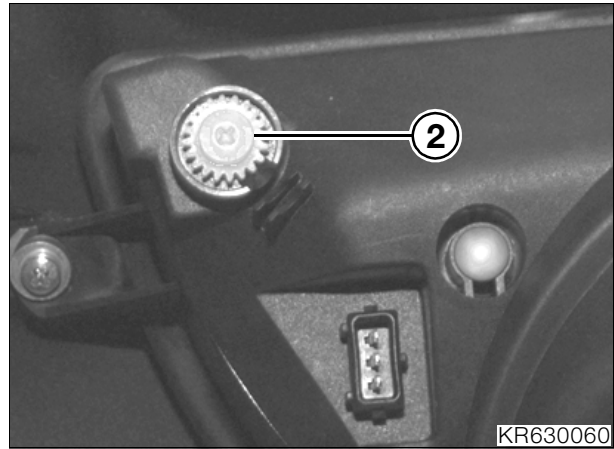
Setting for headlight beam angle adjuster

.....-10 cm (-3.94 in) at a distance of 10 m (32.8 ft)

Turned to left..... longer throw/higher
Turned to right shorter throw/lower

- Adjust the suspension preload.

Lateral adjustment



- If necessary, laterally adjust the headlight beam angle by turning the adjusting screw (2) at the top left of the headlight with the aid of a cross-recessed screwdriver.

Final inspection and function check

- Fill up with fuel.
 - Check engine oil when engine is cold, top up if necessary.
 - Check clutch.
 - Check gear shift action.
 - Check reverser.
 - Check handbrake and foot brake
 - Check lights and signalling equipment:
 - Front and rear parking lights
 - Low and high headlight beams, headlight flasher
 - Brake light (check front brake and rear brake separately)
 - Turn signals left/right
 - Hazard warning flashers
 - Horn
 - Telltale and warning lights
 - Instrument lighting
 - Instruments
 - Cockpit lighting
 - Case lighting.
 - ABS: perform starting test. Both ABS warning lamps must go out when the motorcycle is travelling at speeds over 5 km/h (3 mile/h).
 - Radio and remote control front/rear.
 - Check optional extras, as applicable:
 - Cruise control
 - On-board computer
 - CD changer
 - Seat heating.
 - Trial run if necessary
-
- Place documentation and engine oil filler funnels in the compartment in the top case lid.
 - See “Inspecting motorcycle for damage” if anything is not in order.
 - Confirm pre-delivery check in Service and Technical Booklet.

Final cleaning

- Clean the motorcycle.



Note:

Do not use a steam or high-pressure water jet. The high steam or water pressure could damage seals, the hydraulic system or electrical components.



Key to maintenance intervals

Maintenance intervals consist of the first Inspection (after the first 1000 km/600 miles), the BMW Service, BMW Inspection and BMW Annual Service.

Inspection 1000 km/600 miles

BMW Running-in Check after the first 1000 km/600 miles.

BMW Service

After the first 10,000 km/6000 miles and each additional 20,000 km/12,000 miles (at 18,000 miles ... 30,000 miles ... 42,000 miles).

BMW Inspection

After the first 20,000 km/12,000 miles and each additional 20,000 km/12,000 miles (at 24,000 miles ... 36,000 miles ... 48,000 miles).

BMW Annual Service

Certain maintenance tasks depend on elapsed time as well as the distance the bike has covered. They should therefore be carried out at least once a year (e.g. changing brake fluid).

If these tasks cannot be carried out during a Service or an Inspection, an Annual Service must be performed.

In this Workshop Manual, the individual maintenance intervals are shown by the following codes:

- Inspection at 1000 km (600 miles)..... **I**
- BMW Service at 10,000 km (6,000 miles)..... **II**
- BMW Inspection at 20,000 km (12,000 miles) .. **III**
- BMW Annual Service..... **IV**

General instructions

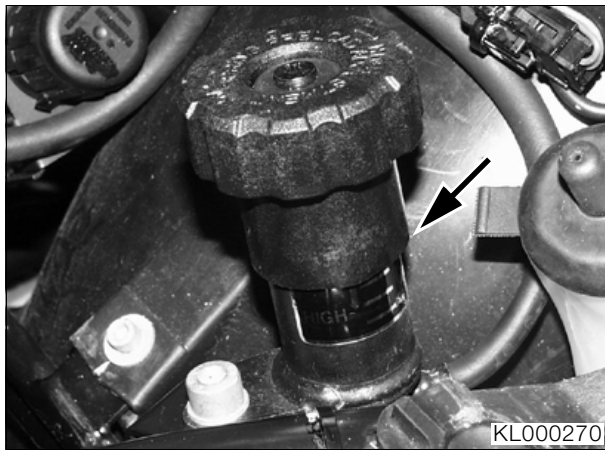
Pushing the motorcycle onto a workshop platform



Warning:

The springs securing the side stand in position can catch as you are pushing the motorcycle onto a workshop platform. This could cause damage to the motorcycle and the workshop platform, or the motorcycle could topple to the side opposite the side stand.

- Lift the seat at the front.



- Note the spring preload setting of the adjustment wheel (see arrow).
- Set the spring tension to High.
- Push the motorcycle carefully onto the workshop platform, tilting it as little as possible.
- Do the same when pushing it off the workshop platform.
- Return the spring preload to its original setting.

High idle speed

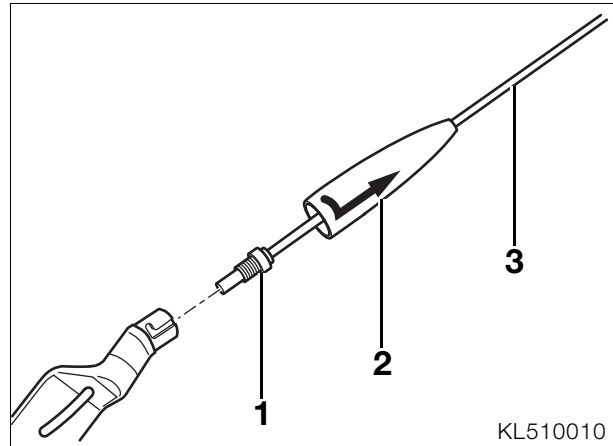


Note:

The idle speed cannot be adjusted in the workshop. The idle speed is controlled by the Motronic system.

- Normal idle speed 950 rpm.
- Engine speed raised to 1500 rpm by the Motronic system when the reverser is activated.
- Engine speed raised to approximately 1150 rpm by the Motronic system if battery voltage is low (battery voltage less than 11.5 volts).

Removing the aerial



Caution:

Take care not to damage the cap when removing.

- Turn the bayonet lock cap (2) 1/8 of a turn and remove.
- Release the nut (1).
- Remove the stub aerial (3).



Tightening torques:

Nut, stub aerial..... 3 Nm

Reading the fault code memory with the MoDiTeC

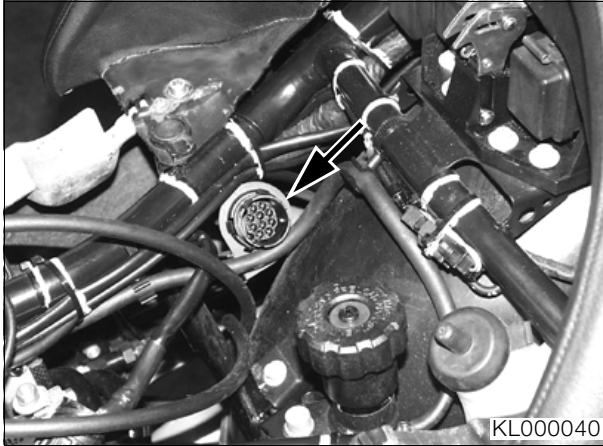
(Inspections I, II, III and IV)



Note:

Loss of power to the Motronic control unit, e.g. as a result of the battery being disconnected, deletes all entries (e.g. faults, adaptations) in the memory.

- Lift the seat at the front.



- Unclip the diagnosis plug (arrow).
- Connect the diagnosis unit to the diagnosis plug (arrow).
- Read out the fault memory.
- Carry out repairs as necessary

Checking throttle cable play, adjusting if necessary

(Inspections I and III)

- Open the throttle twist grip fully at different handlebar positions and then release.
- Turn the handlebars to full left lock.

Models without cruise control

- Preset throttle cable play with the engine cold to 1.5 mm (0.06 in).



Warning:

Observe the hazard avoidance instructions for running internal combustion engines in enclosed spaces.

- Warm up the engine to its normal operating temperature (radiator fan starts to run).
- Adjust throttle cable play to 0.5 mm (0.02 in).

Setting:

Initial throttle cable play setting

(engine cold) 1.5 mm (0.06 in)
Throttle cable play (engine warm).. 0.5 mm (0.02 in)

Models with cruise control

Throttle-opener cable, throttle-closer cable



Note:

The throttle twist grip must not be tight against the stop on the handgrip in the idling position. It must be possible to turn it a further 10 ° in the close direction against a slight spring force. This actuates the cruise-control system switch on the throttle valve. The throttle twist grip has to be turned relative to the throttle-body shaft if this extra rotation is not possible.

- Remove the left side section of the fairing.



Caution:

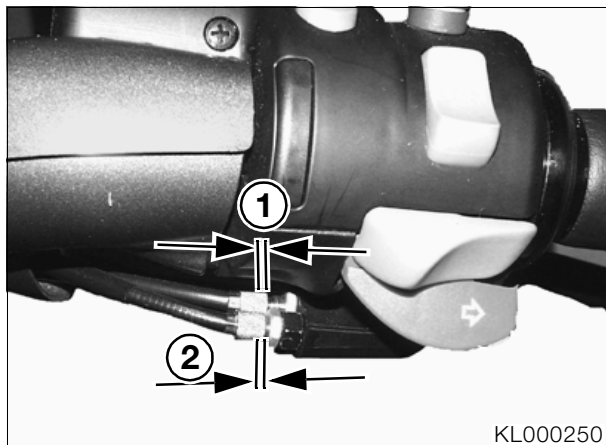
Make sure the cables do not slip out of the adjusting screws as this could cause damage to the cables.

- Preset the play of both cables at the throttle twist grip to 4 ... 5 mm (0.16 ... 0.20 in) with the engine cold.

 **Warning:**

Observe the hazard avoidance instructions for running internal combustion engines in enclosed spaces.

- Warm up the engine to its normal operating temperature; radiator fan starts to run.

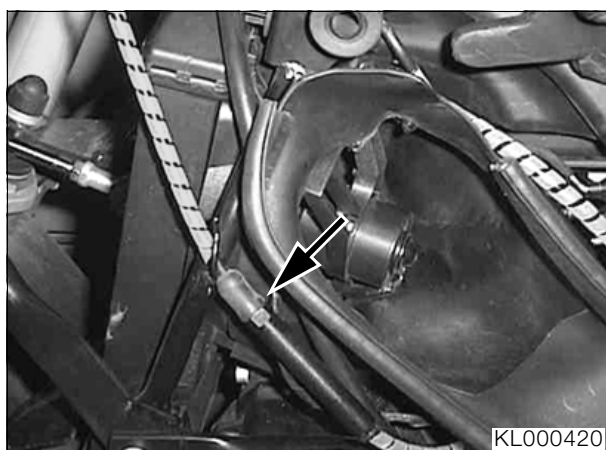


- Reduce play of throttle opener cable (1) to 3 mm ... 4 mm (0.12 in ... 0.16 in).
- Turn throttle twist grip just enough to take up play at throttle opener cable and adjust play of throttle closer cable (2) to 1 mm (0.04 in).

Settings:

Initial setting
(engine cold).....4 mm ... 5 mm (0.16 in ... 0.20 in)
Total play of both cables
at throttle twist grip (engine
warm) 1 mm ... 1.5 mm (0.04 in ... 0.06 in)

Cruise-control system cable



- Adjust play of the cruise control cable to 2 ... 3 mm (0.08 ... 0.12 in) using the adjusting screw on the clamping sleeve (arrow).

- Check the freedom of movement of the throttle twist grip. When released, the twistgrip must return to the closed position by itself and with an audible click.
- Check the routing of the cables if the throttle twist grip does not return to the closed position or if it is stiff.
- The play on the two cables can also be increased if the throttle twist grip is stiff. Do not exceed a total play of 1.5 mm (0.06 in) at the throttle twist grip.

Settings:

Cruise-control
system cable.....2 ... 3 mm (0.08 in ... 0.12 in)

Turning the throttle twist grip relative to the throttle valve shaft



Note:

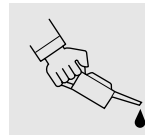
The throttle twist grip must be turned relative to the throttle valve shaft if the switch for the cruise control on the throttle valve is not functioning correctly.

Cruise control system does not switch off

- Increase opener cable play.
- Reduce closer cable play by the same amount.
- Check the operation of the throttle twist grip. When released, the twistgrip must return to the closed position by itself and with an audible click.

Cruise control system cannot be set, or continually shuts down

- Increase play on throttle opener cable to a maximum of 1.5 mm (0.06 in).
- Increase play further, if necessary, to check the operation of the microswitch and the actuating mechanism on the throttle valve rail.



Changing engine oil, replacing oil filter element

(Inspections I, II, III and IV)



Note:

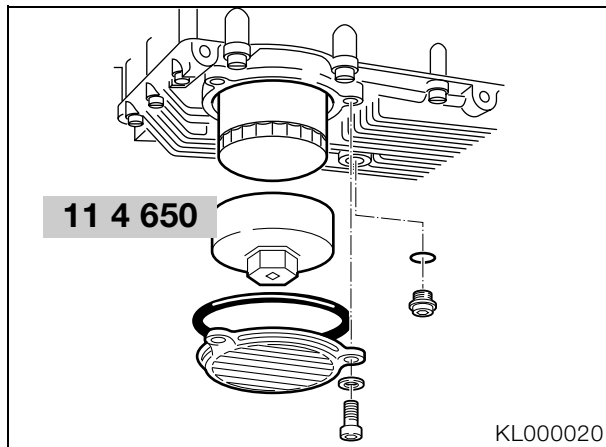
Replace oil and oil filter at least once a year. If the motorcycle is ridden only for short distances or at outside temperatures below 0 °C (32 °F), this task must be performed every 3 months or every 3,000 km (1,800 miles) at the latest.



Warning:

Observe the hazard avoidance instructions for running internal combustion engines in enclosed spaces.

- Drain the engine oil only when it is at normal operating temperature.
- Place the motorcycle on its centre stand so that it is level.



- Unscrew the oil filler plug.
- Remove the oil drain plug from the engine.
- Drain the oil completely.
- Unscrew oil filter cap.
- Release oil filter using special wrench, **BMW No. 11 4 650**
- Remove the oil filter.



Caution:

Dispose of used oil in an environmentally friendly manner.

- Install the oil drain plug with a new sealing ring and tighten.
- Coat the sealing ring for the new oil filter with oil.
- Screw in oil filter, noting instruction on filter.
- Replace the seal in the oil filter cover if necessary.
- Installation is the reverse of the removal procedure.
- Refill the oil system to the correct level.
- Screw in and tighten the oil filler plug.



Caution:

Never fill with engine oil above the MAX mark in the oil level inspection glass.

- Wait at least 10 minutes after a test run before checking the oil; place the motorcycle on its centre stand and check the oil level, topping up if necessary.
- | | |
|--------------------------|-----|
| Upper ring marking | MAX |
| Lower ring marking | MIN |



Note:

The centre of the inspection glass corresponds to the MAX fill level if the motorcycle is standing on its side stand.

Operating fluids:

Brand-name HD oil, API classification SF, SG or SH; suffix letters CD or CE are permitted; alternatively, brand-name HD oil of CCMC classification G4 or G5; suffix PD2 is permitted.
Do not add any additives or use longlife engine oil.

Engine oil capacity:

For filter change..... 3.6 l (6.34 Imp. pints/3.80 US quarts)
Quantity of oil between MIN and MAX marks..... 0.80 l (1.40 Imp. pints/0.85 US quarts)



Tightening torques:

Oil drain plug	30 Nm
Oil filter cap fastener	10 Nm
Oil filter.....	11 Nm

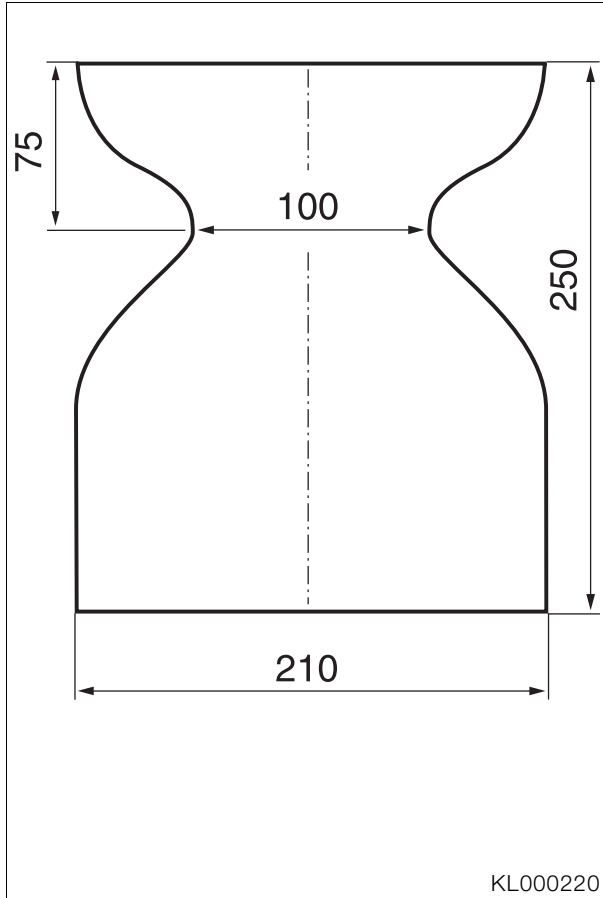
Changing gearbox oil

Change the gearbox oil every two years at the latest (Inspection III)



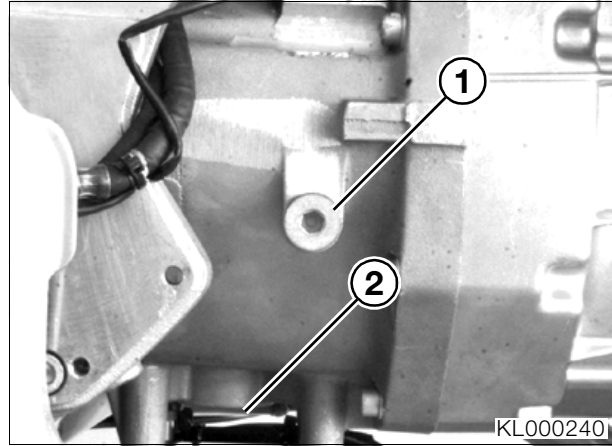
Note:

Only drain gearbox oil when the gearbox is at operating temperature to ensure that dirt and metal particles are flushed out during the oil change.

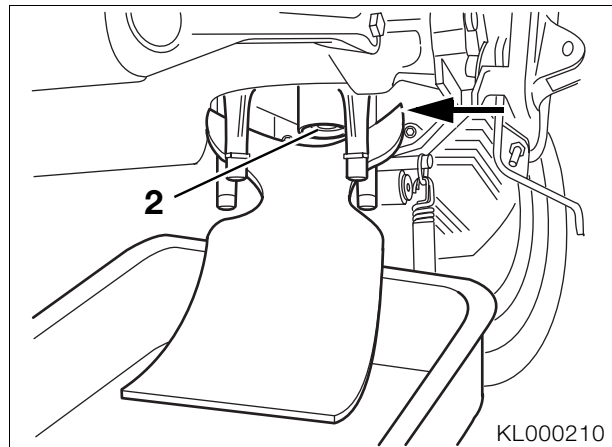


- Cut an oil drain mat from a rubber sheet as shown in the drawing above.

- Place the motorcycle on its centre stand so that it is level.
- Remove engine spoiler.
 - ➔ See Group 46
- Remove the front right footrest.
- Remove the exhaust bracket on the centre stand mounting bracket.
 - ➔ See Group 18, Removing exhaust system



- Unscrew the oil filler plug (1).



- Position the oil drip tray beneath the gearbox. Secure the oil drain mat (arrow) to the centre stand bracket beneath the oil drain plug (2).
- Remove the oil drain plug (2) and channel the oil into the oil drip tray using the drain mat.
- Drain the oil completely.

- Reinstall the oil drain plug.
- Fill with gearbox oil.
- Reinstall the oil filler plug with a new sealing ring.
- Install the exhaust bracket.

Caution:

Dispose of used oil in an environmentally friendly manner.

Tightening torques:

Oil drain plug.....	55 Nm
Oil filler plug	30 Nm
Foot rest mounting	21 Nm
Fastener exhaust mounting bracket to bracket.....	41 Nm
Exhaust bracket, centre (clean thread + Loctite 243).....	30 Nm
Fastener, exhaust bracket to exhaust.....	21 Nm

Quantities:

Initial filling...approx. 0.6 l (1.06 Imp. pint/0.63 US quarts)
Oil changesto the lower edge of the filler opening

Transmission oil grade:

Brand-name SAE 90 hypoid gear oil, API Class GL 5

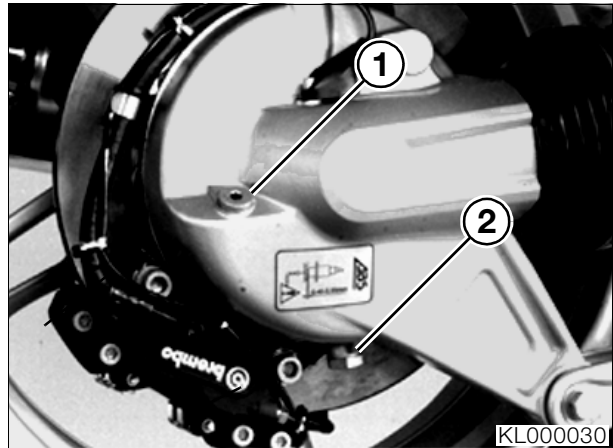
Changing the oil in the rear wheel drive

Change the oil in the rear wheel drive every two years at the latest (Inspections I and III)

Note:

Only drain the oil in the rear wheel drive when the rear wheel drive is warm to ensure that dirt and metal particles are flushed out during the oil change.

- Place the motorcycle on its centre stand so that it is level.



- Unscrew the oil filler plug (1).
- Remove the oil drain plug (2).
- Drain the oil completely.
- Install the oil drain plug (2) with a new sealing ring and tighten.
- Fill with rear-wheel drive oil.
- Screw the oil filler plug (1) in with a new sealing ring, and tighten.

Caution:

Dispose of used oil in an environmentally friendly manner.

Tightening torques:

Oil drain plug.....	23 Nm
Oil filler plug	23 Nm

Quantities:

Initial filling ..0.25 l (0.44 Imp. pints/0.26 US quarts)
Oil changes0.23 l (0.41 Imp. pints/0.24 US quarts)

Oil grade for rear wheel drive:

Brand-name hypoid gear oil, SAE 90, API class GL 5.

Brake pads/brake discs

Checking brake pads and discs for wear and replacing if necessary (Inspections II and III)

Checking brake pads for wear



Warning:

Never permit brake pads to wear past minimum permissible thickness.
Always replace pads as a complete set.

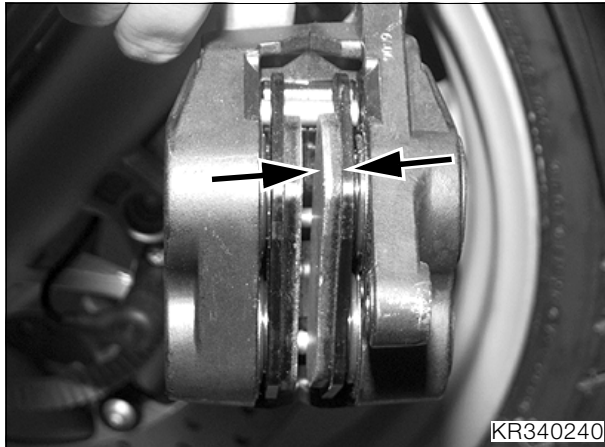
Front brake pads



Caution:

Do not scrape the wheel – mask it off if necessary.

- Remove the brake calliper.



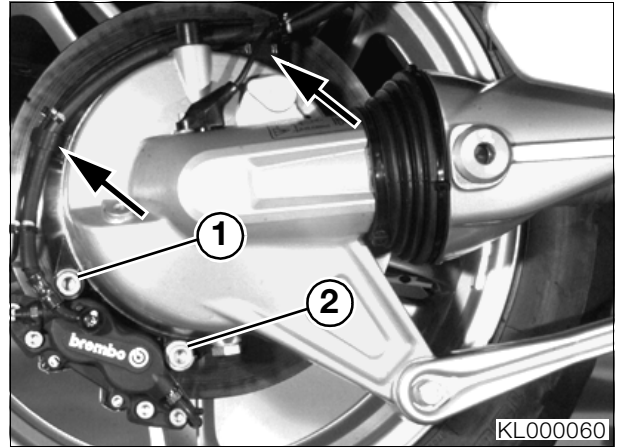
- Measure brake pad thickness (arrows).

Minimum pad thickness 1.0 mm (0.04 in)

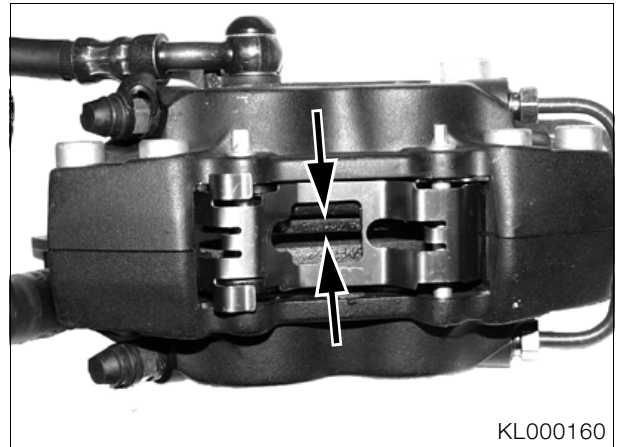
Tightening torques:

Brake calliper to fork tube 40 Nm

Rear brake pads



- Release the brake line from the clips (arrows) on the rear-wheel drive.
- Release fasteners (1, 2), remove brake calliper.



- Measure brake pad thickness (arrows).

Minimum pad thickness 1.0 mm (0.04 in)

Tightening torques:

Brake calliper to rear wheel drive 40 Nm

Replacing brake pads

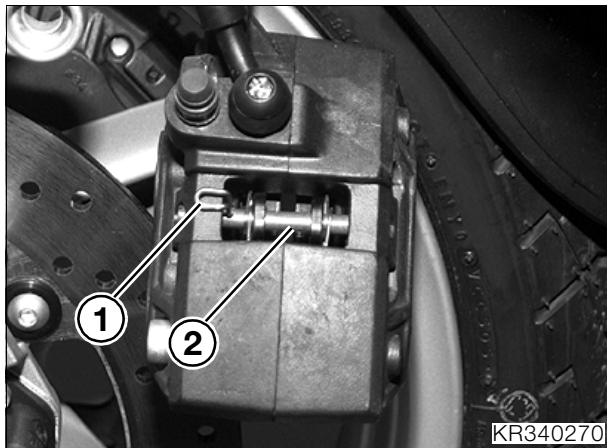
Front brake



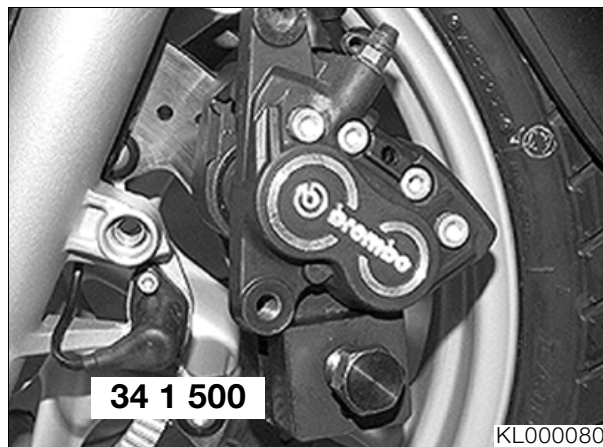
Caution:

Do not separate the two halves of the brake calliper. Do not scrape the wheel – mask it off if necessary.

- Remove the brake calliper.



- Remove the split-pin keeper (1) from retaining pin (2).
- Remove retaining pin (2).
- Remove brake pads by pulling downwards.



- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Before installing the brake calliper, force the pistons fully back with resetting tool, **BMW No. 34 1 500**.
- Check the function of the brake system.



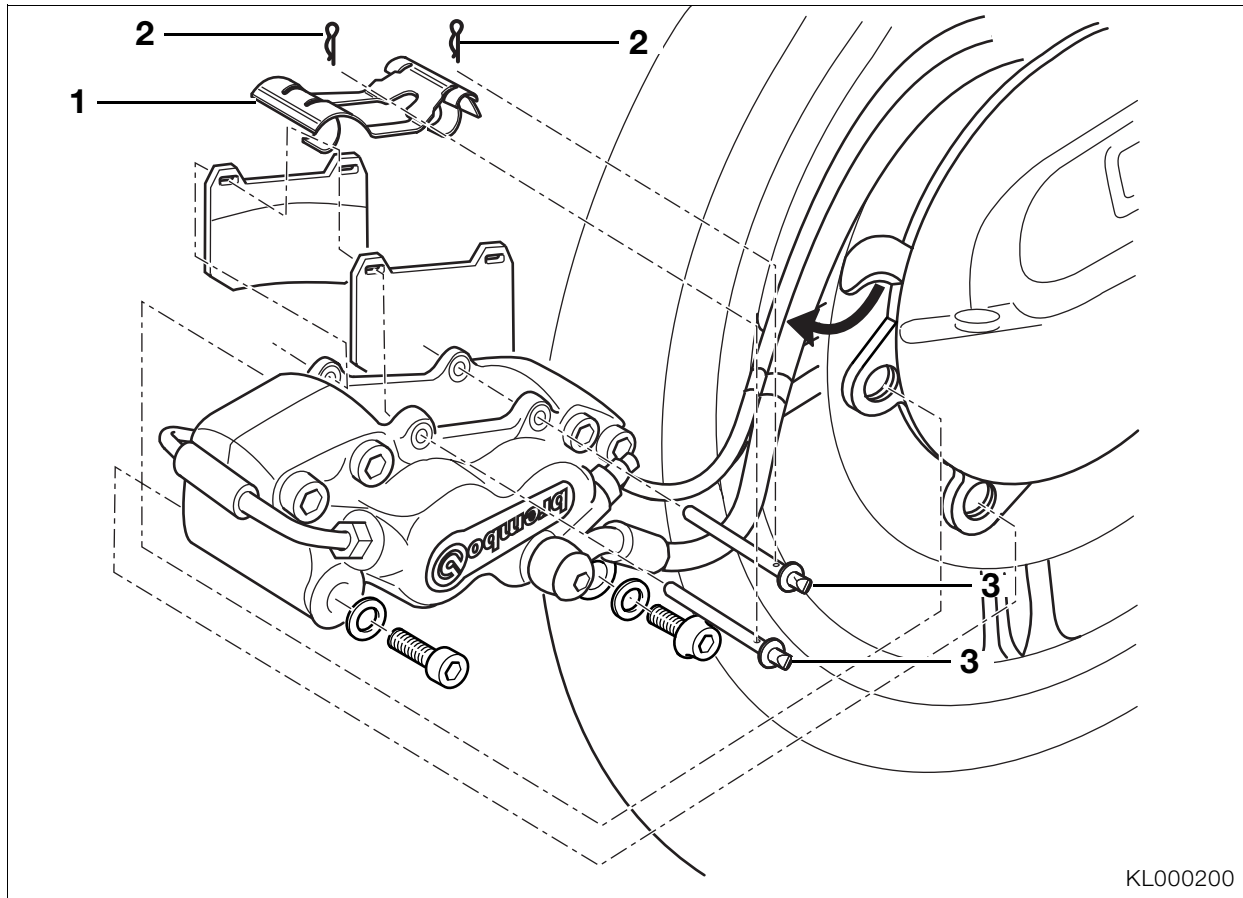
Caution:

The fluid level in the brake fluid reservoir must be at the "MAX" mark after the brake pads have been changed. It is not possible to check the maximum fill level at the inspection glass. See **Checking the front brake fluid level** for the procedure.



Tightening torque:

Brake calliper to fork tube 40 Nm



KL000200

Rear brake



Caution:

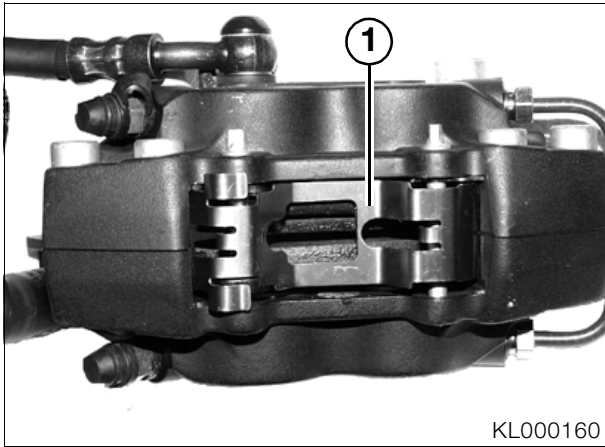
Do not separate the two halves of the brake calliper.

- Remove the brake calliper.
- Remove the split-pin keepers (2) from retaining pins (3).
- Pull out the retaining pins (3) and remove the retaining plate (1).
- Remove brake pads.



KL000090

- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Before installing the brake calliper, force the pistons fully back with resetting tool, **BMW No. 34 1 500**.



KL000160

- Note the installed position of the retaining plate (1).
- Check the function of the brake system.

⚠ Caution:

The fluid level in the brake fluid reservoir must be at the MAX mark after the brake pads have been changed.

🔧 Tightening torque:

Brake calliper to rear wheel drive 40 Nm

Checking the brake discs

- Carefully check the brake discs for cracking, damage, deformation and scoring.



KL000070

- Measure the thickness of the brake discs at several points with a calliper gauge.

Brake disc wear limits

Front brake discs 4.5 mm (0.18 in)
 Rear brake disc 6.5 mm (0.26 in)

Checking the front/rear brake fluid level

(Inspections I, II and III)

Checking the front brake fluid level

⚠ Caution:

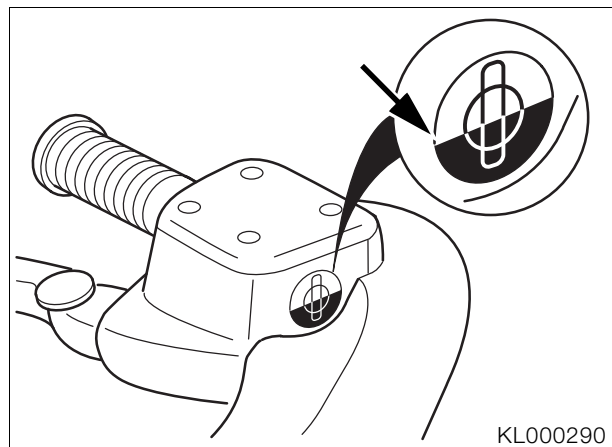
The fluid level in the brake fluid reservoir must be at the MAX mark with new brake pads. It is not possible to check the maximum fill level at the inspection glass. The fluid level must be checked by opening the brake fluid reservoir.

- Place motorcycle on its centre stand.
- Turn the handlebars to full left lock.

📄 Note:

The volume of brake fluid (MIN/MAX) is sufficient for pad thicknesses from new to the wear limit. It is not normally necessary to top up the fluid to compensate for pad wear.

A level below MIN indicates the possibility of other faults.



KL000290

- Check the level of brake fluid on the inspection glass.

Centre of the inspection glass (arrow) MIN if brake pads are worn to the wear limit

🚫 Warning:

Never permit the brake fluid level to fall below the centre of the inspection glass (arrow). Otherwise, there is a danger that air will be sucked into the braking system as the brakes are operated.

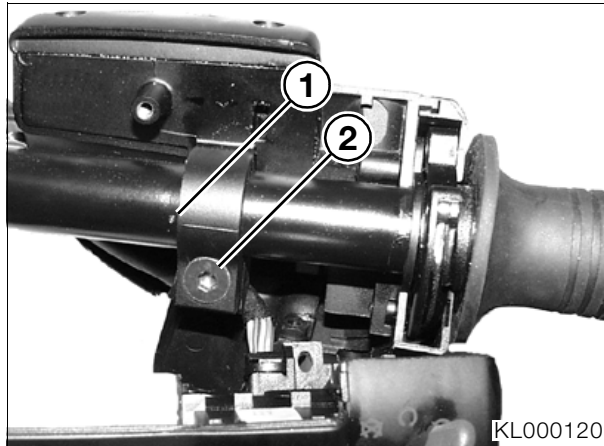
Checking the fluid level with brake fluid reservoir open



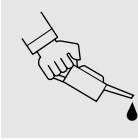
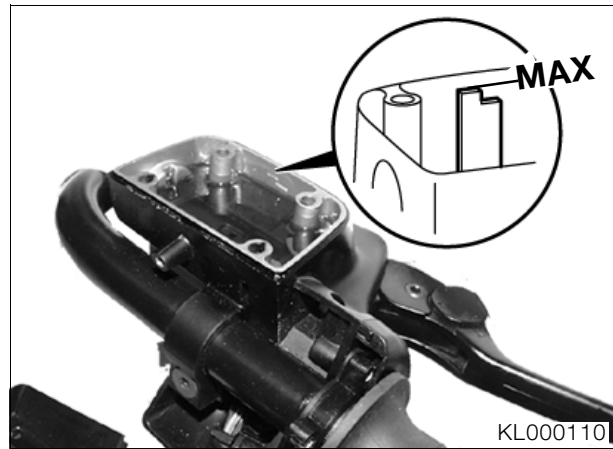
Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint.

- Place the motorcycle on its centre stand so that it is level.
- Remove the top and bottom right handlebar trim panels.
- Remove the combination switch.
- Turn the handlebars to full left lock.



- Loosen the clamping screw (2).
- Rotate the brake fitting so that the sealing surface on the reservoir cap is horizontal when viewed from the side.
- Tighten the clamping screw (2).
- Remove the reservoir cap together with the diaphragm.



Required level with new brake pads

..... MAX mark on the reservoir

- Top up the fluid level and, if necessary, check the brake system for leaks if the brake fluid level is below the MAX mark with new brake pads.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

Wipe the rim of the reservoir, the rubber gaiter and the cap to remove brake fluid, and carefully re-assemble the components.

- Hand-tighten the screws securing the reservoir cap.
- Return the brake fitting to the marked position (1).



Note:

Take care with the routing of the wires and cables when fitting the handlebar trim.

Brake fluid gradeDOT 4



Tightening torque:

Clamping screw 5 Nm

Checking the rear brake fluid level

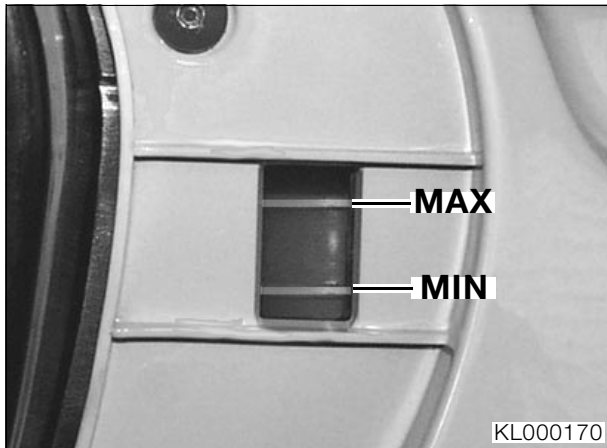
(Inspections I, II and III)



Note:

The volume of brake fluid (MIN/MAX) is sufficient for pad thicknesses from new to the wear limit. It is not normally necessary to add fluid to compensate for pad wear. A level below MIN indicates the possibility of other faults.

- Place motorcycle on its centre stand.
- Open the right-hand side case.



Caution:

The fluid level in the brake fluid reservoir must be at the MAX mark with new brake pads.

- Read off the level of brake fluid in the reservoir. You may need to use a torch to light up the reservoir from behind.
- Do not permit the brake fluid to drop below the MIN level.
- Check the brake system for leaks if the brake fluid level is below the MAX mark with new brake pads.

Required level..... MAX

Brake fluid gradeDOT 4

Checking operation of brake system and freedom from leaks, repairing/ replacing if necessary

(Inspection III)

- Check all brake lines for damage and correct positioning.
- Wipe down all threaded unions on the brake lines and check them.
- Apply the brake hard and hold on in this position for a short time.
- After this, inspect the brake lines for leaks.



Warning:

Immediately replace defective lines and threaded unions in the brake system.

Changing brake fluid and bleeding brake system

Change the brake fluid once a year at the latest (Inspection IV)



Note:

This description applies for the brake filling and bleeding unit with extraction of the brake fluid by a partial vacuum at the brake calliper. If other devices are used, comply with their manufacturers' instructions.

Front brake

- Place the motorcycle on its centre stand so that it is level.

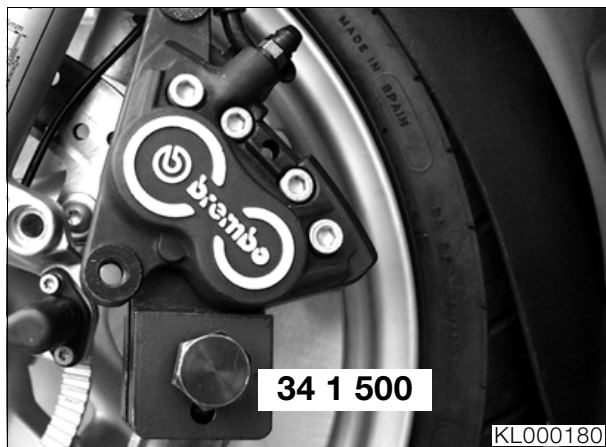
Forcing back the brake pistons



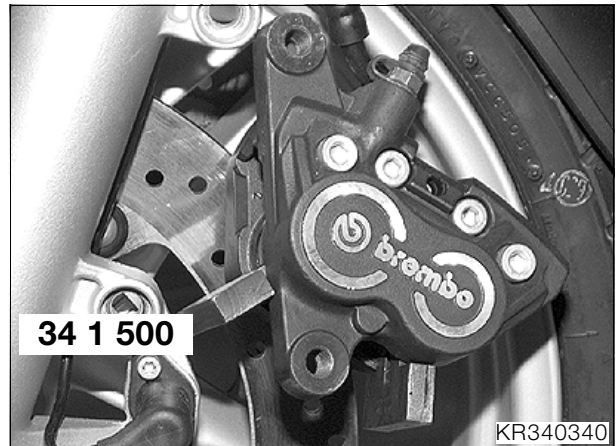
Caution:

Do not scrape the wheel – mask it off if necessary.

- Remove the brake calliper.
- Remove the brake pads.



- Using resetting tool, **BMW No. 34 1 500**, force the pistons fully back.



- Take out the resetting tool and insert spacer, **BMW No. 34 1 520**, in its place.
- Press the pistons back in the second brake calliper but do not remove the resetting tool.
- Fill and bleed the front brake circuit.
- Installation is the reverse of the removal procedure.



Tightening torque:

Brake calliper to fork tube 40 Nm

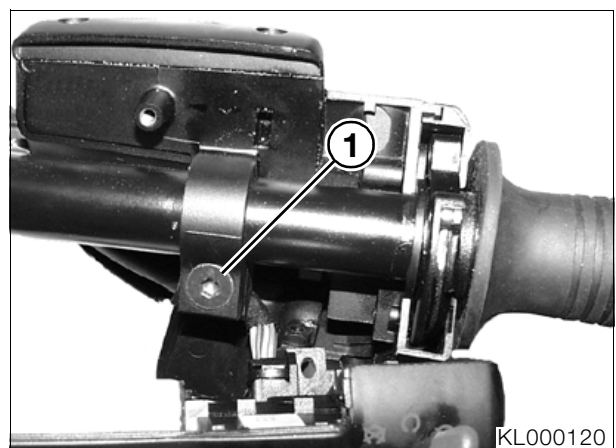
Opening the brake fluid reservoir



Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint.

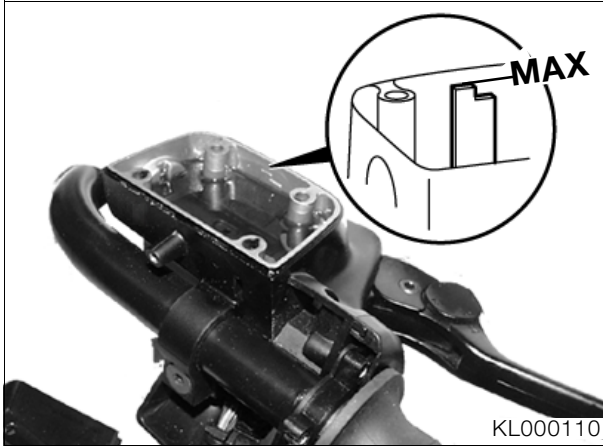
- Remove the top and bottom right handlebar trim panels.
- Remove the combination switch.
- Turn the handlebars to full left lock.



- Loosen the clamping screw (1).



- Rotate the brake fitting so that the sealing surface on the reservoir cap is horizontal when viewed from the side.
- Tighten the clamping screw.
- Remove the reservoir cap together with the diaphragm.



! Caution:

When adding brake fluid, do not allow it to enter the holes for the reservoir cap screws.

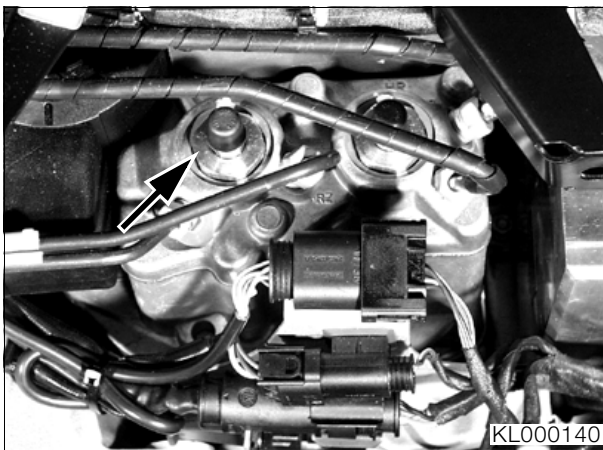
- Add brake fluid up to the MAX mark (arrow).

Bleeding the front brake pressure modulator

📖 Note:

It is only necessary to bleed the pressure modulator if the brake system has been opened or drained.

- Remove the left-hand battery cover.
- ➡See Group 46



- Connect the brake bleeding device to the bleed screw on the pressure modulator for the **front brakes** (arrow).

! Caution:

During the bleeding process, do not permit the brake fluid level to drop below the “MIN” mark, or else air will be drawn into the brake system. Bleed the system again if this happens.

- Open the bleed screw by half a turn.
- Draw off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.

Brake fluid gradeDOT 4

🔧 Tightening torques:

Bleed screw 10 Nm

Bleeding the left brake calliper

- Connect the brake bleeding device to the **left** brake calliper.
- Open the bleed screw by half a turn.

! Caution:

During the bleeding process, do not permit the brake fluid level to drop below the MIN mark, or else air will be drawn into the brake system. Bleed the system again if this happens.

- Draw off brake fluid until it emerges clear and free from air bubbles.
- Tighten the bleed screw.

Brake fluid gradeDOT 4

🔧 Tightening torques:

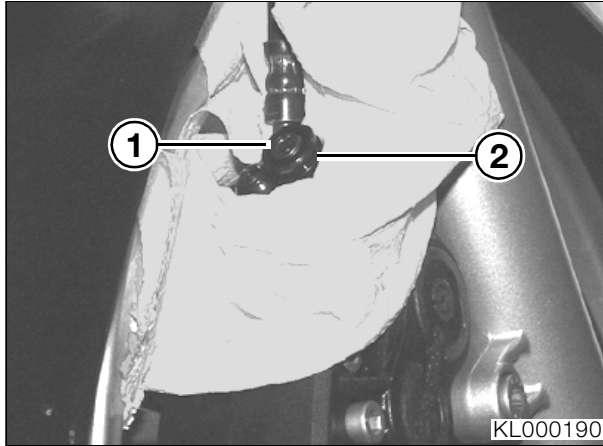
Bleed screw 10 Nm

Bleeding the front right brake calliper



Note:

Remove the grub screw from the filler adapter and install a bleed screw instead so that the brakes can be bled.



- Wrap a cloth around filler adapter (2) of the right brake calliper.
- Remove socket-head grub screw (1) from the filler adapter (2).



Caution:

Installing the bleed screw opens the valve in filler adapter (2), and the flow of brake fluid starts immediately. It is therefore important to connect the brake bleeding device to the bleed screw **before** installing the bleed screw in the filler adapter.

- Connect the brake bleeding device to the bleed screw.
- With brake bleeding device connected, install the bleed screw in the port in filler adapter (2) and fully tighten it (valve in filter adapter closes).
- Open the bleed screw by half a turn (to open the valve).



Caution:

When adding brake fluid, do not allow it to enter the holes for the reservoir cap screws. During the bleeding process, do not permit the brake fluid level to drop below the "MIN" mark, or else air will be drawn into the brake system. Bleed the system again if this happens.

- Draw off brake fluid until it emerges clear and free from air bubbles.



Warning:

The motorcycle must not be ridden without the grub screw screwed into the filling port. Take care when removing the bleed screw and installing the grub screw: do not permit brake fluid to come into contact with the brake pads or other parts of the motorcycle.

- Remove the bleed screw.
- Disconnect the brake bleeding device from the bleed screw.
- Install socket-head grub screw (1) in filler adapter and tighten.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

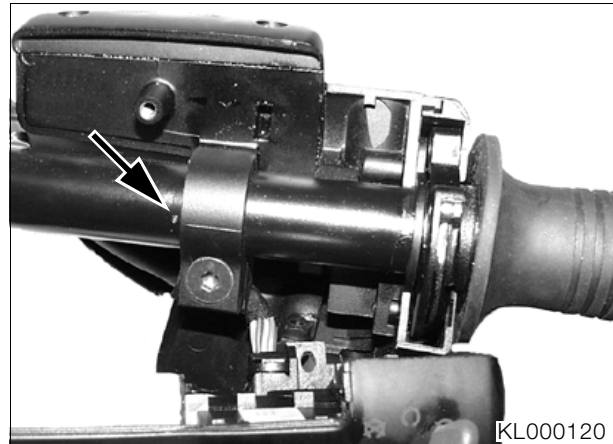
Wipe the rim of the reservoir, the rubber gaiter and the cover to remove brake fluid, and carefully re-assemble the components.

Brake fluid gradeDOT 4



Tightening torque:

Grub screw 10 Nm



- Return the brake fitting to the marked position (arrow).



Note:

Take care with the routing of the wires and cables when fitting the handlebar trim.

- Check the function of the brake system.



Tightening torques:

Clamping screw 5 Nm



Rear brake

- Place the motorcycle on its centre stand so that it is level.
- Remove the right-hand battery cover.
- ➔See Group 46
- Remove rear seat.

Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint.

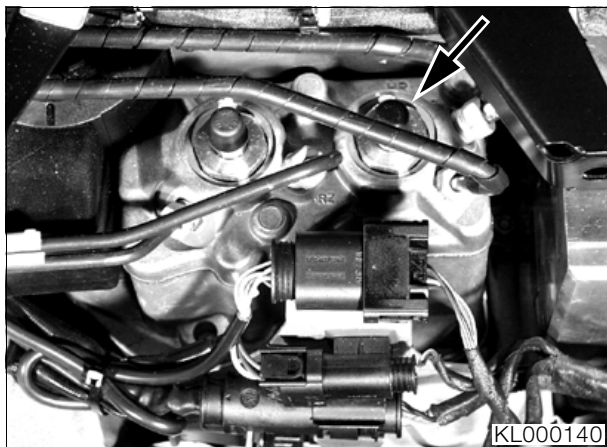
- Remove the lid of the brake fluid reservoir.
- Add brake fluid up to the MAX mark.

Bleeding the rear brake pressure modulator

Note:

It is only necessary to bleed the pressure modulator if the brake system has been opened or drained.

- Remove the left-hand battery cover.
- ➔See Group 46



- Connect the bleeding device to the pressure modulator for the **rear brake** (arrow).
- Open the bleed screw by half a turn.

Caution:

During the bleeding process, do not permit the brake fluid level to drop below the MIN mark, or else air will be drawn into the brake system. Bleed the system again if this happens.

- Draw off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.

Brake fluid gradeDOT 4

Tightening torque:

Bleed screw 10 Nm

Forcing back the brake pistons

Caution:

Do not scrape the wheel – mask it off if necessary.

- Take off the brake calliper.
- Remove the brake pads.

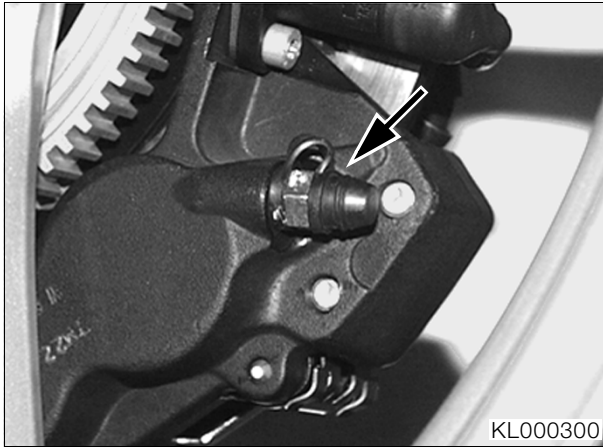


- Using resetting tool, **BMW No. 34 1 500**, force the pistons fully back.
- Fill and bleed the rear brake circuit.
- Installation is the reverse of the removal procedure.

Tightening torque:

Brake calliper to rear wheel drive 40 Nm

Bleeding the brake calliper



- Connect the brake bleeding device to the brake calliper on the **rim side** (arrow).
- Open the bleed screw by half a turn.

Caution:

During the bleeding process, do not permit the brake fluid level to drop below the MIN mark, or else air will be drawn into the brake system. Bleed the system again if this happens.

- Draw off brake fluid until it emerges clear and free from air bubbles.
- Close the bleed screw.



- Bleed the brake calliper on the **drive side**, using an extension if necessary (arrow).
- Hand-tighten the lid of the brake fluid reservoir.
- Check the function of the brake system.

Caution:

Dispose of old brake fluid in an environmentally friendly manner.

Brake fluid gradeDOT 4

Tightening torque:

Bleed screw 10 Nm



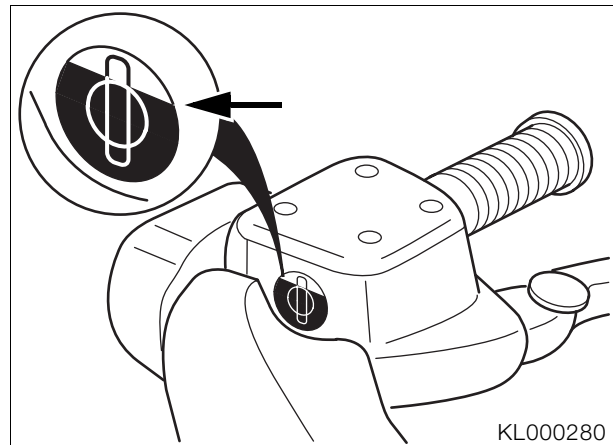
Checking clutch fluid level

(Inspections I, II and III)

- Place the motorcycle on its centre stand so that it is level.
- Turn the handlebars to full right lock.

Note:

The level of fluid in the expansion tank rises as the clutch lining wears.



- Check the level of clutch fluid on the inspection glass.

Warning:

Safe operation of the clutch is not guaranteed if the fluid level is below the centre of the inspection glass.

- Do not permit the clutch fluid to drop below the level for initial filling (see arrow); if necessary, check clutch system for leaks.

Required level with new clutch lining:

..... Upper ring marking

Changing the clutch fluid (every 40,000 km/24,000 miles)

Change the clutch fluid every 2 years at the latest
(Inspection III)



Note:

This description applies for the brake filling and bleeding unit with extraction of the brake fluid by a partial vacuum at the brake calliper. If other devices are used, comply with their manufacturers' instructions.

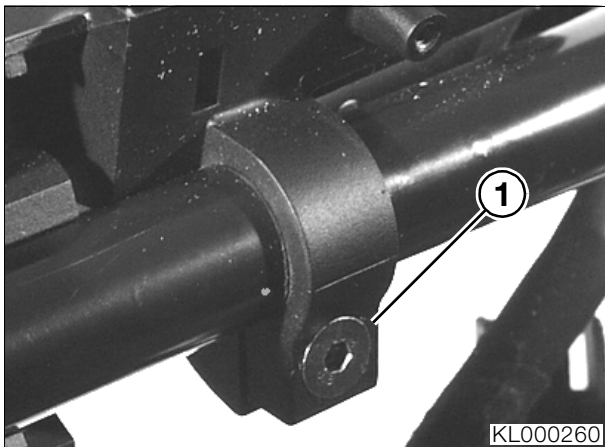
- Place the motorcycle on its centre stand so that it is level.
- Remove the right skirt section.



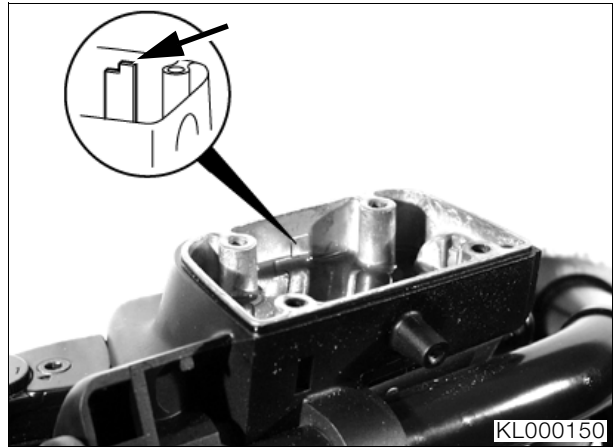
Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint.

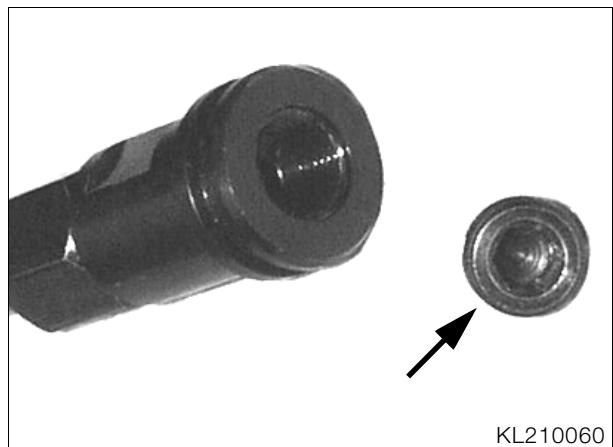
- Remove the top and bottom left handlebar trim panels.
- Remove the combination switch and radio remote control.
- Turn the handlebars to full right lock.



- Loosen the clamping screw (1).
- Rotate the clutch fitting so that the sealing surface on the reservoir cap is horizontal when viewed from the side.
- Tighten the clamping screw.
- Remove the reservoir cap together with the diaphragm.



- Add brake fluid up to the MAX mark (arrow).
- Remove the bleed hose for the clutch fluid from the right-hand skirt bracket.
- Remove the protective hose from the filler adapter.



- Remove socket-head grub screw (arrow) from the filling port.
- Install the bleed screw in the filler adapter.
- Connect the brake bleeding device to the bleed screw.
- Open the bleed screw by half a turn.

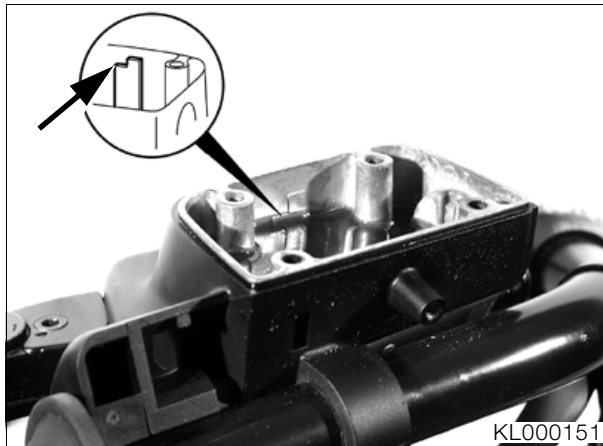
Caution:

During the bleeding process, do not permit the brake fluid level to drop below the MIN mark, or else air will be drawn into the brake system. Bleed the system again if this happens.

- Draw off brake fluid until it emerges clear and free from air bubbles.

Caution:

Dispose of old brake fluid in an environmentally friendly manner.



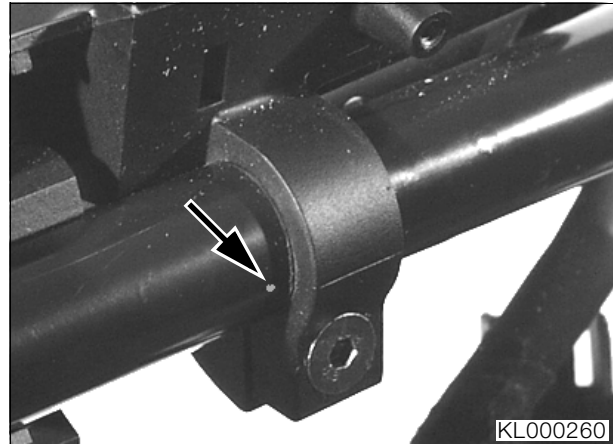
- Draw off brake fluid until level reaches the MIN mark (arrow) in the reservoir.
- Installation is the reverse of the removal procedure: pay particular attention to the following.

Warning:

The motorcycle must not be ridden without the grub screw screwed into the filling port.

- Remove the bleed screw; immediately wipe off brake fluid if it escapes when the adapter is removed.
- Install the socket-head grub screw in the filler adapter and tighten.

- Pull the protective hose over the filling port.
- Secure the bleed hose to the right skirt with a cable tie.



- Return the clutch fitting to the marked position (arrow).

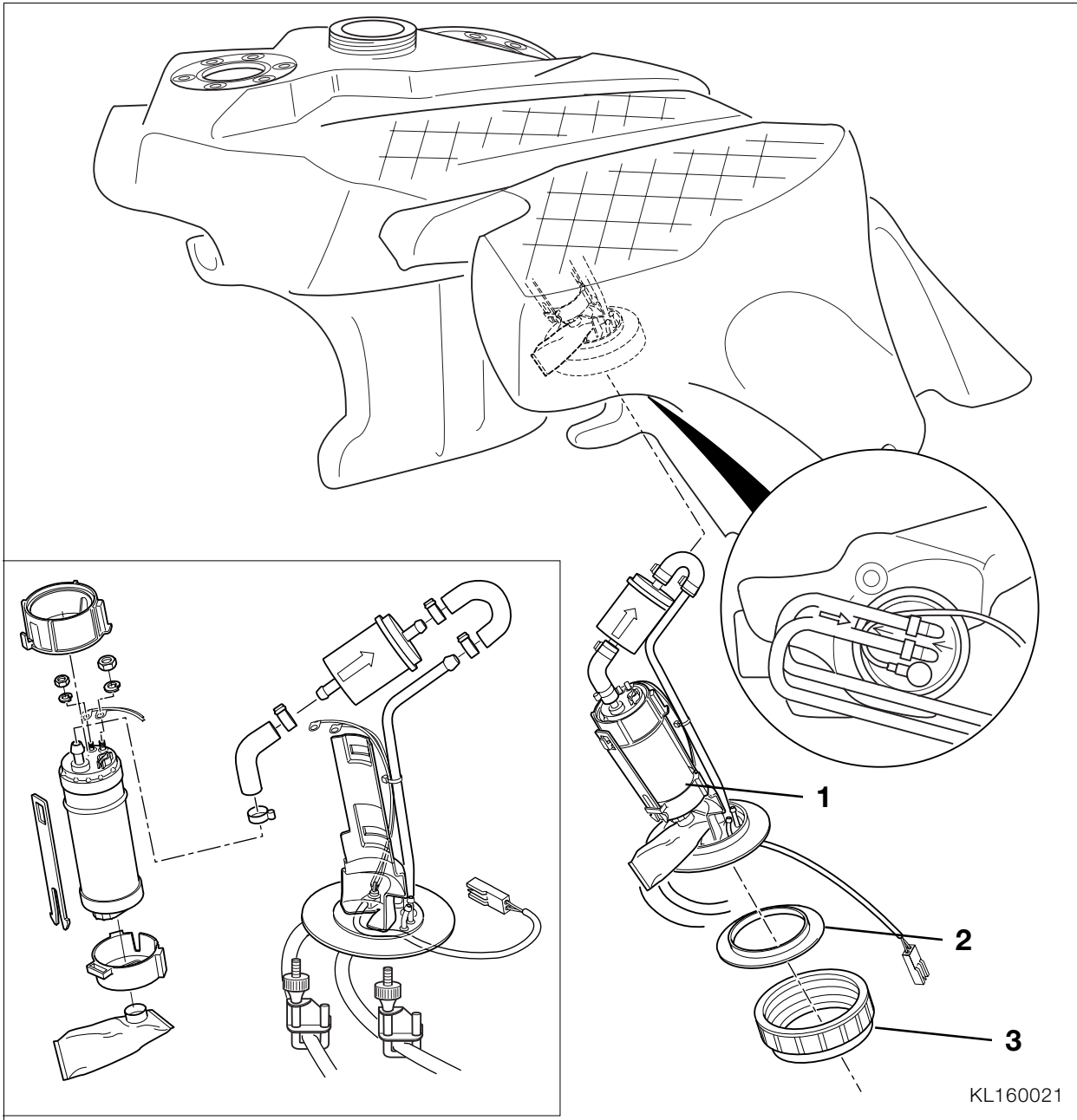
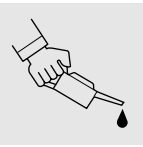
Note:

Take care with the routing of the wires and cables when fitting the handlebar trim.

Brake fluid gradeDOT 4

Tightening torque:

Grub screw 10 Nm
Clamping screw 5 Nm



KL160021

Replacing fuel filter (every 40,000 km/24,000 miles)

(Inspection III)



Note:

If the fuel is of poor quality, replace the fuel filter every 20,000 km (12,000 miles).

– Remove fuel tank.

➡See Group 16



Warning:

Comply with safety precautions when handling or working with fuel.

- Drain fuel tank.

Removing the fuel pump unit

- Release union nut (3) using wrench, **BMW No. 16 1 710**.
- Remove fuel-pump unit (1) with gasket (2).

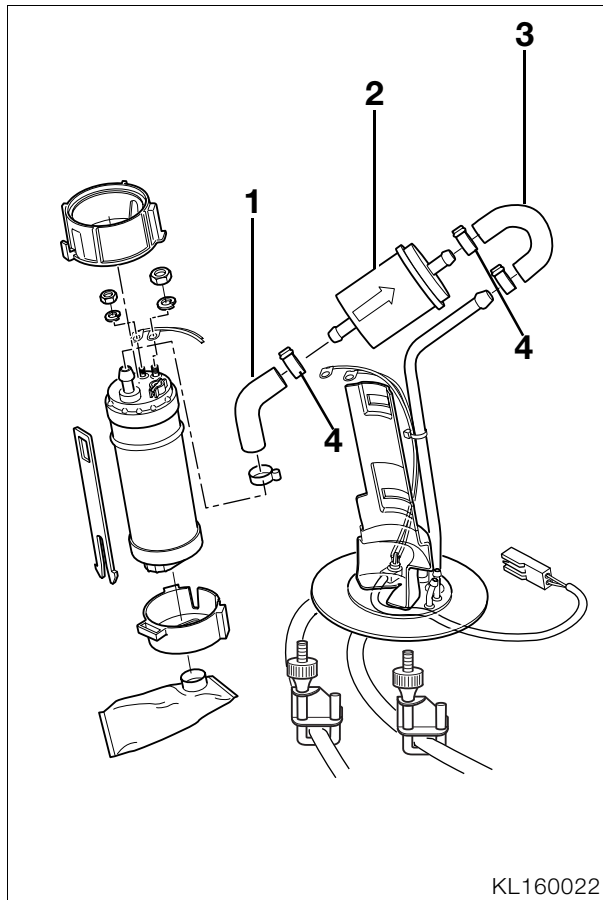
Removing and installing fuel filter

- Open the retainers (4).
- Disconnect fuel hoses (1, 3) from fuel filter (2).



Caution:

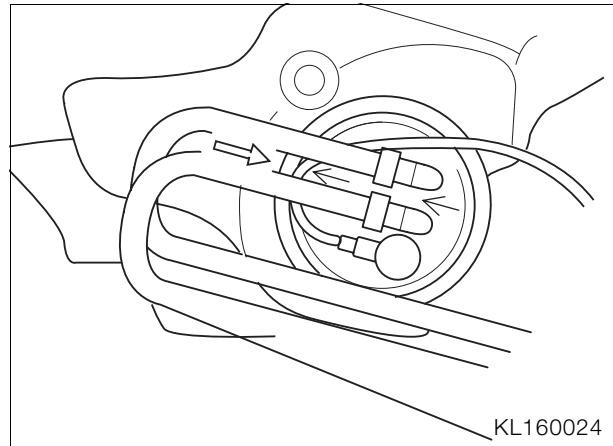
Note correct direction of flow through fuel filter.



- Connect fuel hoses (1, 3) to the new fuel filter (2).
- Close retainers (4) with pliers, **BMW No. 13 1 500.**

Installing the fuel-pump unit

- Install the fuel-pump unit complete with gasket in the fuel tank.



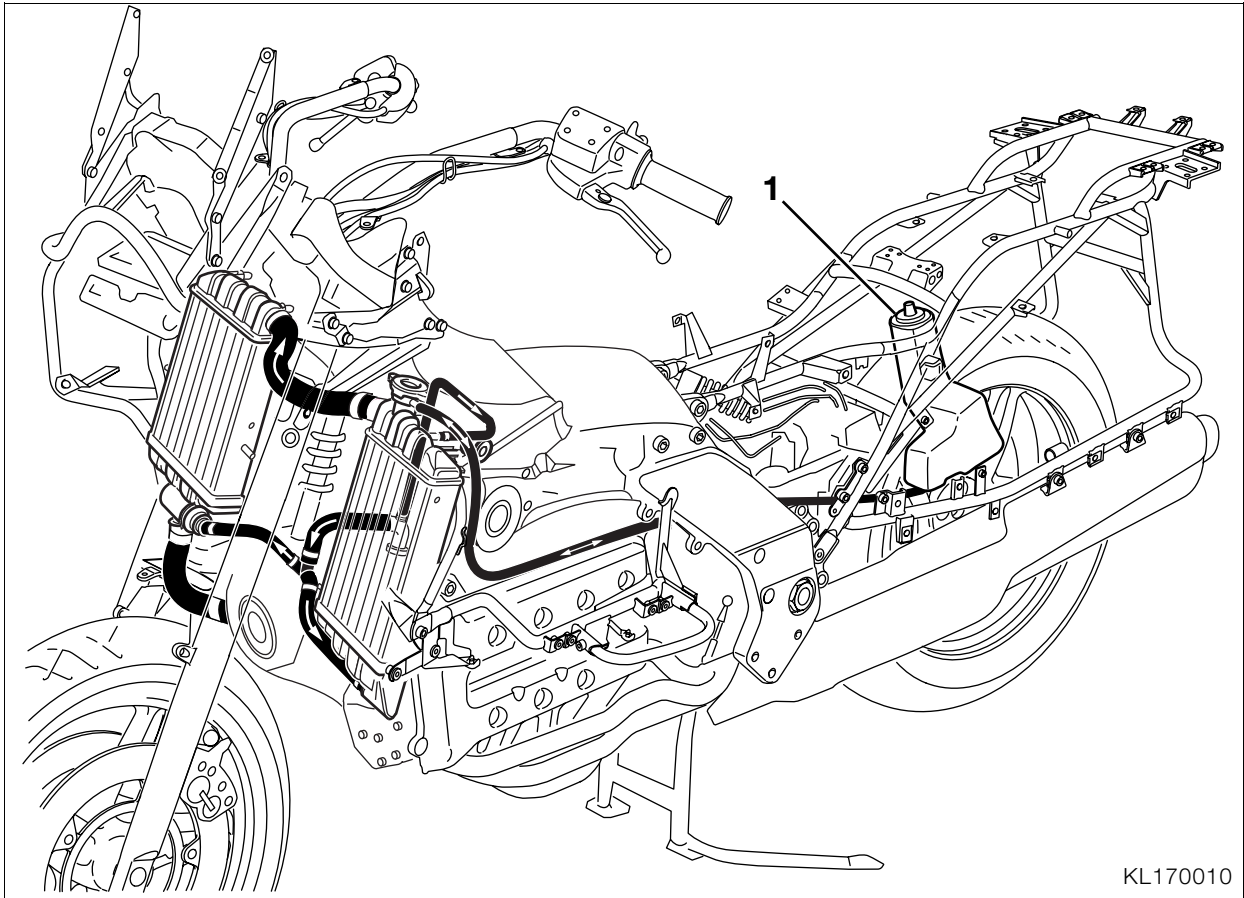
Note:

Make sure that the arrow on the underside of the fuel tank points directly toward the arrows on the fuel-pump unit.

- Tighten the union nut with wrench, **BMW No. 16 1 710.**
- Install the fuel tank.

Tightening torques:

Union nut	30 Nm
Fuel tank to frame M 8	21 Nm
Bridge to frame M 8	21 Nm
Bridge to frame M 6	9 Nm



KL170010

Checking and topping up, if necessary, coolant level and concentration

(Inspections I and III)



Note:

Only correct the coolant level when the engine is cold.

- Lift the seat at the front.

- Open the left-hand side case.

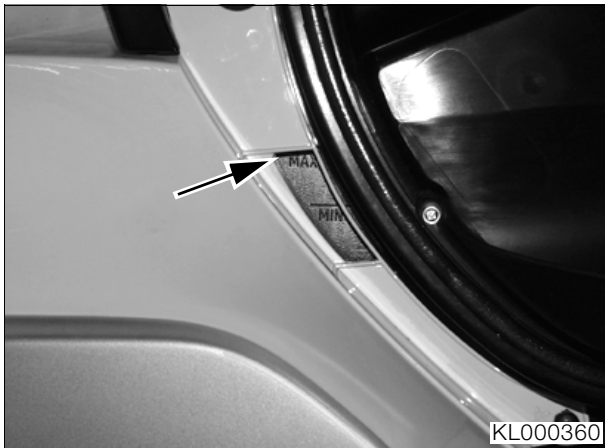


Caution:

Anti-freeze protection must be guaranteed to at least -30 °C (-22 °F). Use only nitrite-free long-term antifreeze and corrosion inhibitor.

Do not top up expansion tank past the MAX mark (arrow).

- Remove the cap from the expansion tank (1).
- Check antifreeze concentration in the expansion tank, top up antifreeze if necessary.



KL000360



Note:

Top up with coolant in a mix ratio of 50 % antifreeze, 50 % water.

- Check coolant level in the expansion tank, top up coolant if necessary.

Changing coolant

(Inspection IV)

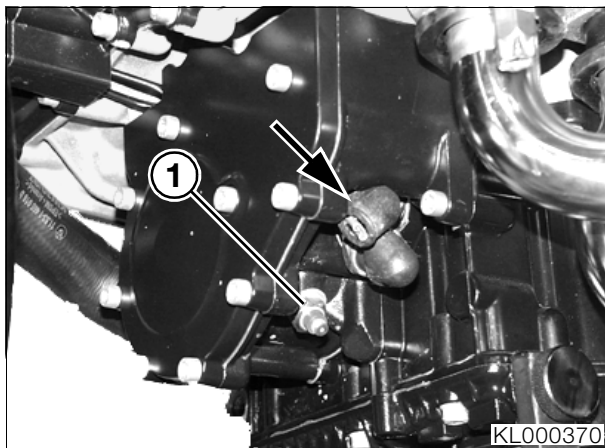


Note:

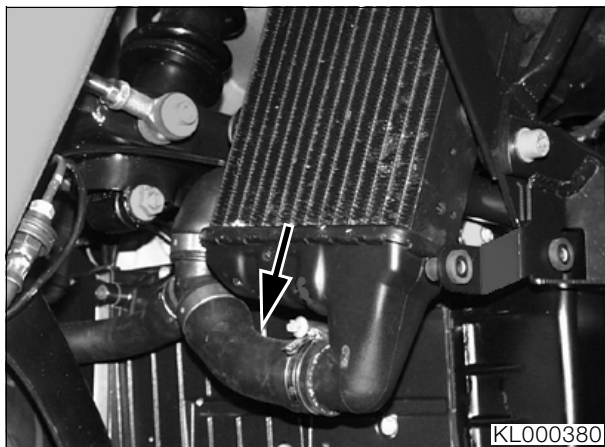
Change the coolant every 2 years at the latest

Draining coolant

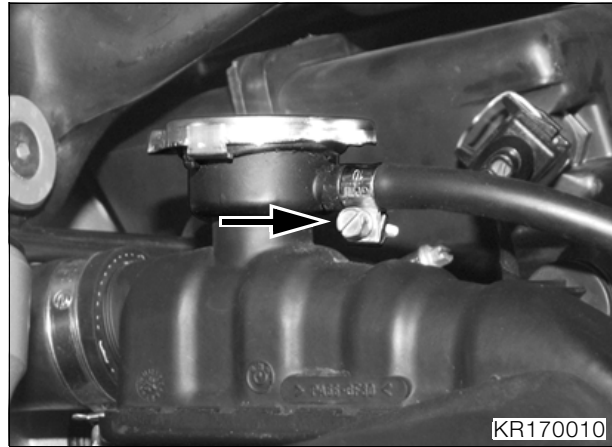
- Remove left fairing sections, left battery cover and centre section of engine spoiler.
- ➡See Group 46
- Remove tank cover.
- ➡See Group 46
- Open the filler cap on the left radiator.
- Position a drip tray beneath the oil/water pump.



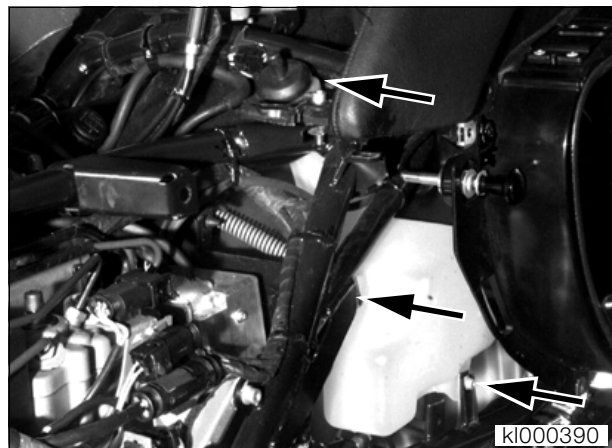
- Disconnect lead (arrow) for water pump temperature sensor (1).
- Remove water pump temperature sensor (1), drain off coolant.



- Knead the coolant hose between the coolant outlet and the left radiator (arrow) to force out the remaining coolant.



- Loosen the vent hose fastener (arrow), pull off vent hose.
- Position a drip tray beneath the coolant expansion tank.



- Release the retaining screws (arrows).



Note:

Coolant can escape as the expansion tank is removed, clamp the nipple on the expansion tank cap.

- Remove expansion tank and drain completely
- Drain vent hose completely.



Caution:

Dispose of old coolant in an environmentally friendly manner.



Filling coolant system

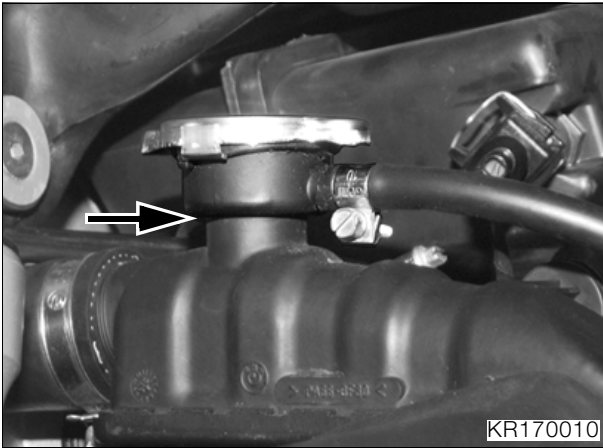
- Reinstall expansion tank and retighten securing screws.



Caution:

Make sure that the vent hose is not pinched or kinked.

- Refit vent hose, turn bolt on hose clip forwards and tighten.
- Screw in water pump temperature sensor and tighten.



- Add coolant up to the lower edge of the filler neck (arrow). Install the cap.
- Top up expansion tank to the MAX mark.

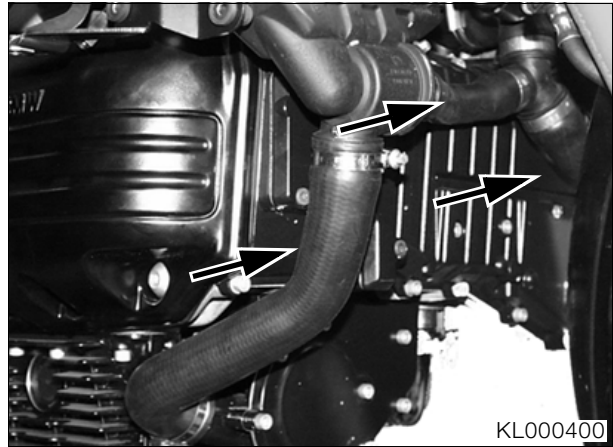
Filling capacity... 2.5 l (4.4 Imp. pints/2.6 US quarts)
In expansion tank..... + 0.6 l (1.1 Imp. pints/0.6 US quarts)

Antifreeze

Use only nitrite-free long-term antifreeze and corrosion inhibitor.

Concentration

Antifreeze 50%
Water 50%



- Turn the engine over on the starter, kneading the hoses to the coolant outlet and the water pump (arrows).
- Top up with coolant to the MAX mark if necessary.
- Installation is the reverse of the removal procedure.



Tightening torques:

Water pump temperature sensor..... 9 Nm
Footrest plate 21 Nm

Battery

(Inspections III and IV)

Check battery acid level and add distilled water if necessary; inspect battery terminals and clean and grease them if necessary



Warning:

Battery acid is highly caustic. Protect the eyes, face and hands and also paintwork and clothing.

Checking battery acid level



Note:

The battery must be removed for checking the acid level.

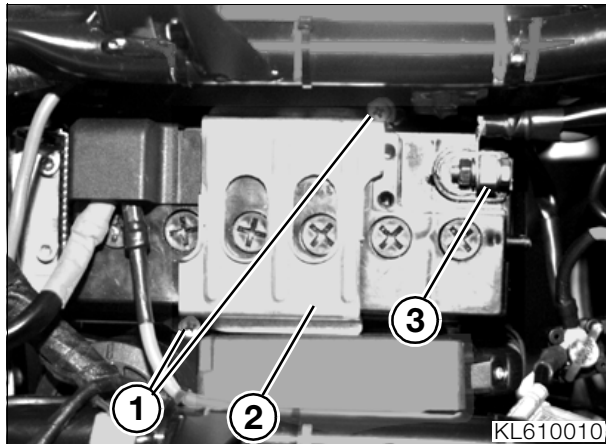
- Place motorcycle on its centre stand.
- Open the seat at the front.



Caution:

Avoid damage to fuel tank, wiring and hoses. Disconnect the battery only when the ignition is switched off.

To avoid short-circuits: Disconnect **negative** battery lead (-) first, then **positive** (+) lead.



- Disconnect negative battery lead (3) from the battery and isolate.

- Open cover cap for the positive battery terminal, disconnect positive battery lead and isolate.
- Release the fasteners (1) on the battery tray (2). Remove the battery tray.
- Lift the battery off the holder together with the battery breather hose and place the battery down on a level surface.
- Clean battery terminals and lubricate with acid-proof grease.
- Check battery acid level.

Adding distilled water

- Remove the battery.
- Set the battery down on a level surface.
- Open the 6 battery caps with a screwdriver.



Caution:

Use only distilled water to top up the acid level in the battery. Never top up with diluted sulphuric acid.

- Add distilled water up to the MAX mark.
- Replace the battery caps securely.

Installing the battery



Caution:

Only reconnect the battery with the ignition switched off to avoid short-circuiting. First connect **positive** battery lead (+), fit the positive battery terminal protective cap, then connect **negative** battery lead (-).

Make sure that the battery breather hose is not kinked or blocked.

Battery acid is highly caustic. Do not permit escaping acid vapour to contact motorcycle components.

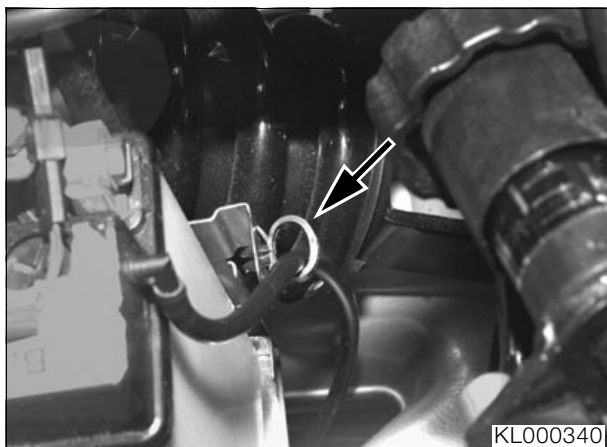
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:

The motorcycle may only be ridden with the protective cap fitted on the positive battery terminal.





- Guide the breather hose through the eyelet (see arrow) in the battery holder to the outside.



Note:

Disconnecting the battery clears all entries (such as errors, adaptations) from the Motronic control unit memory.

The loss of the adaptations may sometimes lead to engine performance being temporarily impaired when the engine is restarted.

Motronic restores the lost adaptations itself over the following operating hours.

- Switch on the ignition.
- Fully open the throttle once or twice with the engine off. Motronic registers the throttle valve position.



Tightening torque:

Battery tray to battery holder 4 Nm

Replacing intake air filter element

(Inspection III)



Note:

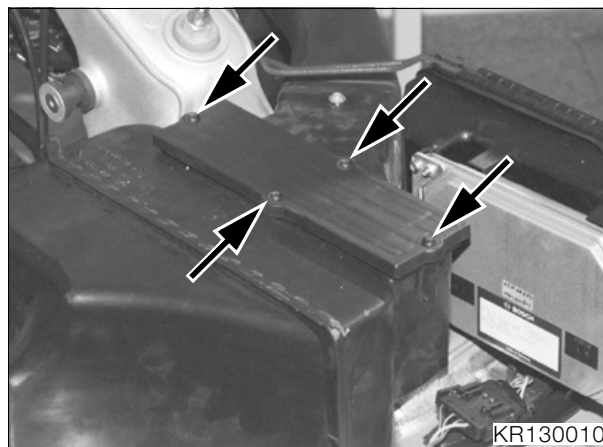
If severe dirt and dust are encountered, replace the intake air filter every 10,000 km (6,000 miles) or even more frequently.



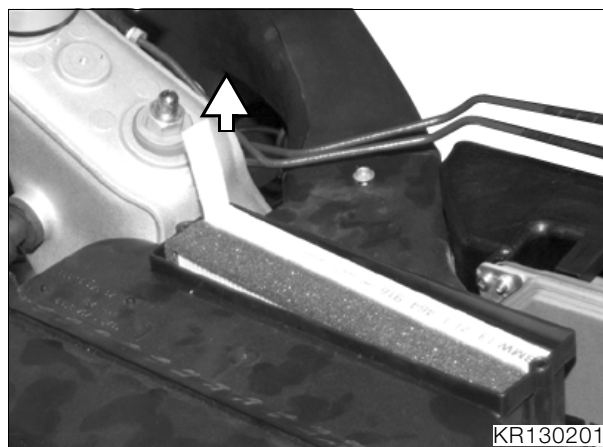
Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

- Remove fuel tank.
- ➔See Group 16



- Remove fasteners (arrows) and take off cover.



- Take out air filter element.
- Installation is the reverse of the removal procedure.



Tightening torques:

Fuel tank to frame M 8 21 Nm
 Bridge to frame M 8 21 Nm
 Bridge to frame M 6 9 Nm

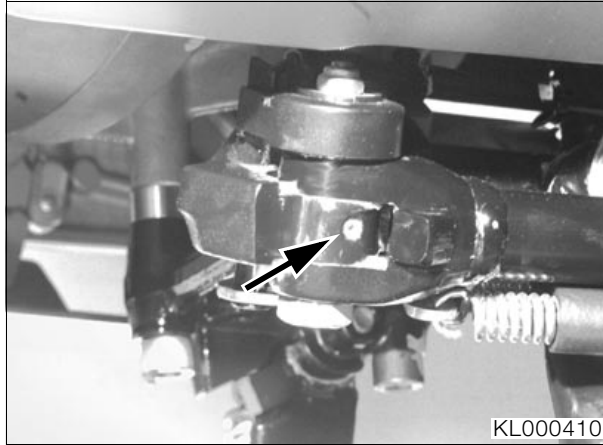
Checking function of side stand contact switch

(Inspections I, II and III)

- Switch off the engine.
- Place motorcycle on its centre stand.
- Select a gear and switch on the ignition.
 - Temperature gauge warning lamp lights up.
- Extend the side stand, observing the temperature gauge warning lamp.
 - Temperature gauge warning lamp goes out (engine control unit switches off).

Greasing the side stand

(Inspections II, III and IV)



- Check that the side stand moves freely, and grease it if necessary.
- Grease bearing bush (arrow) with a grease gun until fresh grease emerges at the lubricated faces.

Lubricant:
for pivot bushing..... **Shell Retinax EP2**

Checking the centre stand, greasing if necessary

(Inspections II, III and IV)

Checking the centre stand

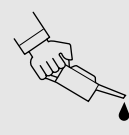
- Remove engine spoiler.
- ➡ See Group 46
- Install lifting gear, **BMW No. 00 1 510**.



Caution:

Make sure the motorcycle cannot topple by using an assembly crane, **BMW No. 46 5 640**, and cross-bar, **BMW No. 46 5 650**.

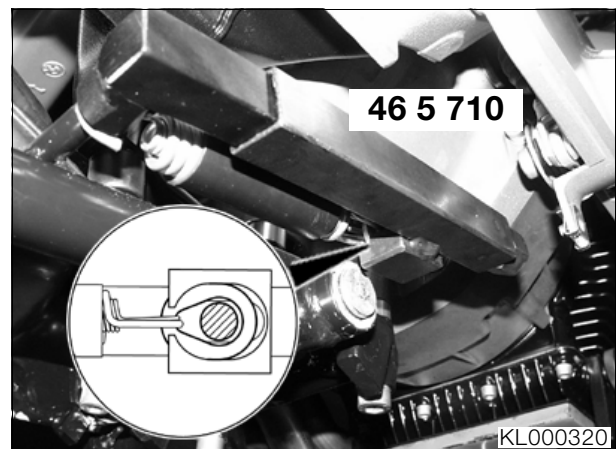
- Carefully hoist the motorcycle with the lifting gear, **BMW No. 00 1 510**, until the centre stand can be freely extended and retracted.
- Check whether the centre stand retracts automatically.
- The centre stand must be lubricated if it does not retract automatically.



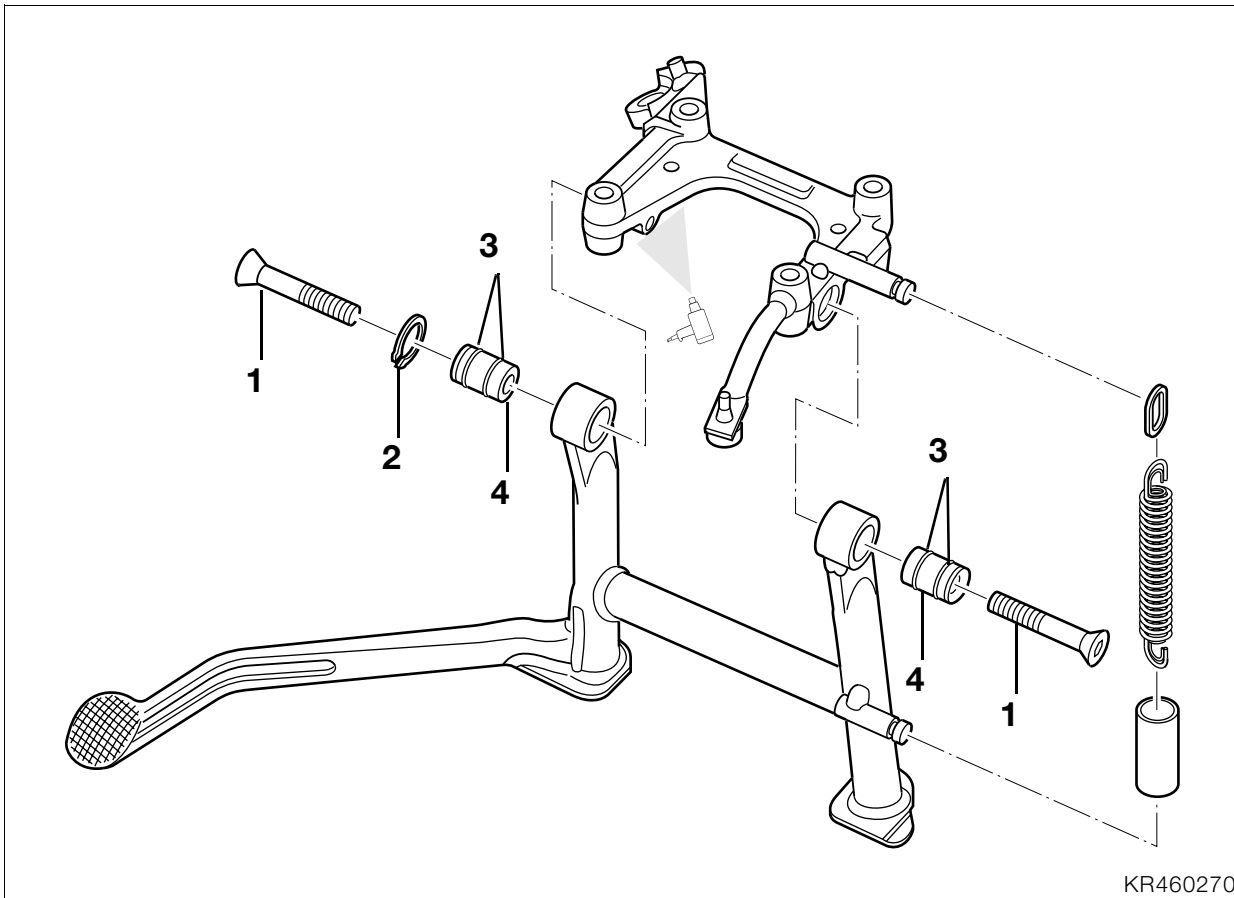
Note:

The centre stand must be removed for lubrication.

Greasing the centre stand



- Retract the centre stand.
- Using spring tensioner, **BMW No. 46 5 710**, tension the springs until they can be disengaged from the pivot mount (arrow).
- Release the spring tensioner and take off the plate with the springs.



⚠ Caution:

Screws (1) are secured with thread-locking compound. Do not overheat the O-rings (3) when softening the thread-locking compound.

- Using a hot-air gun and working from the inside, carefully soften the thread-locking compound on screws (1) on left and right.
- Remove both screws (1).
- Remove circlip (2) on left.
- Press out sleeve (4) on the left and right.
- Check O-rings (3) and replace if necessary.
- Installation is the reverse of the removal procedure: pay particular attention to the following.

⚠ Caution:

When refitting, use new screws or clean threads and bores and install screws with **Loctite 243**.

Lubricant:

For sleeves **Shell Retinax EP 2**



Tightening torques:

Main stand to pivot point
(clean thread + Loctite 243)..... 41 Nm

Checking the steering damper

(Inspections II and III)

- Turn the handlebars to full left lock.
- Waggle the front of the casing to and fro to check the play in the piston rod and on the ball head.

Checking tightness of rear wheel studs

(Inspection I)

- Tighten the rear wheel studs with a torque wrench.



Tightening torque:

Rear wheel studs 105 Nm

Checking rear wheel bearing play by tilting wheel

(Inspection III)

- Tilt the rear wheel to and fro across its axle.

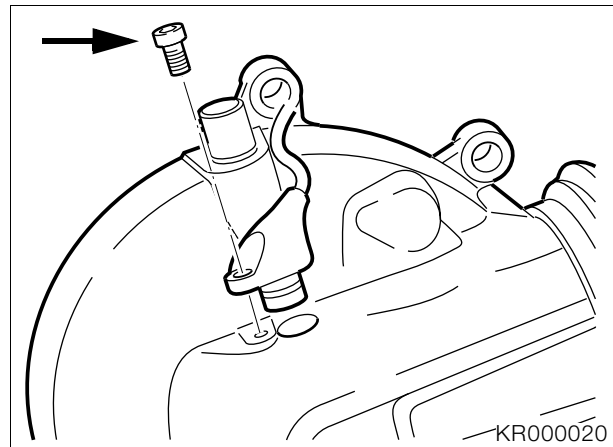
Checking swinging arm bearings, adjusting if necessary

(Inspections I and III)

- Grip the rear wheel by the tyre and attempt to move it sideways while holding the lifter handle.
 - Tighten bearings if there is perceptible play.
- ➡ See Group 33, Installing rear swinging arm

Cleaning the inductive sensor on the rear wheel (every 40,000 km/ 24,000 miles)

Clean the inductive sensor on the rear wheel every two years at the latest (Inspection III)



- Remove the screw (arrow).
- Lever out the inductive sensor and clean with a cloth.
- Installation is the reverse of the removal procedure.



Tightening torque:

Inductive sensor securing screw 5 Nm



Checking valve clearances, adjusting if necessary

(Inspection III)

Checking valve clearances



Caution:

Never unscrew the spark plugs before measuring valve clearances. Oil-carbon particles could become lodged behind the exhaust valve head and falsify the measurement.

The engine temperature must not exceed 35 °C (95 °F) when valve clearance is measured.

- Remove fairing side section, engine spoiler and left skirt bracket.
-See Group 46
- Remove cylinder head cover.
- Turn the engine by the rear wheel.
- Measure valve clearance using a feeler gauge and make a note.
- Determine if a replacement tappet is required by comparing the actual clearance with the specified clearance.

Valve clearances:

Inlet 0.15...0.20 mm (0.006...0.008 in)
 Exhaust 0.25...0.30 mm (0.010...0.012 in)

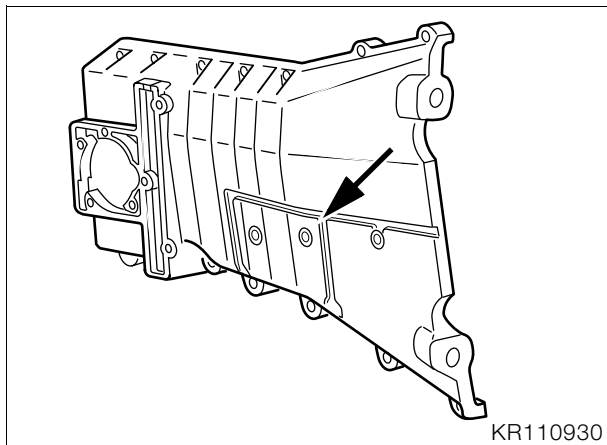
Adjusting valve clearances



Note:

The camshafts must be removed before the bucket tappets can be replaced.

- Remove fairing side section, engine spoiler and left skirt bracket.
- Remove cylinder head cover.



- Remove the screw plug (arrow) for the chain tensioner in the timing case cover.



Note:

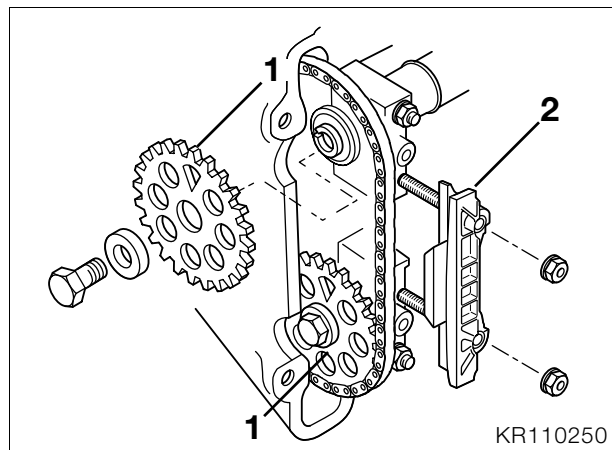
Turn the camshaft in the direction of rotation or press until the oil is forced out of the chain tensioner and the pin for the chain tensioner can be pushed in as far as the stop.

- Insert chain tensioner pin, **BMW No. 11 6 740**, in timing case cover to locate the chain tensioner.



Caution:

Position the pistons midway up the cylinders (cylinder 1 approx. 90° before top dead centre), to avoid damage to the valves and pistons.



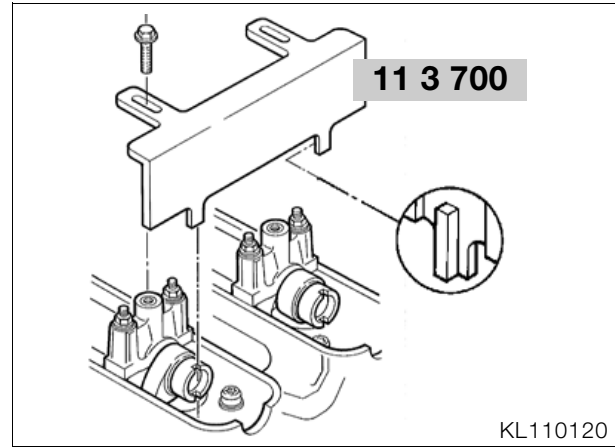
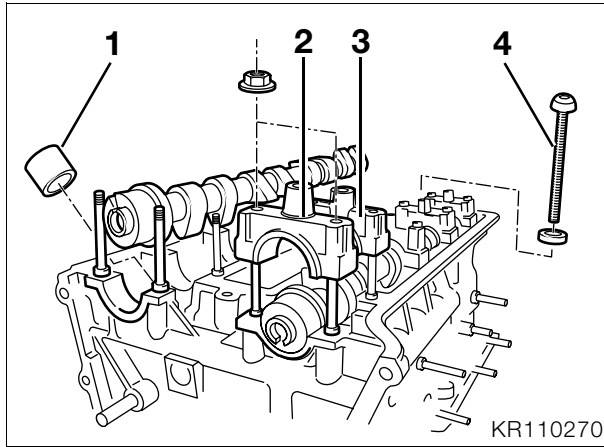
- Release slide rail (2).
- Release the chain sprockets (1), holding the hexagon on the camshaft to prevent it from turning.



Note:

The timing chain must not come away from the crankshaft pinion, secure it to the chain sprockets with a cable tie.

- Remove the chain sprockets and slide rail.



- Turn the camshafts until the tips of the cams are clear.
- Remove the bearing caps (2) for the thrust bearings first, to prevent tilting.
- Uniformly release studs of radial bearing caps (3) and remove the bearing caps.
- Take out the camshafts.
- Use a rubber extractor, **BMW No. 11 3 251**, to withdraw the bucket tappets from the cylinder head.
- Oil the replacement tappets lightly and insert.
- Oil the camshaft bearing journals.

Identification marks, camshafts

Inlet..... 2 grooves behind the thrust bearing
 Exhaust..... 1 groove behind the thrust bearing

Identification marks, camshaft bearing caps

Inlet side odd numbers
 Exhaust side..... even numbers
 Consecutive numerical order from front (timing end) to rear.

- Insert the camshafts in such a way that the tips of the cams are clear.
- Install the inner bearing caps first.
- Install the thrust bearing (timing end) with slide rail last and do not tighten it until the chain sprockets have been installed.
- Tighten the bearing caps uniformly, working from the inside outwards.

Tightening torque:

Bearing cap..... 10 Nm

- Turn the camshafts so that the grooves at the rear (opposite end from timing end) are vertical in relation to the cylinder head.
- The grooves at the timing end must face towards the crankshaft.

- Attach the aligning device, **BMW No. 11 3 700**, and secure to camshaft bearing caps.

Caution:

When turning the crankshaft, make sure that the timing chain does not come away from the crankshaft sprocket.

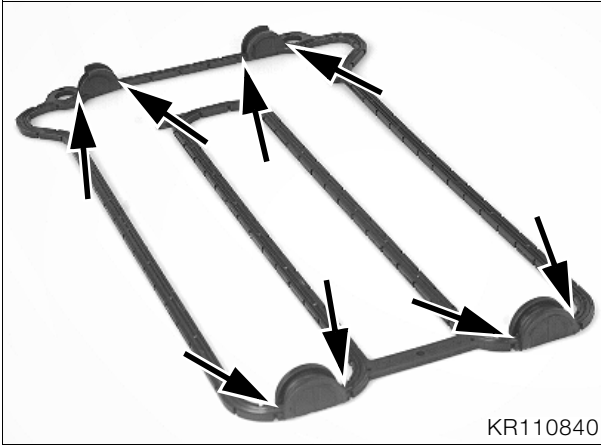
- Turn crankshaft by a further 90°, note the direction of rotation, piston of cylinder 1 must be at top dead centre.
- Install the inlet camshaft chain sprocket so that the timing chain is taut at the guide rail.
- Insert the screw as far as possible.
- Install the exhaust camshaft chain sprocket so that the timing chain is as taut as possible between the sprockets (in the slide rail).
- Insert the screw as far as possible.
- Remove the aligning device, **BMW No. 11 3 700**.
- Push the camshaft lightly against the thrust bearing and fasten the bearing cover with the sliding rail.
- Tighten the chain sprockets, holding the hexagon on the camshaft to prevent it from turning.
- Remove the chain tensioner clamping tool and tighten the screw plug.

Tightening torques:

Bearing cap..... 10 Nm
 Chain sprockets..... 56 Nm
 Timing case cover..... 9 Nm
 Screw plug for chain tensioner..... 9 Nm



- Turn the engine over and check the relative positions of the camshaft chain sprockets and the crankshaft (at TDC).

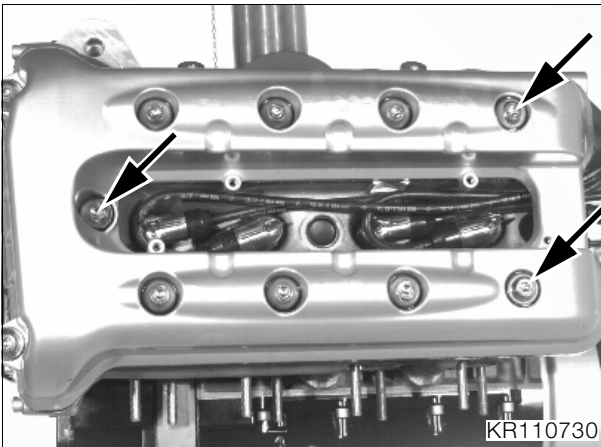


- Install the cylinder head cover gasket with the half-moon cutouts first. The marks at the front and rear of the gasket and the cylinder head cover must coincide.
- Apply a thin coat of **Three Bond 1209** at the areas where the cylinder head, timing case cover and cylinder head cover meet and at the half-moon cutouts (arrows).



Note:

Do not forget the contact spring.



- Install the cylinder head cover. Insert the front centre screw (timing end, arrow) and both rear screws (arrows) in order to locate the gasket.

- Tighten all screws until seated.
- Tighten the screws in diagonally opposite sequence, working from the inside outwards.
- Install the cover plate.

Tightening torques:

Cylinder head cover	9 Nm
Spark plugs.....	20 Nm
Cover plate screws	5 Nm

- Install the skirt bracket, engine spoiler and left fairing section.

Tightening torques:

Skirt bracket	21 Nm
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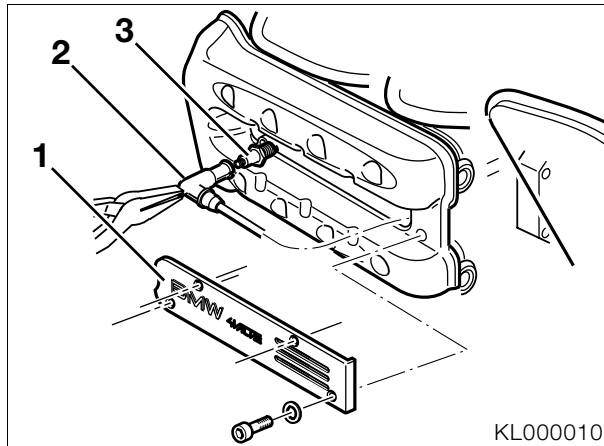
Replacing the chain tensioning rail lining and chain guide rail

(every 60,000 km/36,000 miles)

➡See Group 11

Replacing spark plugs

(Inspection III)



- Remove left engine spoiler.
- ➔See Group 46
- Remove the cover plate (1).
- Pull off spark plug caps (2) with flat pliers.
- Remove spark plugs (3) with spark plug wrench, **BMW No. 12 3 500**.
- Installation is the reverse of the removal procedure.

⚠ Tightening torques:

Spark plugs.....	20 Nm
Cover plate screws	5 Nm

Final inspection with road safety and functional check

(Inspections I, II, III and IV)

Road safety check

- Check wheels and tyres.
- Check tyre pressures and correct if necessary.
- Wait at least 10 minutes after a test run to check and correct the engine oil level.

Tyre pressures

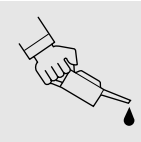
One-up.....	front 2.5 bar (35.6 psi)
One-up.....	rear 2.9 bar (41.2 psi)

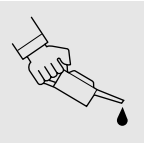
Two-up	front 2.5 bar (35.6 psi)
Two-up	rear 2.9 bar (41.2 psi)

Two-up with luggage.....	front 2.5 bar (35.6 psi)
Two-up with luggage.....	rear 3.2 bar (46.4 psi)

Roadworthiness check

- Clutch
- Gear shift
- Steering
- Hand brake and foot brake, ABS
- Lights and signalling equipment
- Telltale and warning lights
- Instruments
- Horn
- Radio
- Special equipment
- Test ride if necessary



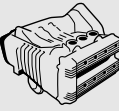


11 Motor

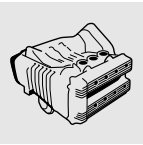
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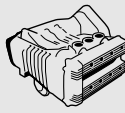
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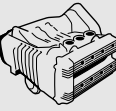


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Technical Data		K 1200 LT
Engine, general		
Engine design		In-line four-stroke engine installed longitudinally, with double overhead camshafts, liquid cooling and electronic fuel injection.
Location of engine number		At lower rear right of engine block
Cylinder bore	mm (in)	70.5 (2.77)
Stroke	mm (in)	75 (2.95)
Number of cylinders		4
Effective displacement	cc	1171
Compression ratio		10.8 : 1
Power output	kW	72
Max. torque	Nm	115
Permissible maximum engine speed	min ⁻¹	8500
Idle speed	min ⁻¹	950
Direction of rotation		Counter-clockwise, looking at ignition system
Compression test pressure		
good	bar (psi)	above 10.0 (142)
normal	bar (psi)	8.5...10.0 (121...142)
poor	bar (psi)	below 8.5 (121)
Lubrication system		
Engine lubrication		Pressurised oil circuit
Oil filter		Full-flow type
Differential pressure to open bypass valve	bar (psi)	1.5 (21.4)
Oil pressure warning light comes on below	bar (psi)	0.2...0.5 (2.8...7.1)
Pressure relief valve opens at	bar (psi)	5.4 (76.8)
Oil content		
With filter change	l (Imp. pints/ US quarts)	3.6 (6.34/3.80)
min/max	l (Imp. pints/ US quarts)	0.8 (1.40/0.84)
Permissible oil consumption l/1000 km (miles per Imp. pint/miles per US quart)		1.0 (350/590)



Technical Data		K 1200 LT	
Oil pump			
Oil pump		Gear-type	
Timing chain			
Type		Pre-stretched, endless single roller chain with 128 links	
Valves			
Included valve angle			
Inlet	°	20.5	
Exhaust	°	19.5	
Valve clearances with engine cold (max. 35 °C/95 °F)			
Inlet valve	mm (in)	0.15...0.20 (0.059...0.079)	
Exhaust valve	mm (in)	0.25...0.30 (0.010...0.012)	
Valve timing		for 3 mm (0.12 in) lift and valve clearance 0	
Inlet opens		19° after TDC	
Inlet closes		13° after BDC	
Exhaust opens		7° before BDC	
Exhaust closes		25° before TDC	
Valve head dia.			
Inlet	mm (in)	26.5 (1.043)	
Exhaust	mm (in)	23 (0.905)	
Stem dia.			
Inlet	mm (in)	4.966...4.980 (0.1955...0.1961)	
Wear limit	mm (in)	4.946 (0.1947)	
Exhaust	mm (in)	4.956...4.970 (0.1951...0.1957)	
Wear limit	mm (in)	4.954 (0.1950)	
Max. runout of valve head at valve seat			
Inlet, exhaust	mm (in)	0.02 (0.0008)	



Technical Data		K 1200 LT	
Valve seat			
Valve seat angle			
Inlet	°		45
Exhaust	°		45
Valve seat width			
Inlet	mm (in)		0.95...1.25 (0.037...0.049)
Wear limit	mm (in)		2.5 (0.10)
Exhaust	mm (in)		1.15...1.45 (0.045...0.057)
Wear limit	mm (in)		3.0 (0.12)
Valve seat extl. dia. (dimension for machining seat)			
Inlet	mm (in)		25.60...26.00 (1.007...1.023)
Exhaust	mm (in)		22.15...22.55 (0.872...0.887)
Seat ring dia. (oversize +0.2 mm/+0.008 in)			
Inlet	mm (in)		27.59...27.72 (1.086...1.091)
Exhaust	mm (in)		25.09...25.22 (0.987...0.992)
Seat dia. in cylinder head (oversize +0.2 mm/+0.008 in)			
Inlet	mm (in)		27.70...27.91 (1.090...1.098)
Exhaust	mm (in)		25.20...25.41 (0.992...1.000)
Valve guide			
Length of valve guide			
Inlet	mm (in)		45 (1.77)
Exhaust	mm (in)		57.5 (2.26)
Valve guide	Extl. dia.	mm (in)	11.533...11.544 (0.4541...0.4545)
Bore in cylinder head		mm (in)	11.500...11.518 (0.4528...0.4535)
Overlap		mm (in)	0.015...0.044 (0.0006...0.0017)
Repair stage			
Oversize valve guide	Extl. dia.	mm (in)	11.700...11.718 (0.4606...0.4613)
Valve guide			
Intl. dia.	mm (in)		5.000...5.012 (0.1969...0.1973)
Wear limit	mm (in)		5.1 (0.20)
Valve spring			
	Extl. dia.	mm (in)	21.3 (0.84)
	Wire dia.	mm (in)	3.05 (0.120)
Spring length, off-load		mm (in)	42.6 (1.68)
Wear limit		mm (in)	41.1 (1.62)





Technical Data		K 1200 LT
Camshaft		
Inlet camshaft	°	244
Exhaust camshaft	°	232
Guide bearing dia.	mm (in)	29.970...30.000 (1.1799...1.1811)
Wear limit	mm (in)	29.95 (1.179)
Guide bearing bore	mm (in)	30.020...30.041 (1.1819...1.1827)
Camshaft bearing bore	mm (in)	24.020...24.041 (0.9457...0.9465)
Radial clearance		
Guide bearing	mm (in)	0.020...0.071 (0.0008...0.0028)
Camshaft bearing	mm (in)	0.020...0.071 (0.0008...0.0028)
Cam base circle dia.	mm (in)	30 (1.18)
Cam height, inlet	mm (in)	37.989 ... 38.033 (1.4957...1.4974)
Wear limit	mm (in)	37.620 (1.4811)
Cam height, exhaust	mm (in)	37.619 ... 37.681 (1.4811...1.4835)
Wear limit	mm (in)	37.250 (1.4666)
Tappets		
Extl. dia.	mm (in)	25.980...25.993 (1.0226...1.0234)
Wear limit	mm (in)	25.970 (1.0225)
Bore dia. in cylinder head	mm (in)	26.065...26.086 (1.0262...1.0270)
Wear limit	mm (in)	26.170 (1.0303)
Radial clearance	mm (in)	0.072...0.106 (0.0028...0.0042)
Wear limit	mm (in)	0.200 (0.0079)
Crankshaft		
Main bearing and crankpin markings		
no colour spot		Grinding stage 0
with colour spot		Grinding stage 1 (-0.25 mm/-0.010 in)
Main bearing dia.		
Grinding stage 0	mm (in)	44.976...45.000 (1.7707...1.7716)
Grinding stage 1	mm (in)	44.726...44.750 (1.7609...1.7618)
Main bearing radial play	mm (in)	0.020...0.056 (0.0008...0.0022)
Wear limit	mm (in)	0.130 (0.0051)
Guide bearing width	mm (in)	23.020...23.053 (0.9063...0.9076)
Axial play	mm (in)	0.080...0.173 (0.0031...0.0068)
Wear limit	mm (in)	0.250 (0.0098)
Crankpin dia.		
Grinding stage 0	mm (in)	37.976...38.000 (1.4951...1.4961)
Grinding stage 1	mm (in)	37.726...37.750 (1.4853...1.4862)

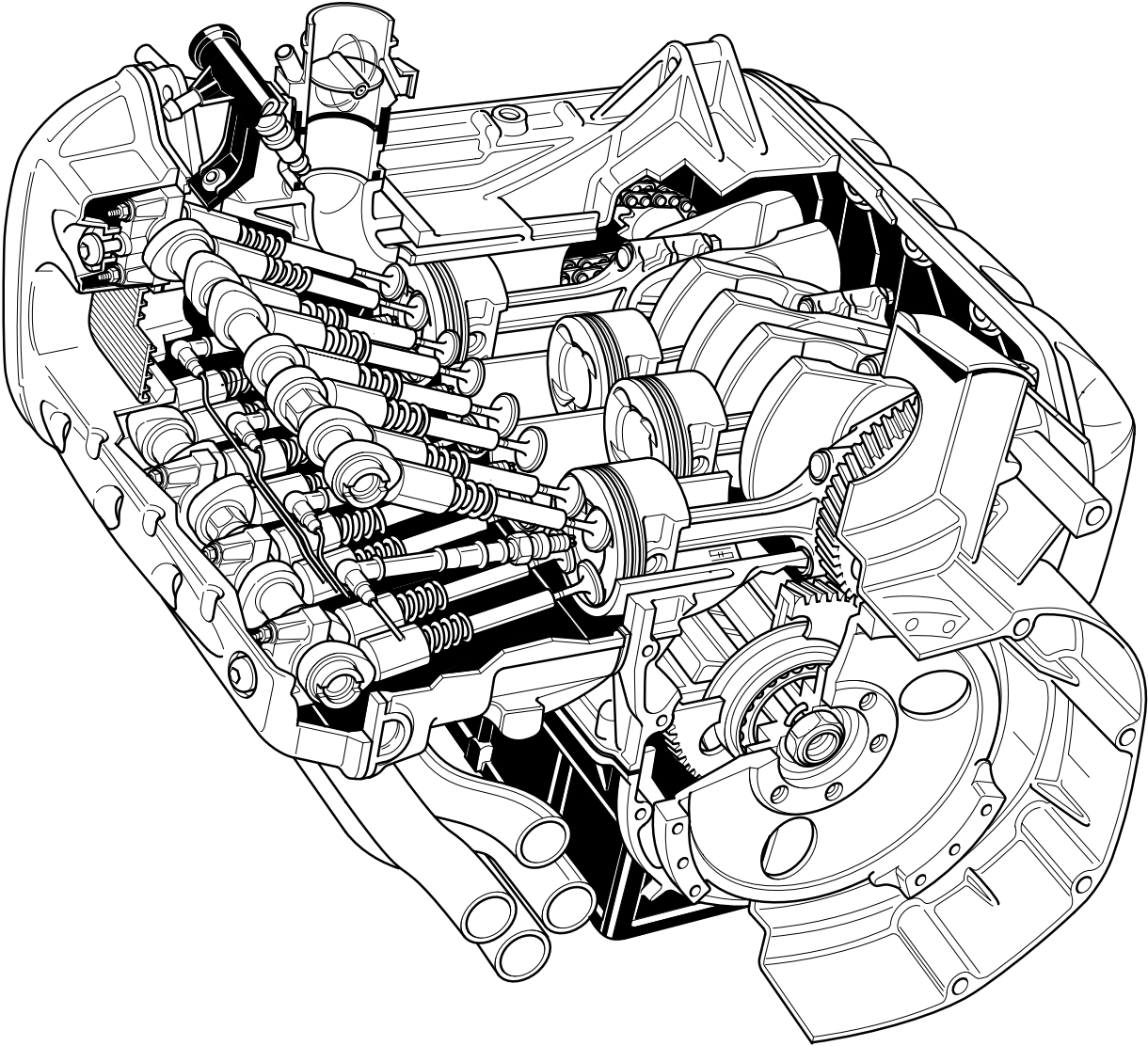
Technical Data		K 1200 LT	
Connecting rod			
Big end bearing with bearing shell			
Radial clearance	mm (in)	0.030...0.066 (0.0012...0.0026)	
Wear limit	mm (in)	0.130 (0.0051)	
Piston pin bore dia. with bushing	mm (in)	17.006...17.017 (0.6695...0.6699)	
Distance between centers	mm (in)	130.9...131.1 (5.15...5.16)	
Permissible weight difference	g (oz.)	± 4 (± 0.14)	
Cylinders			
Bore			
A	mm (in)	70.495...70.505 (2.7754...2.7758)	
Wear limit	mm (in)	+0.05 (+0.002)	
B	mm (in)	70.505...70.515 (2.7758...2.7762)	
Wear limit	mm (in)	+0.05 (+0.002)	
Total wear clearance of piston and cylinder	mm (in)	0.130 (0.0051)	
Permitted out-of-roundness of cylinder bore			
at 20 mm (0.79 in) from the top edge	mm (in)	0.05 (0.002)	
Pistons			
Piston dia.	Make: KS	(Measuring plane A: see piston and cylinder check)	
A	mm (in)	70.466...70.480 (2.7742...2.7748)	
Wear limit	mm (in)	0.080 (0.0031)	
B	mm (in)	70.476...70.490 (2.7747...2.7752)	
Wear limit	mm (in)	0.080 (0.0031)	
Installed clearance	mm (in)	0.015...0.039 (0.0006...0.0015)	
Wear limit	mm (in)	0.130 (0.0051)	
Weight classes			
Weight group identification		2 groups, stamped + or -	
Weight difference in one group	g (oz.)	6 (0.21)	
Direction of installation		Arrow on piston crown points forward	



Technical Data		K 1200 LT	
Piston rings			
1st groove	Rectangular-section ring		
Height	mm (in)	0.975...0.990 (0.0383...0.0389)	
Wear limit	mm (in)	0.90 (0.035)	
End gap	mm (in)	0.10...0.30 (0.004...0.012)	
Wear limit	mm (in)	1.50 (0.059)	
Side clearance	mm (in)	0.030...0.065 (0.0012...0.0026)	
Wear limit	mm (in)	0.20 (0.007)	
2nd groove	Taper-face oil-control ring		
Height	mm (in)	1.195 ... 1.170 (0.0470...0.0461)	
Wear limit	mm (in)	1.10 (0.043)	
End gap	mm (in)	0.10...0.30 (0.004...0.012)	
Wear limit	mm (in)	1.50 (0.059)	
Side clearance	mm (in)	0.005...0.035 (0.0002...0.0013)	
Wear limit	mm (in)	0.20 (0.007)	
3rd groove	U-Flex, with spring		
Height	mm (in)	1.960...1.990 (0.0772...0.0783)	
Wear limit	mm (in)	1.90 (0.074)	
Side clearance	mm (in)	0.020...0.070 (0.0007...0.0027)	
Wear limit	mm (in)	0.3 (0.01)	
Installed direction of piston rings		"Top" marking uppermost	
Piston pins			
Piston pin dia.	mm (in)	16.995...17.000 (0.6691...0.6693)	
Wear limit	mm (in)	16.96 (0.667)	
Radial play at conrod	mm (in)	0.006...0.022 (0.0002...0.0008)	
Wear limit	mm (in)	0.060 (0.002)	



Cutaway drawing of engine, K 1200 LT



KL119000



Preparatory work with engine installed

...for removal of combined oil/water pump

- Remove engine spoiler.
➡See Group 46
- Drain coolant.
➡See Group 17
- Drain engine oil.
➡See Group 00

...for removal of timing case cover, removal of timing chain



Caution:

Disconnect ground lead from battery and insulate.

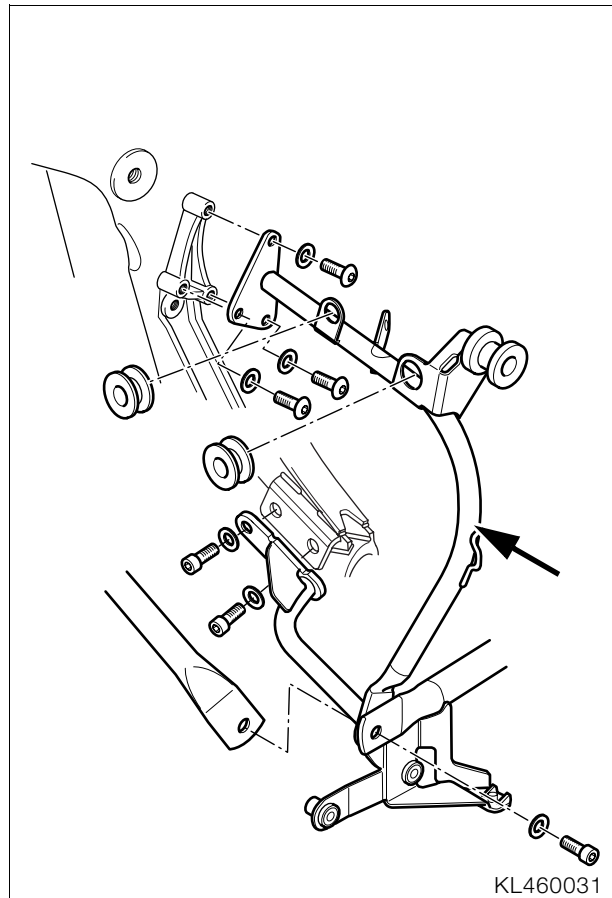
- Remove left and right fairing side sections and engine spoilers.
➡See Group 46
- Remove left and right skirt brackets.
- Remove the crankcase cover.



Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

- Remove fuel tank.
➡See Group 16
- Remove left and right radiators with fans.
➡See Group 17
- Remove coolant adapters with coolant hoses from radiators and from combined oil/water pump.



- Remove left-hand radiator bracket (arrow).

...for removal of cylinder head



Caution:

Disconnect ground lead from battery and insulate.

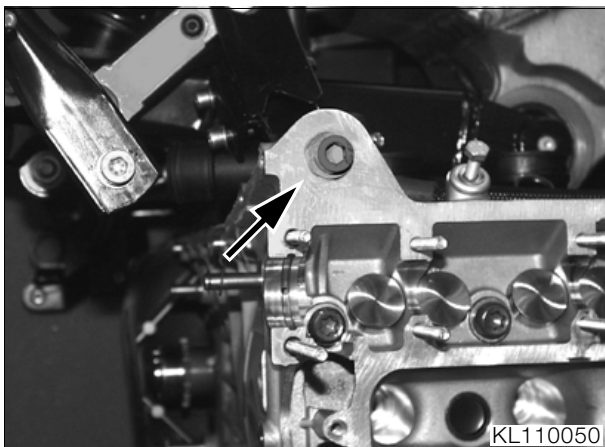
- Remove left and right fairing side sections and engine spoilers.
➡See Group 46
- Remove left-hand skirt bracket.



Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

- Remove fuel tank.
➡See Group 16
- Remove left/right radiators with fans.
➡See Group 17
- Remove coolant adapters with coolant hoses from radiators.
- Remove left-hand radiator bracket.
- Remove exhaust system.
➡See Group 18
- Remove fuel injection rail.
➡See Group 13
- Remove throttle butterfly rail together with intake air silencer.
➡See Group 17



- Remove nut securing engine to cross member at front left (arrow).
- Remove temperature sensor for cylinder head.
➡See Group 61
- Remove timing case cover.
- Remove timing chain.

Removing/installing engine

Removing engine



Note:

Engine removal is necessary for:
- Removal of intermediate flange
- Removal of output shaft
- Removal of countershaft.



Caution:

Disconnect the negative battery lead first, then the positive lead.

- Remove the battery.
- Drain engine oil.

Group: frame

- Remove rear footrest plates.
- Remove left and right side panels, engine spoilers and battery covers.
- Remove left and right skirt brackets.

Groups: radiators, fuel tank and fuel lines



Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

- Remove fuel tank.
- Drain coolant.
- Remove left/right radiators with fans.
- Remove coolant adapters and coolant hose from water pump.
- Remove left-hand radiator bracket.
- Remove fuel injection rail.
- Remove throttle butterfly rail together with intake air silencer.
- Disconnect fuel lines and crankcase breather from engine.

Group: exhaust system

- Disconnect plug of lambda sensor.
- Remove exhaust system.

Groups: rear-wheel drive, wheels and tyres

- Remove rear-wheel inductive sensor.
- Remove rear-wheel brake caliper.
- Use cable ties to secure brake caliper and inductive sensor to frame.
- Remove rear wheel.



Warning:

Note high release torques.

- Remove swinging arm.

Groups: frame and clutch

- Remove transverse tube.
- Disconnect or open plug connections for engine and gearbox.
- Remove switch for gear indicator, pull cable toward rear and remove.
- Disconnect clutch breather line from frame, pull breather line toward rear to remove.
- Remove clutch slave cylinder and use cable tie to secure cylinder to frame.
- Remove clutch pushrod.

Groups: engine electrical system and general vehicle electrics

- Remove temperature sensor for cylinder head.
- Disconnect ground cable from cylinder head.
- Unclip cables for side-stand switch and reverser inductive sensor and pull cables down to remove.
- Disconnect cables for oil-pressure indicator, temperature sensor water pump and magnetic gate in electronics box and pull cables forward to remove.
- Disconnect cables from alternator.
- Disconnect cables from starter motor.

Group: frame and gearbox

- Remove reverser switch unit.
- Remove front left footrest system.
- Slacken screws securing front right footrest system and use cable tie to secure footrest to frame.
- Disconnect gearshift linkage from selector lever.
- Attach hoist, **BMW No. 00 1 510**, to oil sump.



Note:

Secure front wheel in position.

- Remove nuts securing front cross members to engine at left and right.
- Release screws securing gearbox to frame.

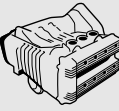


Caution:

When raising the frame and maneuvering the engine beneath the motorcycle, take care not to damage lines and cables.

Maintain adequate clearance between frame and gearbox and between transverse tube at top and alternator; take care not to scratch the surfaces.

- Use workshop crane, **BMW No. 46 5 640**, to raise rear of frame high enough to take weight off gearbox mounts.
- Remove screws securing gearbox mounts.
- Use workshop crane, **BMW No. 46 5 640**, to raise frame until gearbox and starter motor are accessible.
- Remove gearbox complete with starter motor.
- Use hoist, **BMW No. 00 1 510**, to raise engine far enough to take weight off mounts of cross members.
- Lower hoist, **BMW No. 00 1 510**, and pull engine clear of motorcycle from below.
- Bolt engine carrier, **BMW No. 11 0 610**, to crankcase.
- Lower engine onto stand, **BMW No. 00 1 490**.
- Remove hoist, **BMW No. 00 1 510**.
- Remove alternator.
- Remove the clutch.



Installing engine

- Install the clutch.
- Secure engine to hoist, **BMW No. 00 1 510**, and disengage engine from stand, **BMW No. 00 1 490**.

Groups: frame and gearbox



Caution:

When maneuvering the engine below the motor-cycle and raising and lowering the frame, always take care not to damage components or scratch surfaces.

- Install the alternator.
- Apply a coat of **Optimoly MP 3** to the splines of the gearbox input shaft.
- Secure guide pins, **BMW No. 23 1 820**, to intermediate flange.
- Slide gearbox with starter motor over guide pins, **BMW No. 23 1 820**, and into position against intermediate flange.
- Install link for reverser, and secure mounts for link and gearbox to intermediate flange.
- Remove guide pins.
- Use hoist, **BMW No. 00 1 510**, to raise engine slightly and carefully lower frame just far enough to allow cables to be connected to starter motor and alternator: connect the cables.
- Continue lowering frame until gearbox mounts can be installed: install and tighten the gearbox mounts.
- Secure cross members on left and right.
- Pull down the centre stand.
- Fully lower hoist, **BMW No. 00 1 510**, and remove.
- Fully lower the frame.
- Remove workshop crane, **BMW No. 46 5 640**.
- Connect inductive sensor for reverser.
- Connect selector lever to gearshift linkage.
- Install actuator unit for reverser.

Group: clutch

- Connect switch for gear indicator.
- Insert the clutch release rod.
- Install clutch slave cylinder with new paper seal.
- Insert clutch breather hose, working from rear toward front.

Groups: engine electrical system and general vehicle electrics

- Connect cable for side-stand switch.
- Connect ground cable to cylinder head.
- Install and tighten temperature sensor for cylinder head and reconnect cable.
- Connect cables for temperature sensor water pump, oil-pressure indicator and magnetic gate; use cable ties to secure.
- Install spark plugs and ignition leads.
- Install heat shield for cylinder head.

Groups: frame, rear-wheel drive, wheels and tyres

- Install transverse tube.
- Install swinging arm.
- Install the rear wheel drive.
- Install the rear wheel.
- Install rear brake and inductive sensor.

Group: exhaust system

- Install lambda sensor and connect cable.
- Install exhaust.
- Install exhaust heat shield.

Groups: radiators, fuel tank and fuel lines



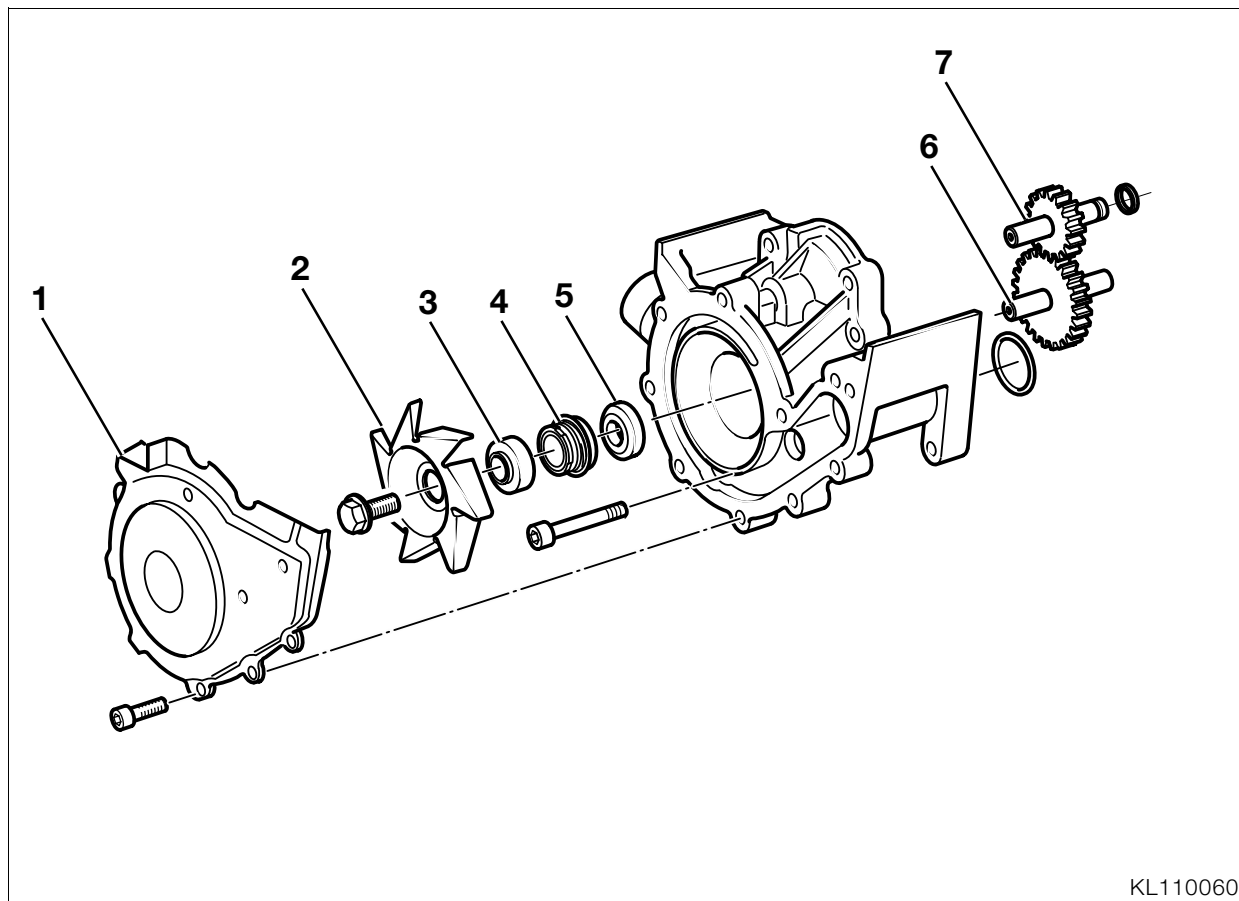
Caution:

Make sure that all lines and cables are correctly routed.

- Secure fuel lines to engine.
- Install throttle butterfly rail complete with intake air silencer.
- Install fuel injection rail.
- Connect lines to injection valves and intake air silencer.
- Connect crankcase breather hose.
- Install left-hand radiator bracket.
- Install left and right radiators and coolant hoses.
- Install intake air pipe for air filter.
- Install fuel tank, connect lines and fuel hoses.

Group: frame

- Install left and right front footrest systems.
- Install front saddle.
- Install tank cover.
- Install left and right skirt brackets.
- Use cable tie to secure clutch breather hose to right-hand skirt bracket.
- Install fairing panels and engine spoilers.
- Install left and right rear footrests.
- Install skirts.



KL110060

Disassembling engine

Removing, disassembling/assembling water pump

Removing the oil/water pump

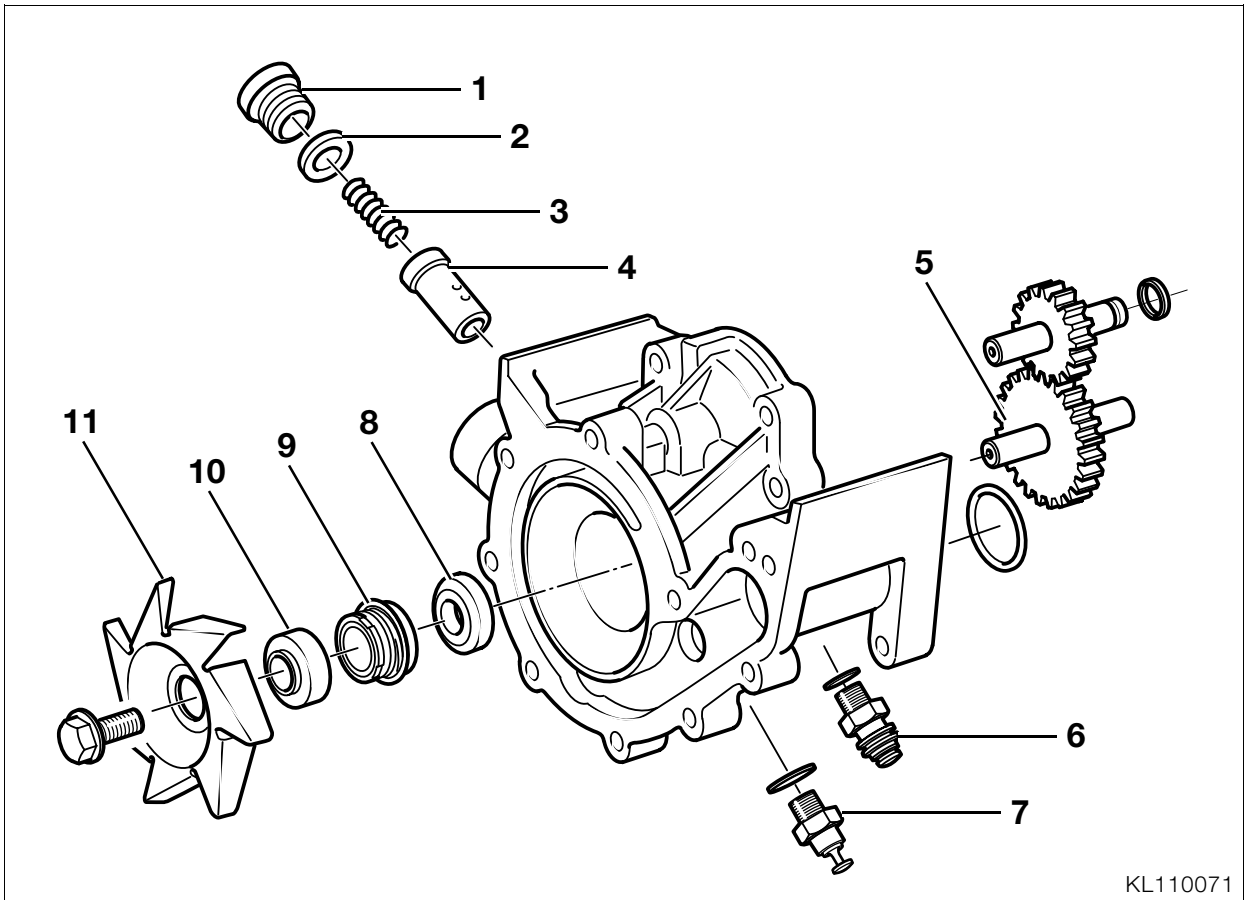
- Disconnect oil pressure warning and water pump temperature sensor wires from switches.
- Withdraw wires through hole in pump housing.
- Remove pump housing cover (1) and loosen the gasket by tapping lightly with a plastic-headed hammer.
- Remove the housing and loosen the gasket by tapping lightly with plastic-headed hammer.
- Remove oil-pump gear (7).

Disassembling the oil/water pump

- Clamp the pump housing by the sealing faces in a vice fitted with jaw protectors.
- Remove water pump impeller (2), holding pump shaft (6) to prevent it from turning.
- Remove water-pump impeller (2) with spacer bushing (3).
- Press out pump shaft (6).
- Examine the pump housing for damage.

Removing slipping seal and shaft sealing ring

- Drive out piston-ring-type oil seal (4) with drift, **BMW No. 11 6 721**.
- Press out shaft sealing ring (5) with drift, **BMW No. 11 6 721**.



KL110071

Removing the oil pressure relief valve

- Unscrew plug (1) and take out spring (3).
- Pull valve piston (4) out with a magnet and examine it for damage.

Installing the oil pressure relief valve

- Oil valve piston (4) lightly and install.
- Install spring (3) and tighten screw plug (1), fitted with new sealing ring (2).

Tightening torque:

Oil pressure relief valve screw plug 35 Nm

Oil-pressure switch, temperature sensor for water pump

Tightening torque:

Oil-pressure switch (6) 35 Nm
 Temperature sensor for water pump (7)..... 9 Nm

Installing the pump shaft with shaft sealing ring and slipping seal.



Note:

Clean the sealing ring seats.

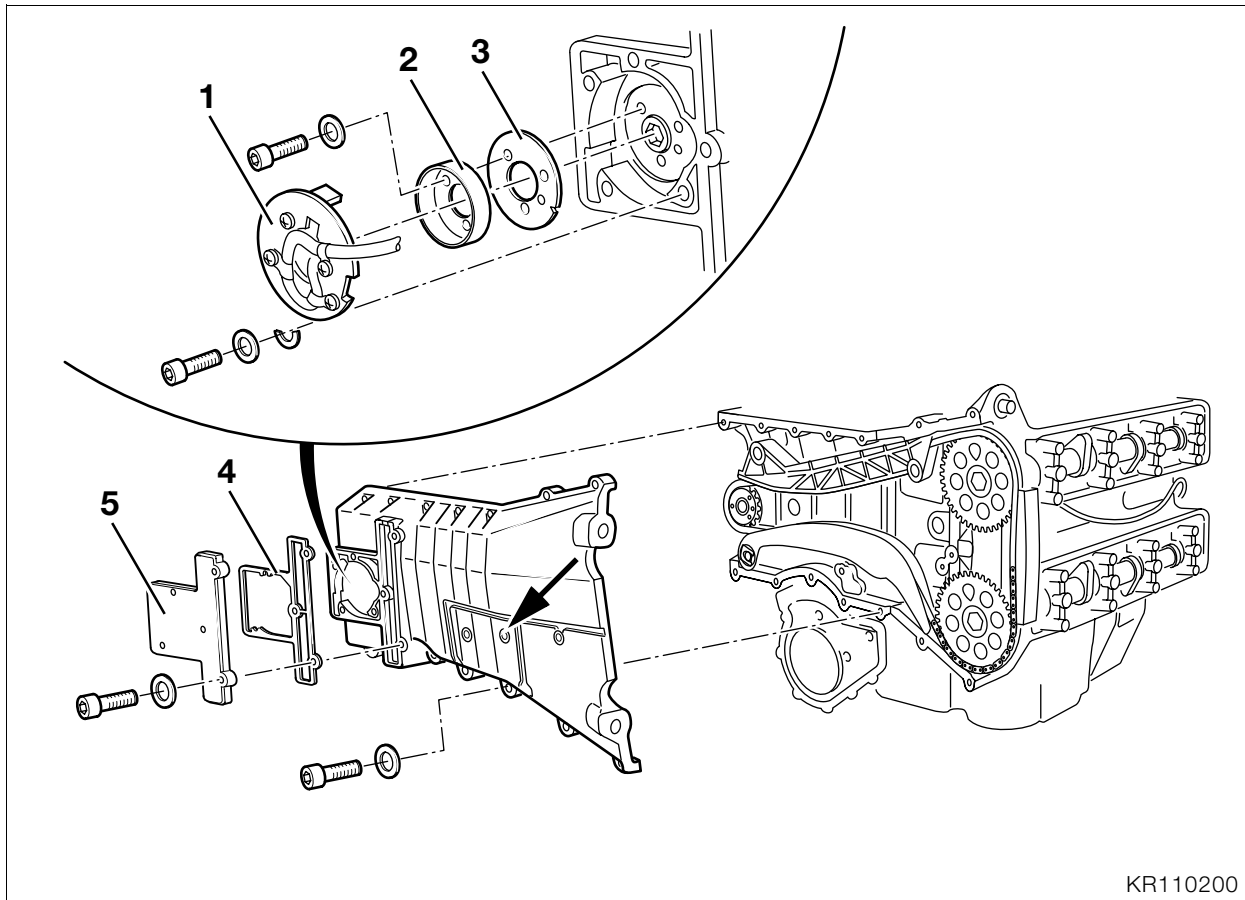
- Insert pump shaft (5) (lightly oiled) into the housing.
- Place sliding sleeve, **BMW No. 11 6 722**, on pump shaft.
- Insert shaft sealing ring (8) into the guide sleeve of pressing-in tool, **BMW No. 11 6 723**, and press in with the open side facing inwards.
- Remove the sliding sleeve.
- Press in slipping seal (9) (free of grease) with pressing-in tool, **BMW No. 11 6 724**.

Installing water pump impeller

- Install water pump impeller (11) with spacing bushing (10). When tightening, hold the pump shaft to prevent it from turning.

Tightening torque:

Water pump impeller 33 Nm



KR110200

Removing timing chain cover

Removing ignition pulse generator

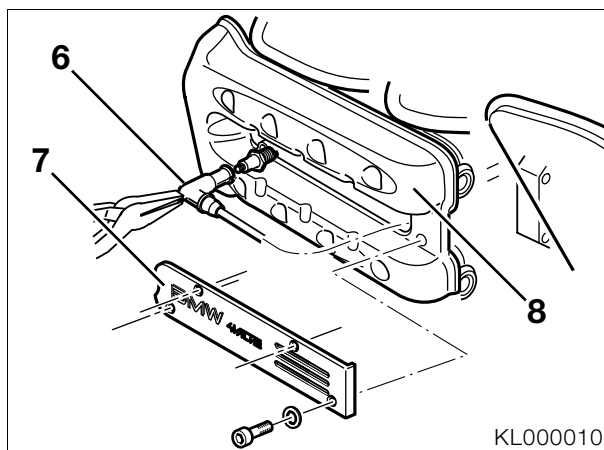
- Remove cover (5).
- Remove gasket (4).

Removing cylinder head cover



Note:

Mark the position of the magnetic gate in relation to the engine block, or remove it in the top dead centre (TDC) position.



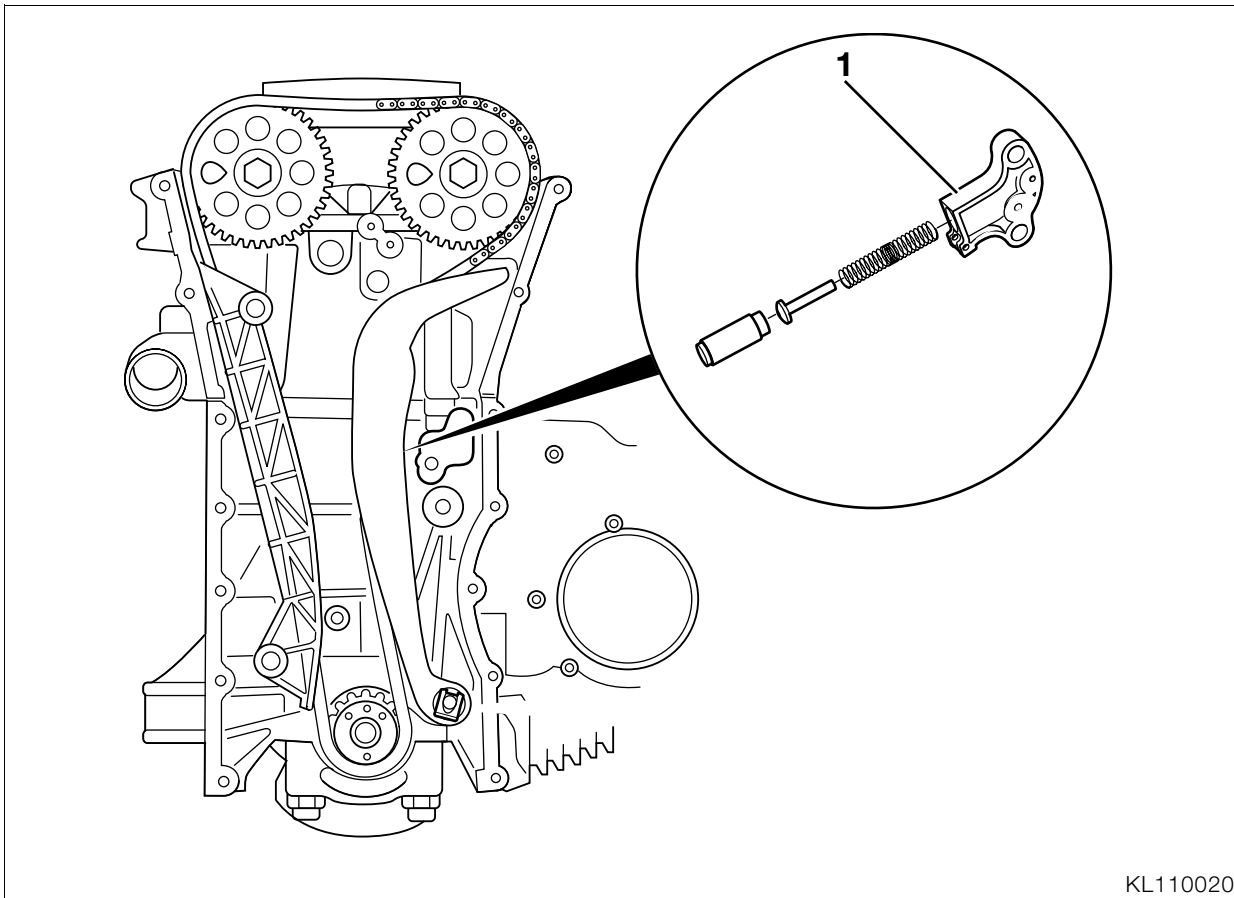
KL000010

- Remove magnetic gate (1), noting the presence of semi-circular shims.
- Remove rotor (2) and take off adjusting disc (3).

Removing timing chain cover

- Remove the screw plug (arrow) for the pin in the timing case cover.

- Remove heat shield (7).
- Pull off spark plug caps (6) with flat pliers.
- Remove cylinder head cover (8).



KL110020

- Use pin, **BMW No. 11 6 740**, to prevent chain tensioner (1) moving.



Note:

Turn the camshaft in its normal direction of rotation until oil is forced out of the chain tensioner and the pin can be inserted all the way.

- Disconnect oil pressure switch and water pump temperature switch cables. Pull the cables out through the cable duct in the timing case cover.
- Remove the screws, loosen the timing case cover with light blows of a plastic-faced hammer and remove.
- Slacken the chain tensioner and remove it from the timing case cover.

Removing/installing sealing ring in timing case cover

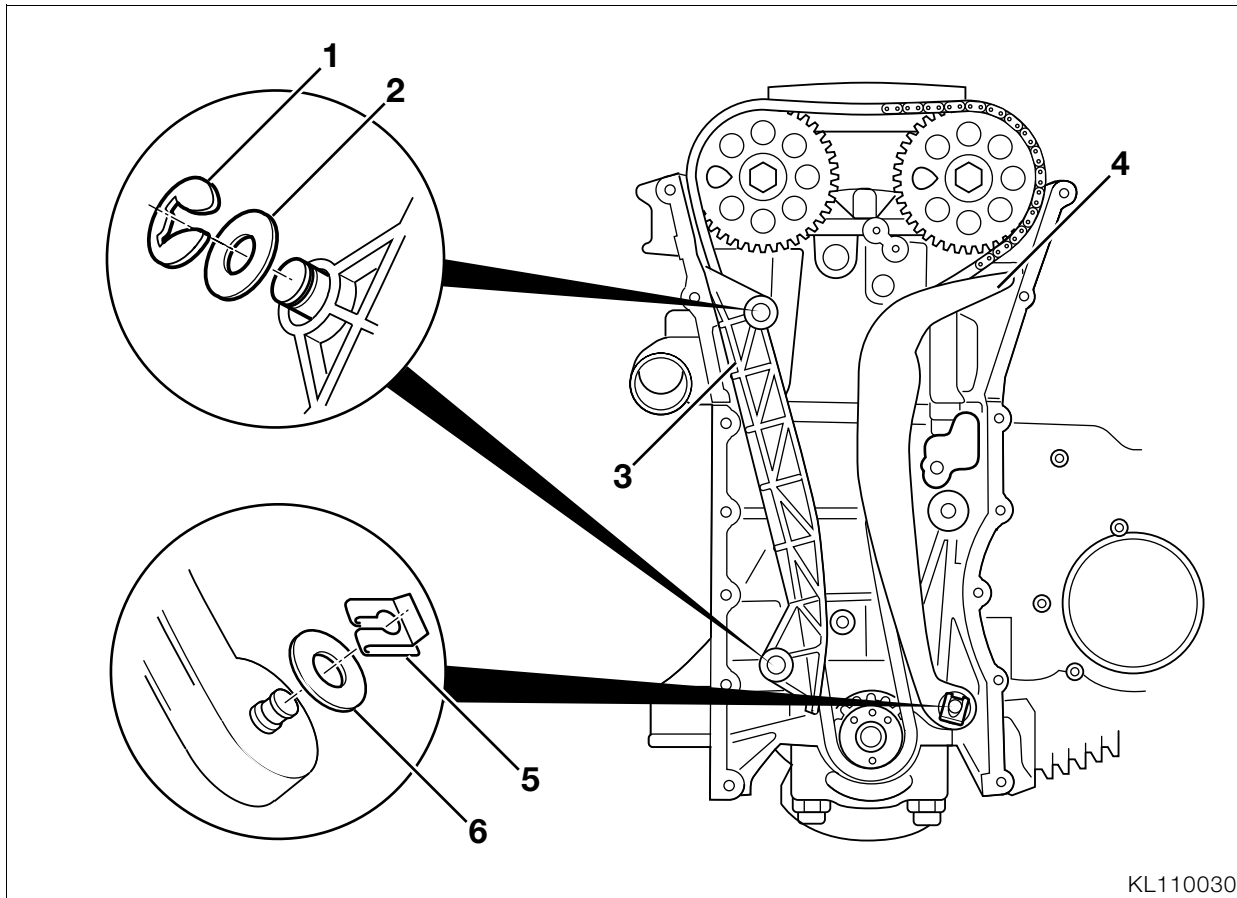
- Using a drift, drive the sealing ring inwards to remove.



Note:

Remove traces of paint and clean the seat of the sealing ring.

- Press the sealing ring in from the inside using pressing-in tool, **BMW No. 11 1 610**, and handle, **BMW No. 00 5 500**.



KL110030

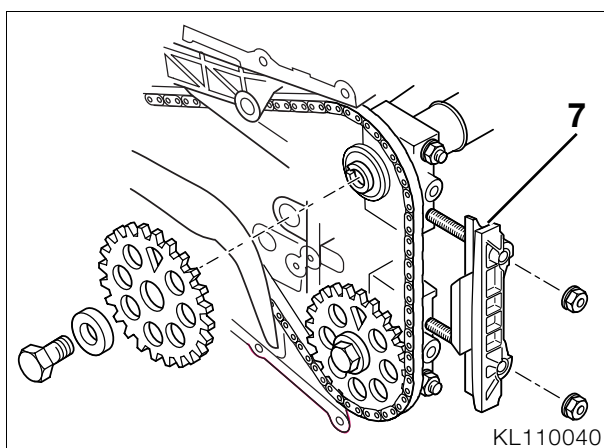
Removing the timing chain



Caution:

Centre the piston in the cylinder (cylinder 1 approx. 90° before top dead centre), to avoid damage to the valves and piston. Turn the crankshaft in the counter-clockwise direction only.

Removing camshaft chain sprockets



KL110040

- Slacken the nuts securing the slide rail (7).

- Remove the screws securing the chain sprockets, holding the camshaft at the hexagon.
- Remove the chain sprockets and slide rail.

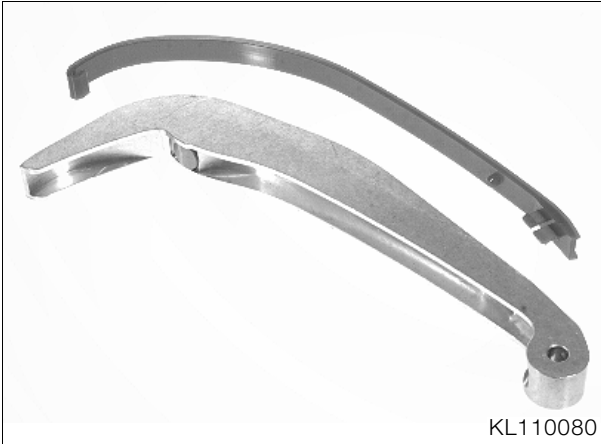
Removing chain tensioner rail

- Remove the keeper (5) and washer (6).
- Remove tensioner rail (4).

Removing chain guide rail

- Remove snap rings (1) and washers (2) from locating pins.
- Remove guide rail (3) with bushing and timing chain.

Renewing tensioning strap for chain tensioner rail

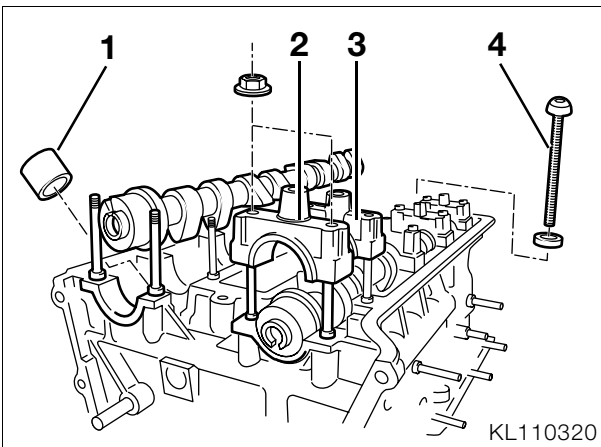


- Unclip the tensioning strap from the tensioner rail.

Removing, disassembling and assembling cylinder head

Removing camshafts

- Turn the camshafts until the tips of the cams are clear.



- Remove the bearing caps (2) for the thrust bearings first, to prevent tilting.
- Uniformly release the screws securing the radial bearing caps (3) and remove the bearing caps.
- Remove the camshafts.

Removing bucket-type tappets



Note:

Make a note of which bucket-type tappets belong to which valves.

- Use the rubber suction device, **BMW No. 11 3 251**, to pull the bucket-type tappets (1) out of the cylinder head.

Removing cylinder head

- Remove the spark plugs and ignition cables.
 See Group 12

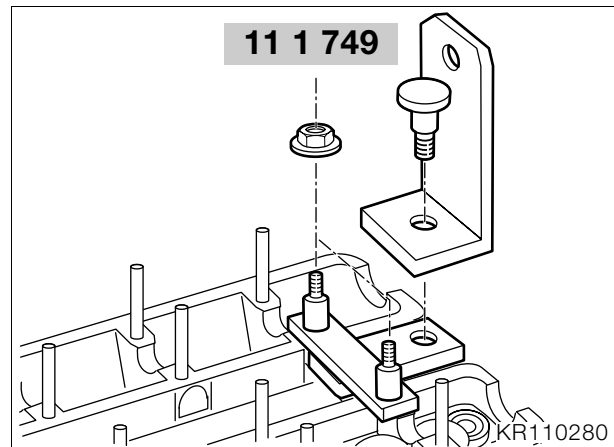


Note:

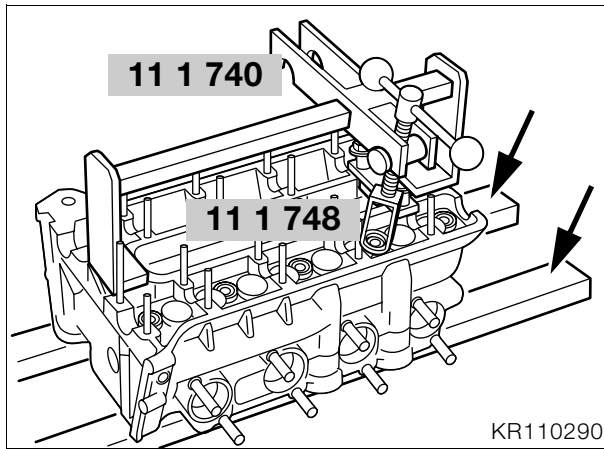
Place a drip tray in position underneath the engine to catch escaping coolant.

- Release the cylinder head screws (4) using Torx socket T 50, **BMW No. 00 2 630**.
- Remove the cylinder head, tapping the gasket lightly with a plastic-headed hammer to release, if necessary.

Removing valves



- Install support plate, **BMW No. 11 1 749**, for the valve spring compressor at the rear of the cylinder head (not the timing end).

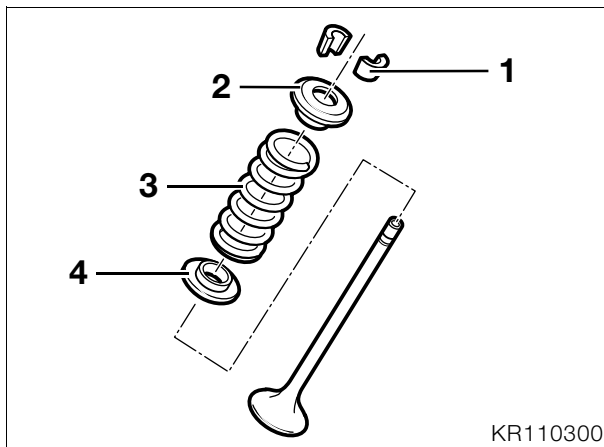


- Install the valve spring compressor, **BMW No. 11 1 740**.
- Use compressor cage, **BMW No. 11 1 748**.

⚠ Caution:

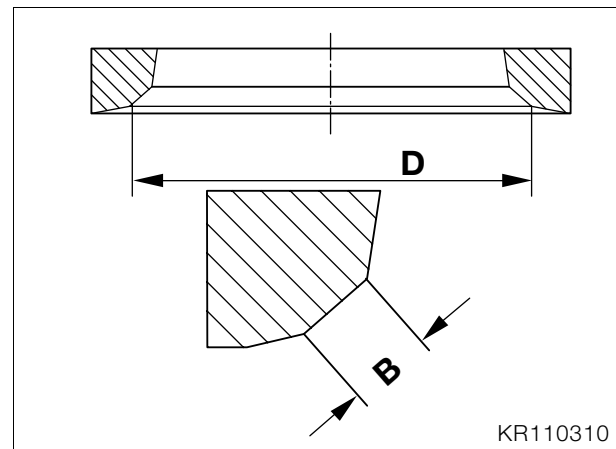
Centre the compressor cage in order to avoid damaging the tappet bores.

- Place the cylinder head on suitable blocks (arrows) to ensure adequate clearance for valve removal.



- Tap the valve collets (1) lightly to release.
- Compress the valve spring (3) using compressor cage, **BMW No. 11 1 748**.
- Remove valve collets (1) with a magnetised screwdriver.
- Release valve spring (3) and remove upper spring retainer (2), valve spring and lower spring retainer (4).
- Remove the valve stem seal with special pliers, **BMW No. 11 1 250**.

Machining valve seat

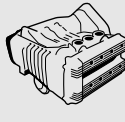


D = valve diameter
B = valve seat width

- Machine the valve seat with turning tool, **BMW No. 00 3 530**.
- When remachining, the correct width of the valve seat must always be maintained.

📄 Note:

If valve seat has been machined, install and grind in new valve.



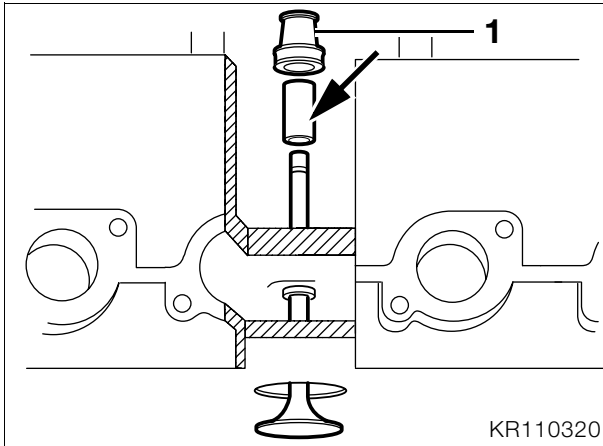
Installing valve and valve stem seal



Note:

If a valve is removed, the valve stem seal must be renewed.

- Oil the stem when installing the valve.
- Insert the lower spring retainer.



- Place a shrink-fit tube approx. 20 mm (0.79 in) long on the valve stem and heat it up.
- Drive in valve stem seal (1) with the assembly tool, **BMW No. 11 5 602**, until resistance is felt.



Caution:

Remove the shrink-fit sleeve from the valve stem.

-
- Install the valve spring.
- Install the upper spring retainer.

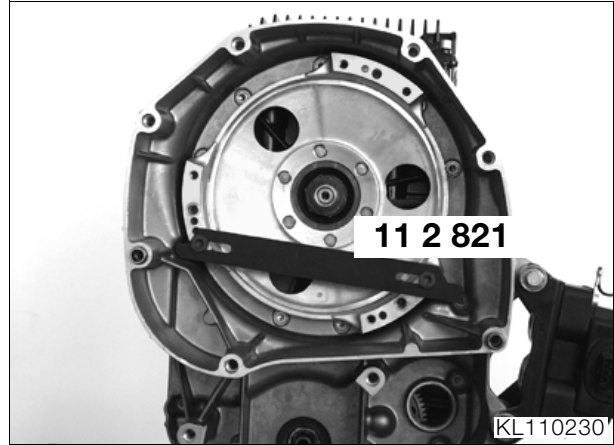


Caution:

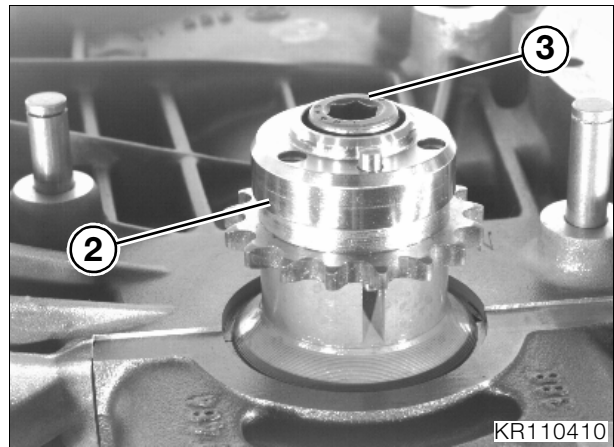
Centre the compressor cage in order to avoid damaging the tappet bores.

- Compress the valve spring, lightly oil the valve collets and insert them, then release the spring.
- Clean and oil the bucket-type tappet and install.

Removing/installing crankshaft gear and rotor flange



- Mount the retaining device, **BMW No. 11 2 821**, on the clutch housing as shown.



- Release the screw (3) securing the crankshaft gear and rotor flange.
- Remove the rotor flange (2), tapping it lightly to release if necessary, and remove the gear.
- Installation is the reverse of the removal procedure.



Tightening torque:

Rotor flange 50 Nm

Removing crankshaft

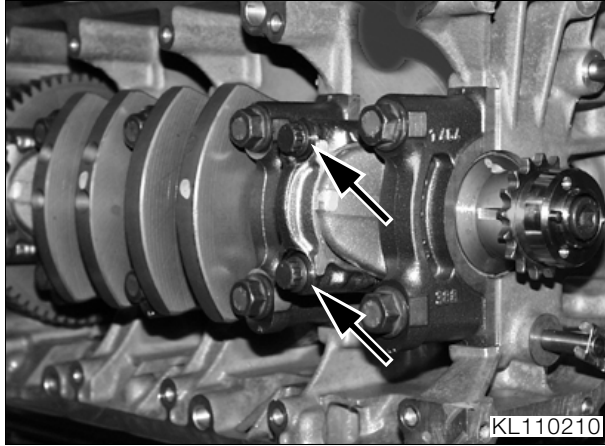


Note:

Remove the driver first if the intermediate flange is to be removed after the crankshaft.

Removing big end bearings

- Bring pistons 1 and 4 to BDC position.



- Release the connecting rod screws (arrows).
- Carefully release and remove the big-end bearing caps.

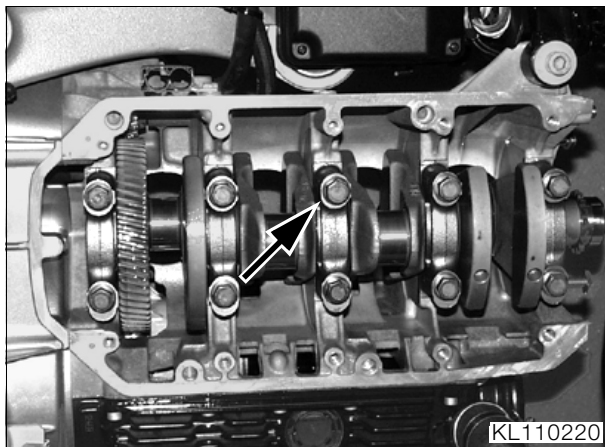


Caution:

Make a note of which caps belong to which connecting rods, and note the installed positions.

- Repeat the work sequence at cylinders 2 and 3.

Removing main bearings (engine installed)



- Loosen all but one (arrow) of the main bearing bolts.



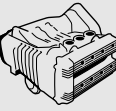
Note:

Make a note of which caps belong to which main bearings, and note the installed positions. Bearing caps 1 - 3 are marked for identification. Bearing 4 (thrust bearing) and bearing 5 are not marked. Cylinder 1 = timing end of engine.

- Remove the bearing caps.
- Remove the final bolt.
- Take off the bearing cap, pressing the crankshaft in towards the housing while doing so.

Removing main bearings (engine removed)

- Remove all main bearing bolts and remove the bearing caps and the crankshaft.



Removing, disassembling and assembling piston with conrod

Removing piston with conrod

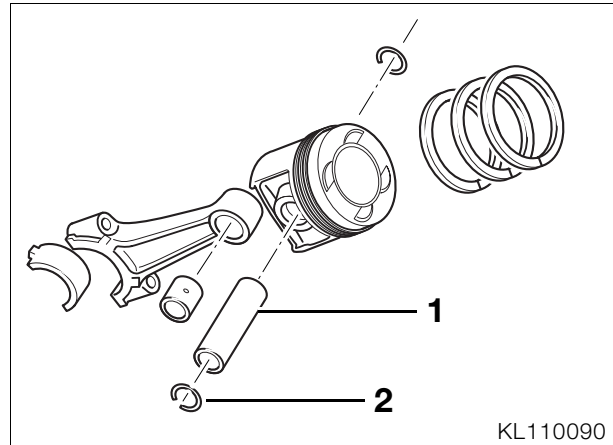


Note:

Make a note of which pistons belong to which cylinders, and note the installed positions.

- Working from the crankshaft side, press the piston with conrod out of the cylinder.

Disassembling piston



- Remove the wire circlip (2) at one side.
- Press out piston pin (1) with drift, **BMW No. 11 6 710**.
- Carefully remove piston rings with piston ring pliers.

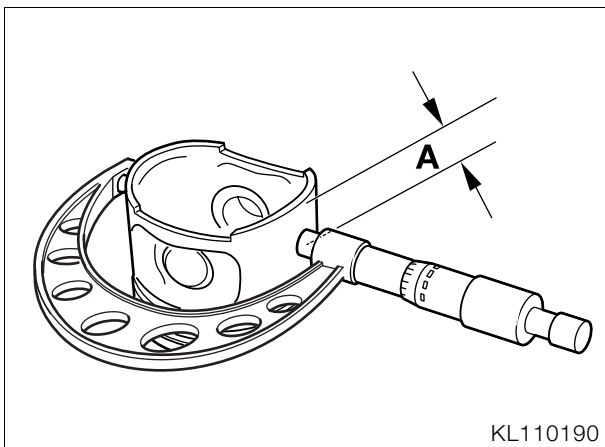


Note:

Note the installed position.

- Clean the piston.

Checking piston dimensions

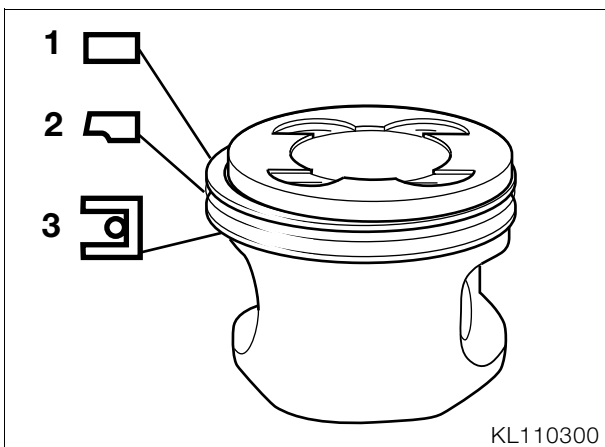


- Use caliper gauge to measure the piston diameter at planes "A".

Dimension "A" 10 mm (0.4 in)

- Measure piston ring edge clearances with feeler gauge.
- Measure the end gaps of the piston rings in the cylinder.
- For correct edge clearances and end gaps, see Technical Data.

Assembling pistons



- Install piston rings, using piston-ring pliers.

Note:

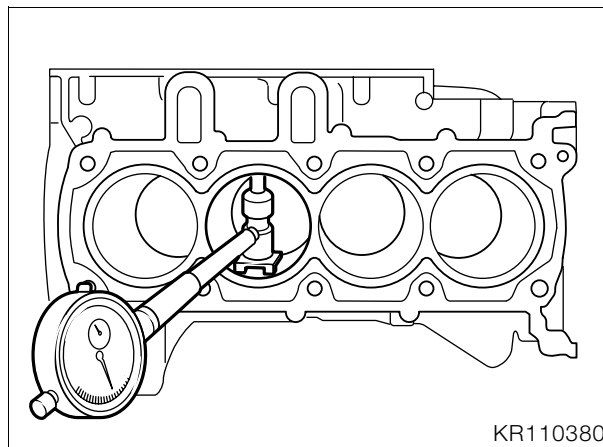
The "Top" inscription is uppermost and according to the installed position previously noted.

- 1st groove: Rectangular-section ring.
- 2nd groove: Taper-face oil-control ring; note pin for butt joint.
- 3rd groove: U-Flex ring with spring.

Note:

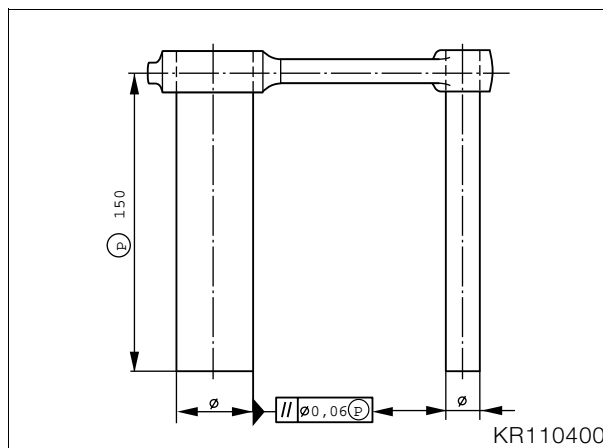
The gap in the spring must be offset by 180° in relation to the Flex ring gap.

Checking cylinder dimensions



- Measure cylinder bores with inside-diameter measuring gauge.
- Measure each cylinder bore at 3 levels, taking two measurements at right angles at each level: in the direction of forward travel and at a right angle to it.

Checking that conrod bores are parallel



- The difference over the reference length "P" must not exceed 0.06 mm (0.002 in).

Reference length "P" 150 mm (5.9 in)

Assembling pistons and conrods

- Note weight tolerances when replacing conrods: use only conrods of the same weight class.

Weight tolerance ± 4 g (0.14 oz.)

- Weigh the conrods to determine the weight class.

Weight classes

Class	Weight in g (oz.)
0	413 ... 416.9 (14.578...14.716)
1	417 ... 420.9 (14.720...14.857)
2	421 ... 424.9 (14.861...14.998)
3	425 ... 428.9 (15.002...15.140)
4	429 ... 432.9 (15.143...15.281)
5	433 ... 436.9 (15.285...15.422)
6	437 ... 440.9 (15.426...15.563)
7	441 ... 444.9 (15.567...15.704)

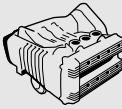
- Applying light pressure, push the piston pin through the small-end bushing.



Note:

The oil bore in the small-end bore is at the top in the installed position. The arrow on the piston crown must point in the forward direction of travel.

- Install only pistons of the same weight group.



- Check the marks on the piston crowns (arrow) to determine the weight class.

Weight classes for pistons

Weight of piston in g (oz.)	189 ...195 (6.671...6.883)	195 ... 210 (6.883...7.413)
Marking	-	+



Caution:

Always use two new wire circlips per piston pin when reassembling.

- Assemble piston and conrod.

Measure backlash at the countershaft



Note:

Abnormal noises, especially at low engine speeds, could be due to excessive backlash between the crankshaft/countershaft gearing.

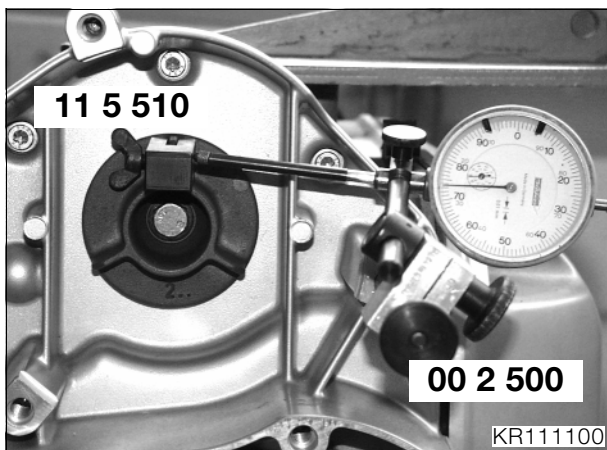


Caution:

Always measure backlash with the engine cold.

– Remove alternator.

➔See Group 12



- Secure dial-gauge holder, **BMW No. 00 2 500**, to gearbox intermediate flange.
- Use the clamping screw to secure the clamp, **BMW No. 11 5 510**, to the upright vane of the driver.
- Adjust the dial gauge, **BMW No. 00 2 510**, such that the needle touches the mark on the tool (3 mm/0.1 in from outside edge) on the reference face.
- Manually turn the driver and note dial-gauge reading.
- Remove the clamp, **BMW No. 11 5 510**.
- Turn the crankshaft to rotate the driver through 120°.
- Secure the clamp to the second driver vane and use the dial gauge to measure the backlash.
- Take a third measurement.
- Calculate the average over the three measured values.
- Replace the countershaft if the average obtained from the three measurements is at least 0.03 mm (0.001 in).

Determining countershaft

Average of 3 measurements	Colour code	Stage
0.03 mm ... 0.06 mm (0.0012...0.0024 in)	green	- 0.040 mm (- 0.0016 in)
greater than 0.06 mm (0.0024 in)	yellow	- 0.080 mm (- 0.0031 in)

Removing intermediate flange

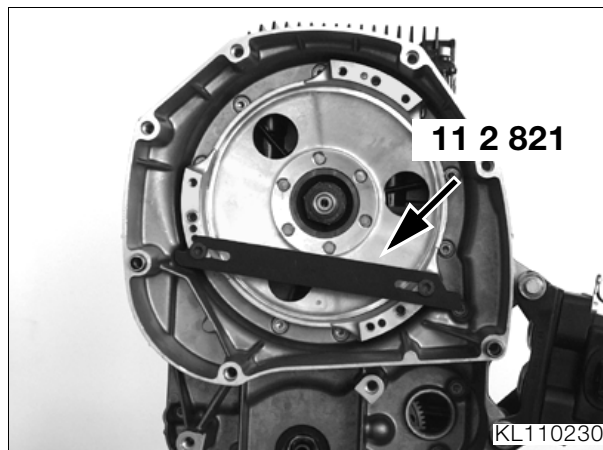
- Remove the ignition coil.
- ➔See Group 12
- Remove the clutch.
- ➔See Group 21

Removing driver

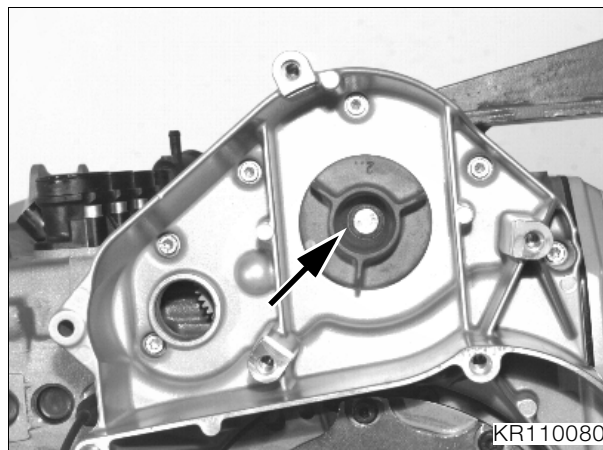


Note:

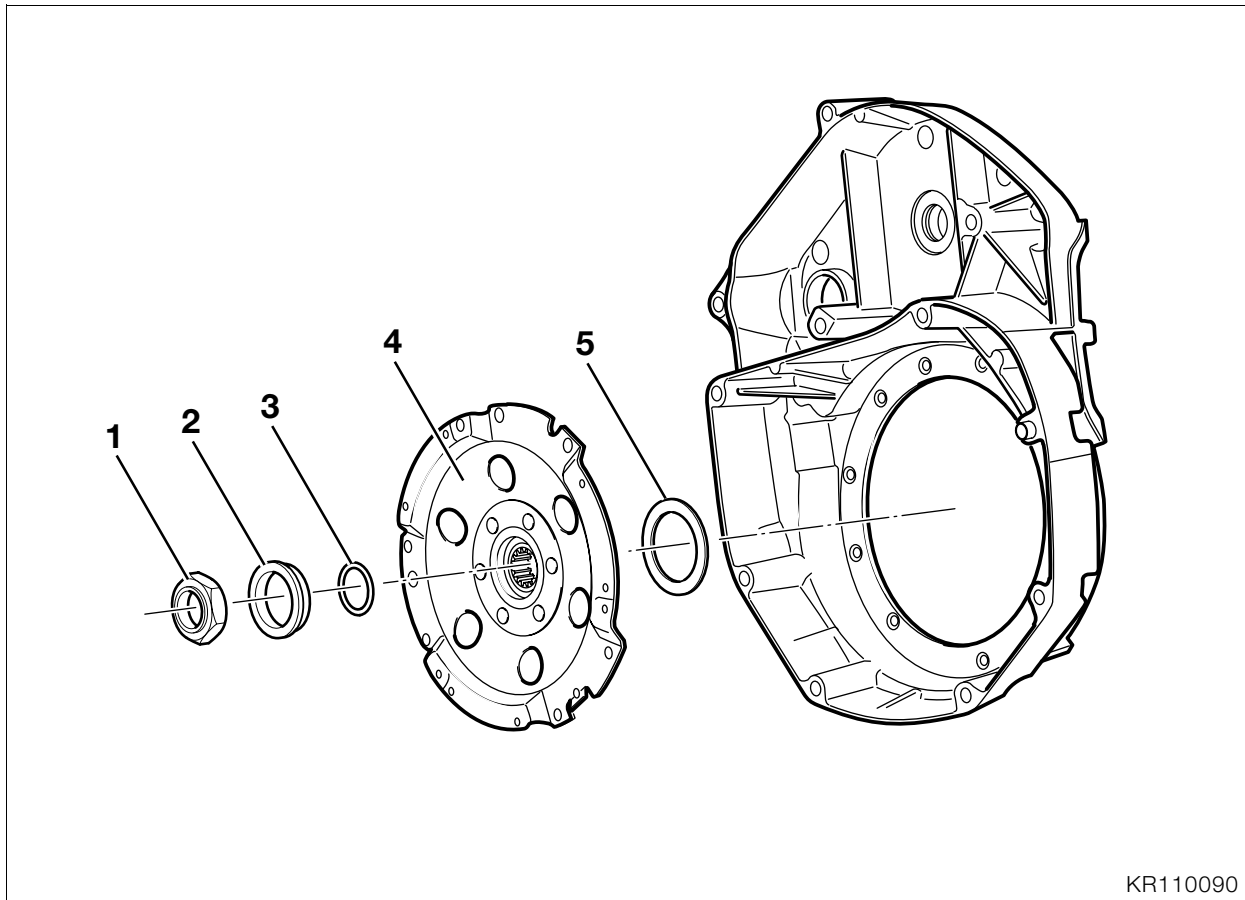
The driver can be removed only with the crankshaft installed.



- Mount the retaining device, **BMW No. 11 2 821**, as shown (arrow).



- Remove screw (arrow).
- Pull the driver off by hand.
- Use puller, **BMW No. 00 8 400**, if the driver is a tight fit on the shaft.



KR110090

Removing clutch housing

⚠ Caution:

After unscrewing nut (1), do not strike the output shaft or turn the engine over, so that output shaft endplay cannot cause damage to the crankcase or pump housing.

- Unscrew nut (1) and remove thrust ring (2).
- Rock the clutch housing backwards and forwards until the O-ring (3) is accessible and remove the O-ring.

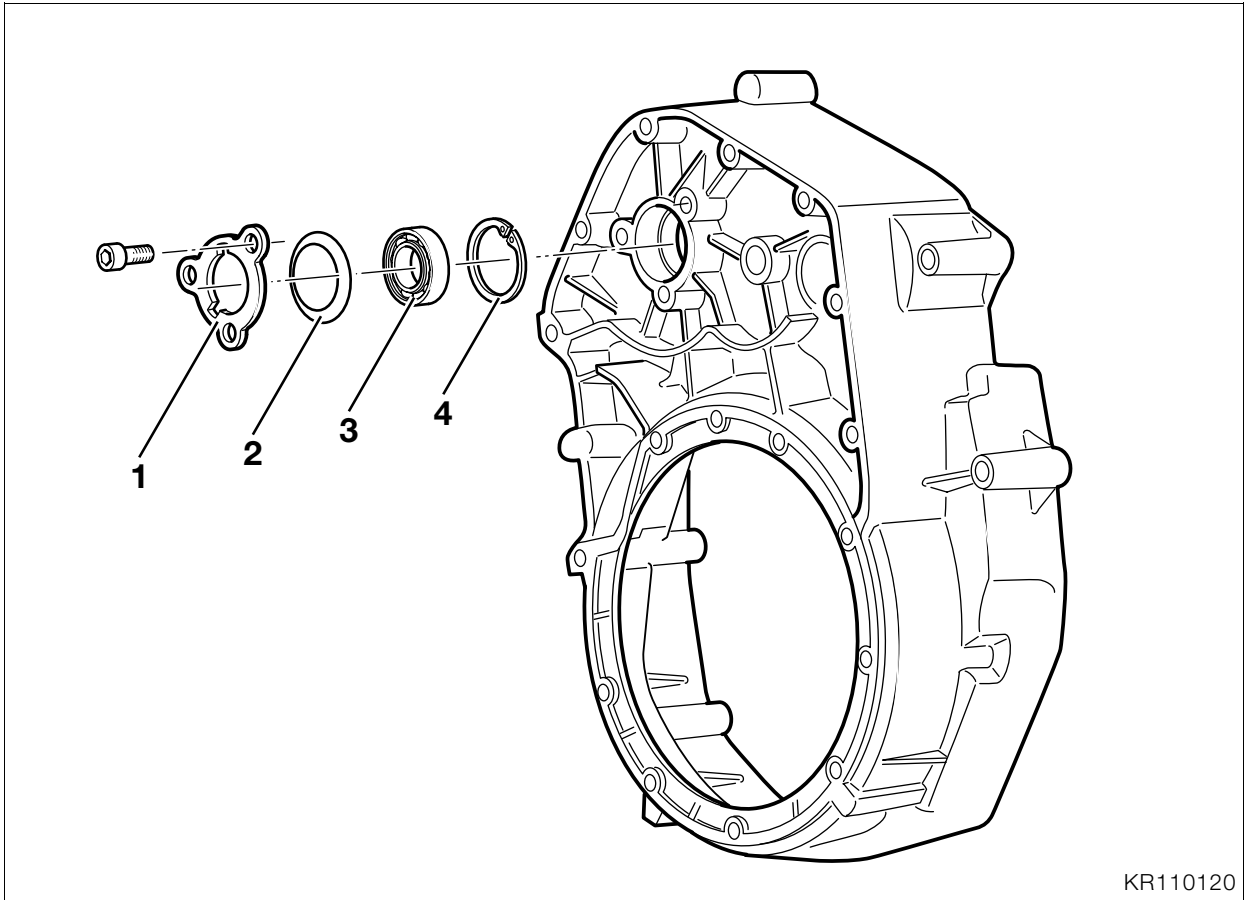
⚠ Caution:

Do not lever the puller against the stub shaft.

- Pull off clutch housing (4), noting the presence of thrust washer (5).

Removing intermediate flange

- Use Torx socket T 30, **BMW No. 00 2 600**, to release the screws.
- Remove the intermediate flange and loosen the gasket by tapping lightly with plastic-headed hammer.



KR110120

Disassembling/assembling intermediate flange

Removing the driver bearing

- Remove thrust plate (1).
- Remove cup spring (2).
- Remove ball bearing (3) with puller, **BMW No. 00 8 570**, and internal puller 21/3, **BMW No. 00 8 574**.
- Remove retaining ring (4).

Installing driver bearing

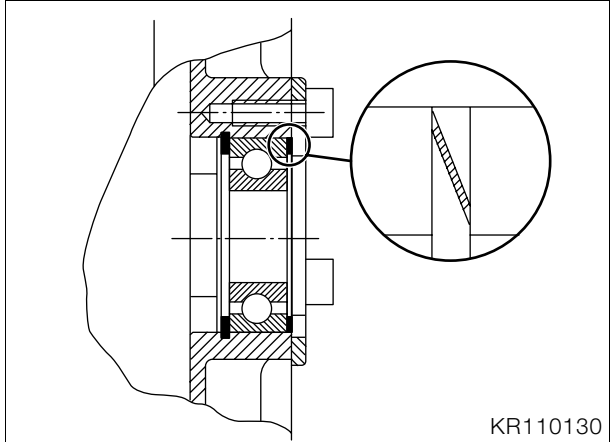
- Install retaining ring (4).



Note:

Use temperature measuring device, **BMW No. 00 1 900**, to check heat rise.

- Heat the intermediate flange at the bearing seat to approx. 120 °C (248 °F).
- Press the ball bearing into the bore until seated against retaining ring.



KR110130

- Insert the cup spring with the larger diameter facing the bearing.
- Install the thrust plate with the large cutout at the top.



Tightening torque:

Thrust plate (clean thread + Loctite 243)..... 9 Nm

Removing/installing shaft sealing ring for driver

- If the intermediate flange has been removed, lever out the sealing ring.



- If the intermediate flange is installed, use puller, **BMW No. 00 5 010**, to remove the sealing ring.

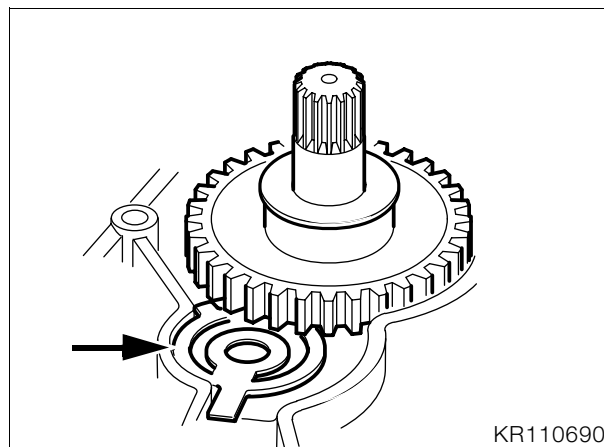


Note:

Clean the sealing ring seat.

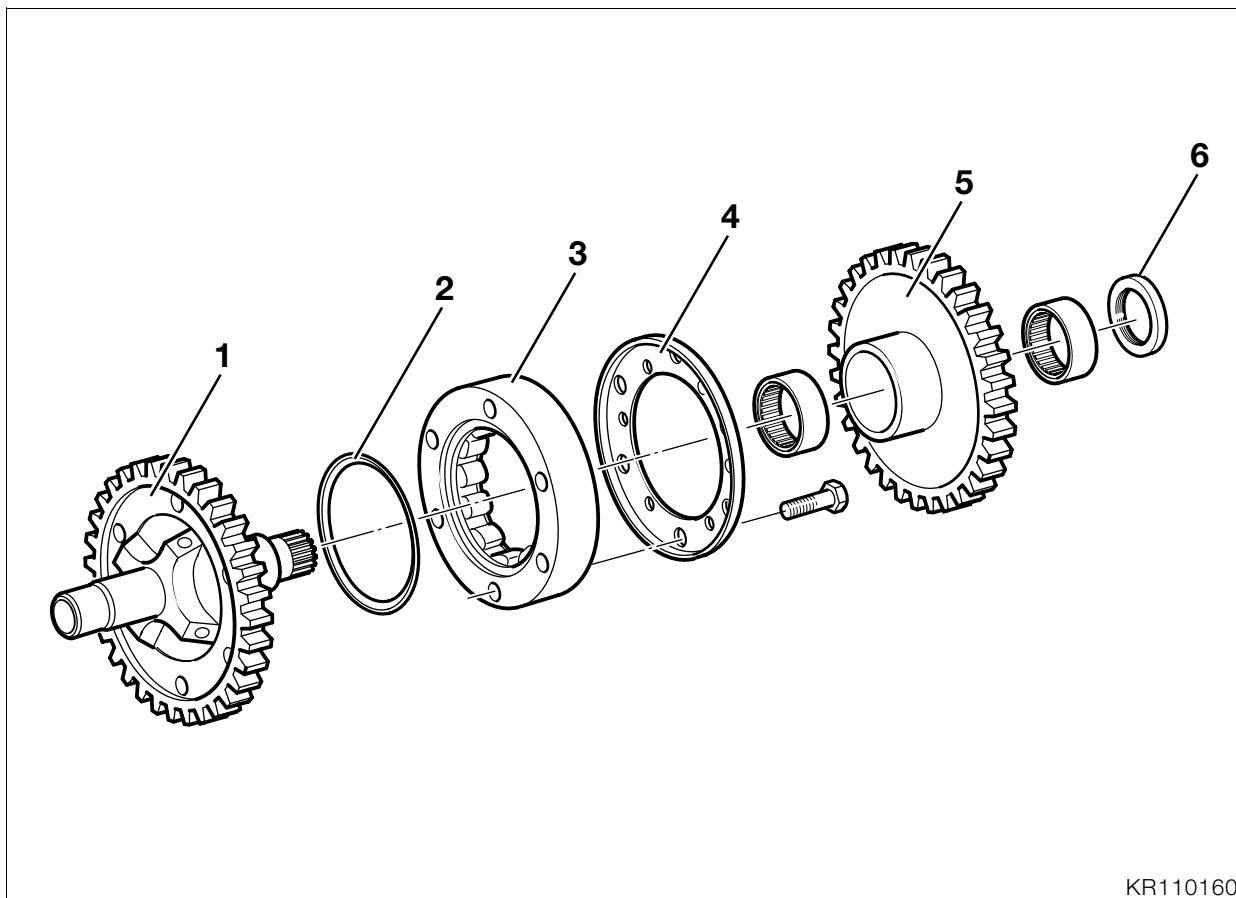
- Pre-shape the sealing ring with the thumbs and drive it in (in a dry condition) with a drift, **BMW No. 11 1 620**, and handle, **BMW No. 00 5 500**.

Removing countershaft and layshaft with freewheel



- Pull the countershaft and layshaft out of the crankcase together.
- Note special spring (arrow).





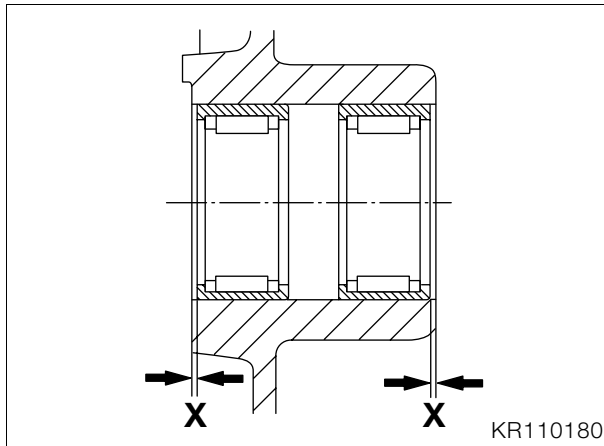
KR110160

Disassembling/assembling freewheel

Disassembling freewheel

- Pull washer (6) and freewheel gear (5) off the layshaft (1).
- Clamp the layshaft into a vice with soft jaws (smooth side down).
- Remove cover plate (4).
- Pull off freewheel cage (3).
- Take out cup spring (2).
- Press out the needle bearing.

Assembling freewheel



- The inscription on the needle roller bearing faces down.
- Press the needle bearings into the freewheel gear, making sure that distance (X) from edge is uniform.

Distance "X" 0.2...0.6 mm (0.007...0.023 in)

- Install the cup spring with the larger diameter facing the layshaft.
- Insert the freewheel (oiled with engine oil) into the outer race.
- Position the outer race with freewheel on the layshaft (sprag toward cover plate); the cup spring must engage the outer race.
- Install the cover plate.

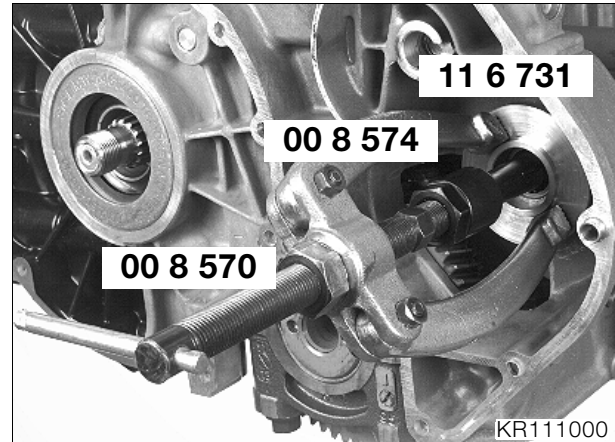
Tightening torque:

Cover plate..... 10 Nm

- Push the freewheel gear on to the layshaft while turning it clockwise.
- Push the thrust washer on to the layshaft.

Removing/installing needle bearing for layshaft and shaft sealing ring in crankcase

Removing bearing



- Place support ring, **BMW No. 11 6 731**, in position and remove bearing with puller, **BMW No. 00 8 570**, and internal puller 21/3, **BMW No. 00 8 574**.
- If a defective bearing cannot be pulled out, carefully cut through the needle roller race (with a grinder).

Removing shaft sealing ring

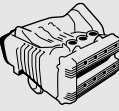
- Lever out the shaft sealing ring.

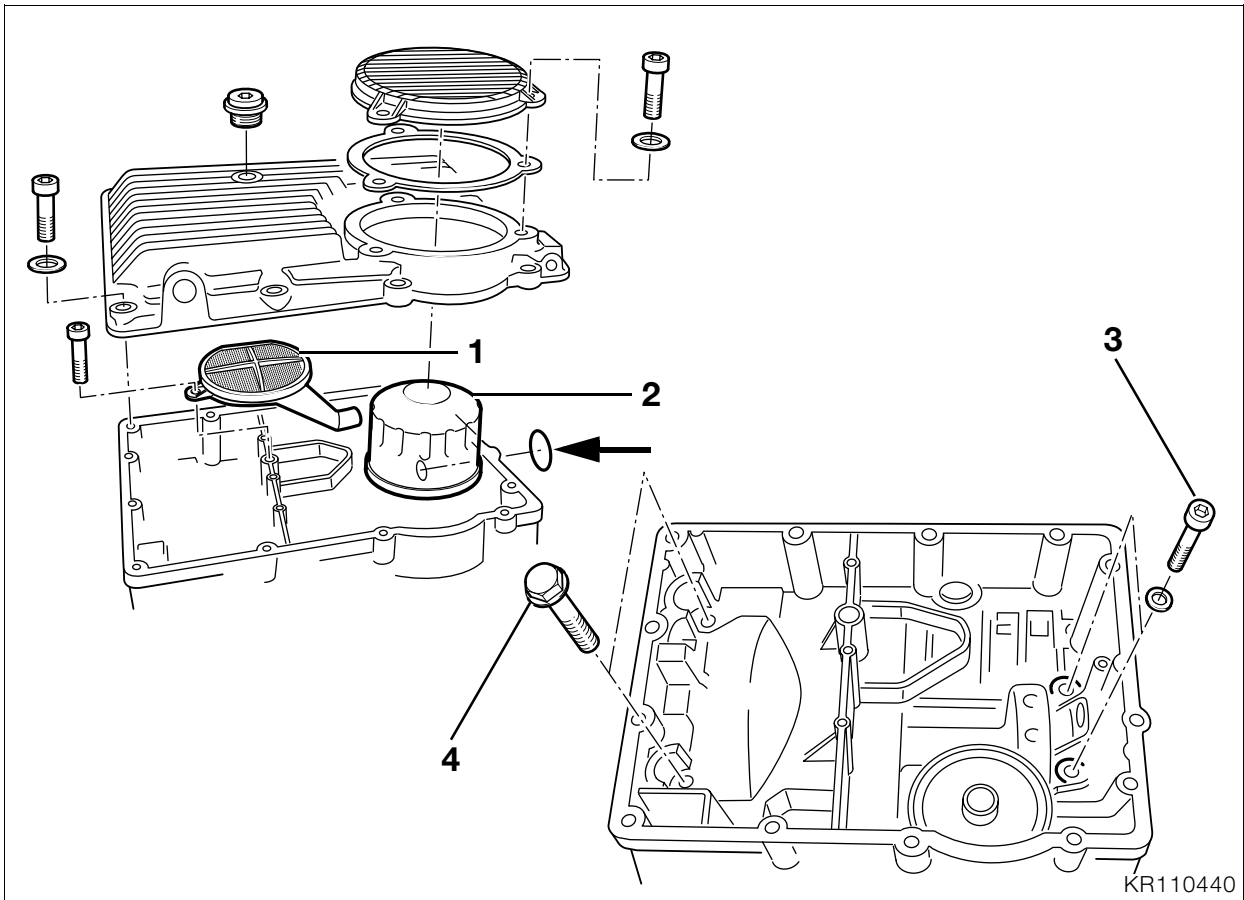
Installing shaft sealing ring

- Clean the sealing ring seat.
- Drive in the new shaft sealing ring with a drift, **BMW No. 11 6 732**.

Installing bearing

- The inscription on the needle roller bearing faces outwards.
- Drive the bearing in with a drift, **BMW No. 11 6 733**.





Removing output shaft

Removing oil sump

- Remove the screws.
- Loosen the gasket with light blows of a plastic-faced hammer and take off the oil sump.

Removing the oil mesh strainer and oil filter

- Remove the screw and pull off oil mesh strainer (1).
- Remove the O-ring for the oil mesh strainer (arrow) from the lower part of the crankcase.
- Unscrew oil filter (2) with the oil filter wrench, **BMW No. 11 4 650**.

Removing lower part of crankcase

- Remove the screws securing the lower part of the crankcase.
- Remove screws (4) for the shouldered bearing and screws (3) for the needle roller bearing.
- Loosen the gasket with light blows of a plastic-faced hammer, and remove the lower part of the crankcase. Note the O-rings for the water and oil passages.
- Carefully lift out the output shaft; the needle roller bearing and circlip are loose on the shaft.

Removing/installing oil level sight glass

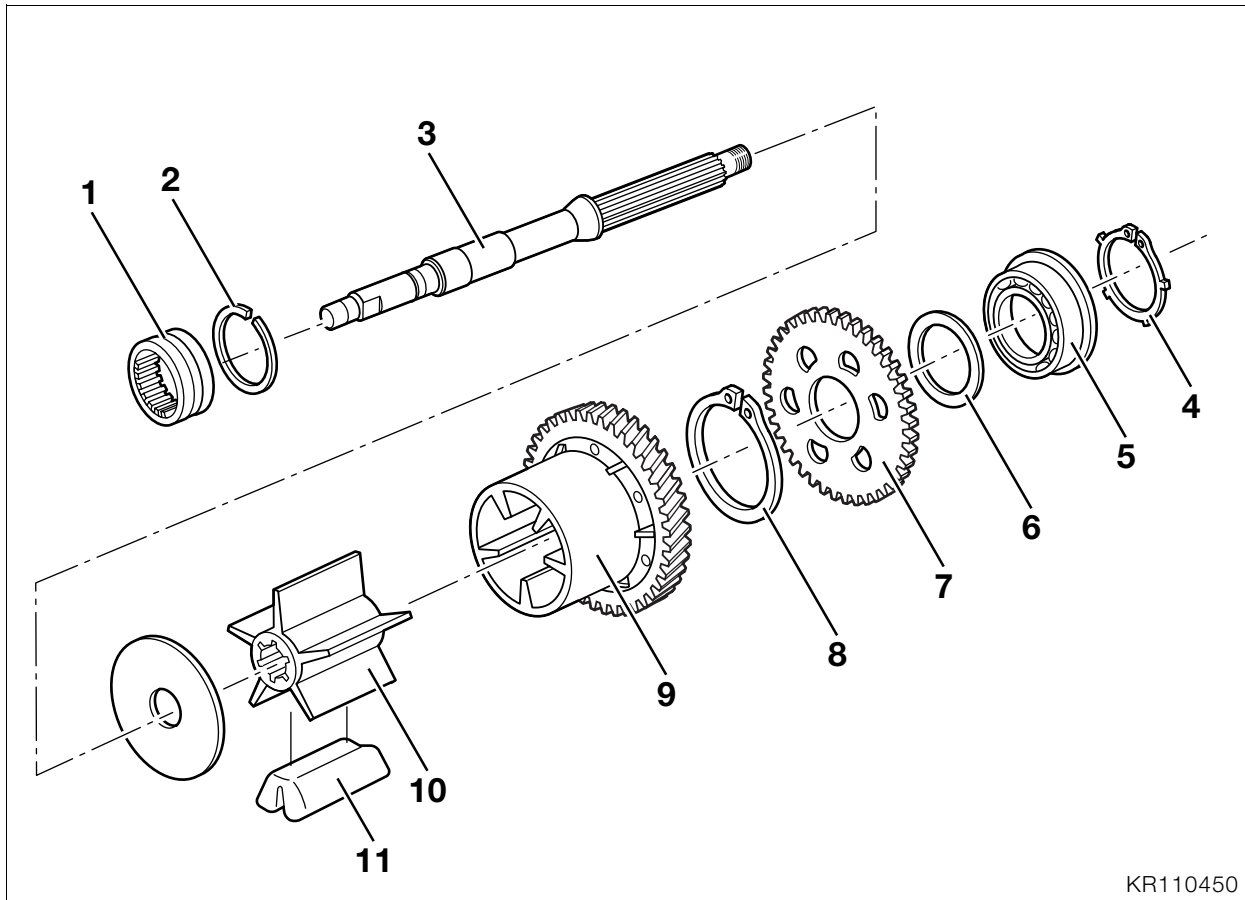
- Using a large screwdriver, pierce the plastic window and lever out the oil level sight glass.



Note:

Clean the sealing face.

- Coat the outer circumference of the oil level sight glass with engine oil.
- Drive in the oil level sight glass with a drift, **BMW No. 00 5 550**.



KR110450

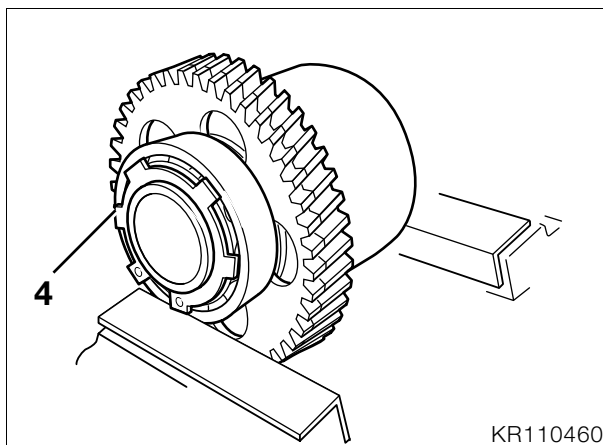
Disassembling/reassembling output shaft

Disassembling output shaft

- Remove needle roller race (1) and circlip (2).
- Remove output shaft (3) from the damper housing (9) and remove rubber dampers (11).
- Drive the output shaft out of the inner section of the damper (10) with a plastic-faced hammer.

Disassembling tensioning gear

- Clamp the damper housing into a vice with soft jaws, to take the load off circlip (4).
- Remove circlip (4) with circlip pliers.
- Insert a puller, **BMW No. 00 8 400**, in the opposite cutouts of the gearwheel and pull ball bearing (5) off with pressure block, **BMW No. 33 1 307**.
- Remove spacing ring (6), turn tensioning gearwheel (7) clockwise with counter-holder, **BMW No. 12 4 600**, and pull upwards.
- Remove tensioning spring (8).



KR110460



Note:

Inspect all parts for damage or wear.

Assembling tensioning gear

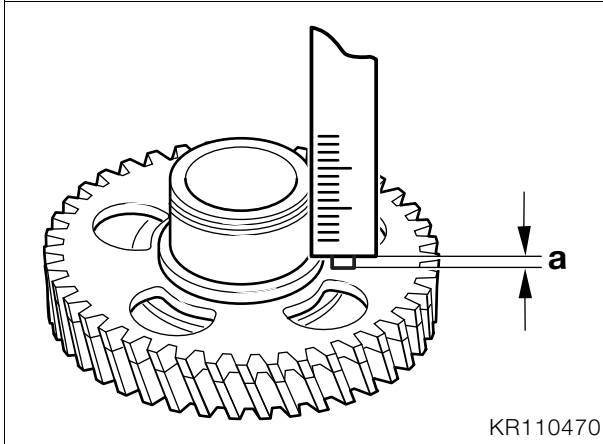
- Insert the tensioning spring.
- Engage the tensioning spring on the pin in the tensioning gear and turn it clockwise with the counter-holder, **BMW No. 12 4 600**, until the pin of the tensioning gear engages the hole in the gear.
- Clamp the tensioning gear with damper housing in a vice with soft jaws.



Note:

Use temperature measuring device, **BMW No. 00 1 900**, to check heat rise.

- Heat the ball bearing to approx. 80 °C (176 °F) and place it in position (with shoulder uppermost).

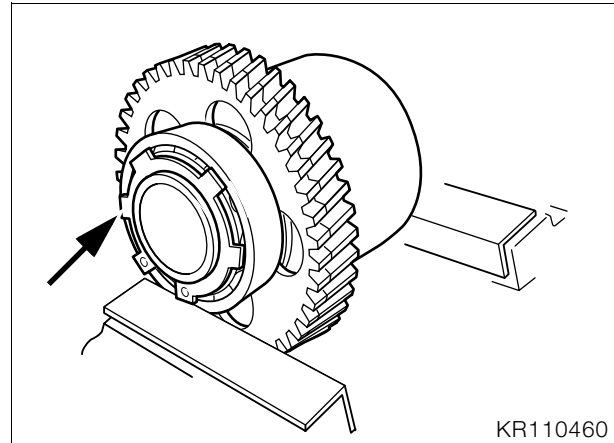


- Measure distance "a" from the base of the ball bearing seat to the tensioning gear.

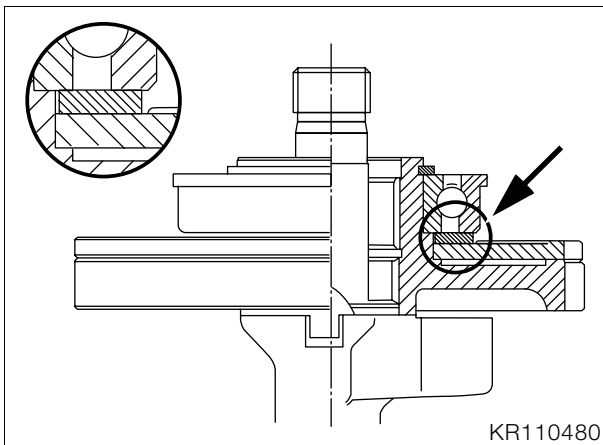


Caution:

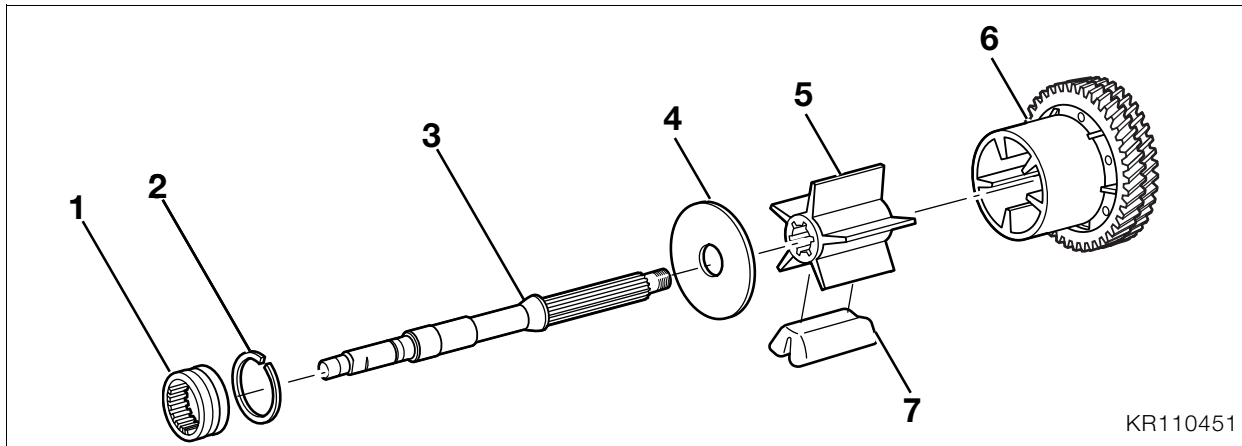
The thickness of the spacing washer must never exceed this measurement.



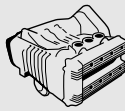
- Clamp the damper housing and the ball bearing together in the vice (with soft jaws).
- Using circlip pliers, insert the snap ring (arrow) into the groove in front of the bearing.
- The circlip must snap completely into the groove.



- Place a suitable spacing washer (arrow) on the tensioning gear.



KR110451



Assembling damper

- Insert the rubber dampers (7) into the damper housing (6).



Note:

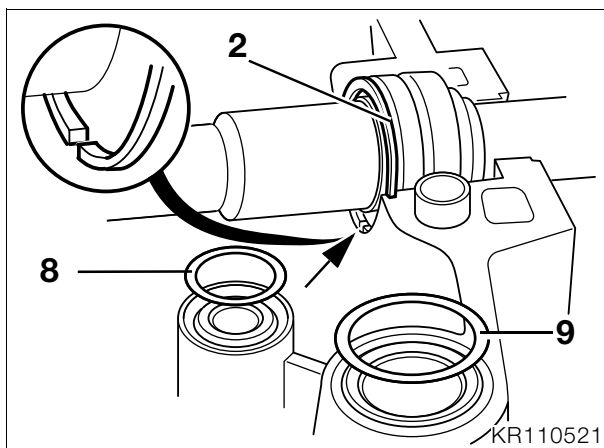
New parts must be oiled lightly.

- Push the retaining plate (4) onto the output shaft (3), slightly heat the inner part of the damper (5) and press it into position on the shaft.
- Push the damper housing on to the output shaft.

Assembling engine

Installing output shaft

- Push the snap ring (2) and the needle roller race (1) onto the output shaft.
- Place the output shaft in the crankcase.



KR110521

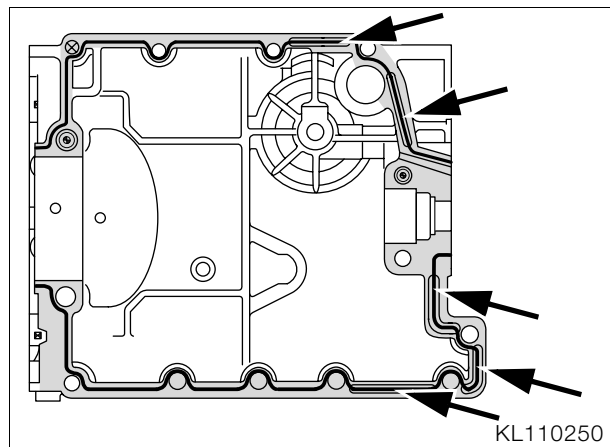


Note:

Make sure that the open end of the snap ring (arrow) is facing downward in the crankcase.

- Install O-rings (8, 9) for the water and oil passages.

Assembling the crankcase



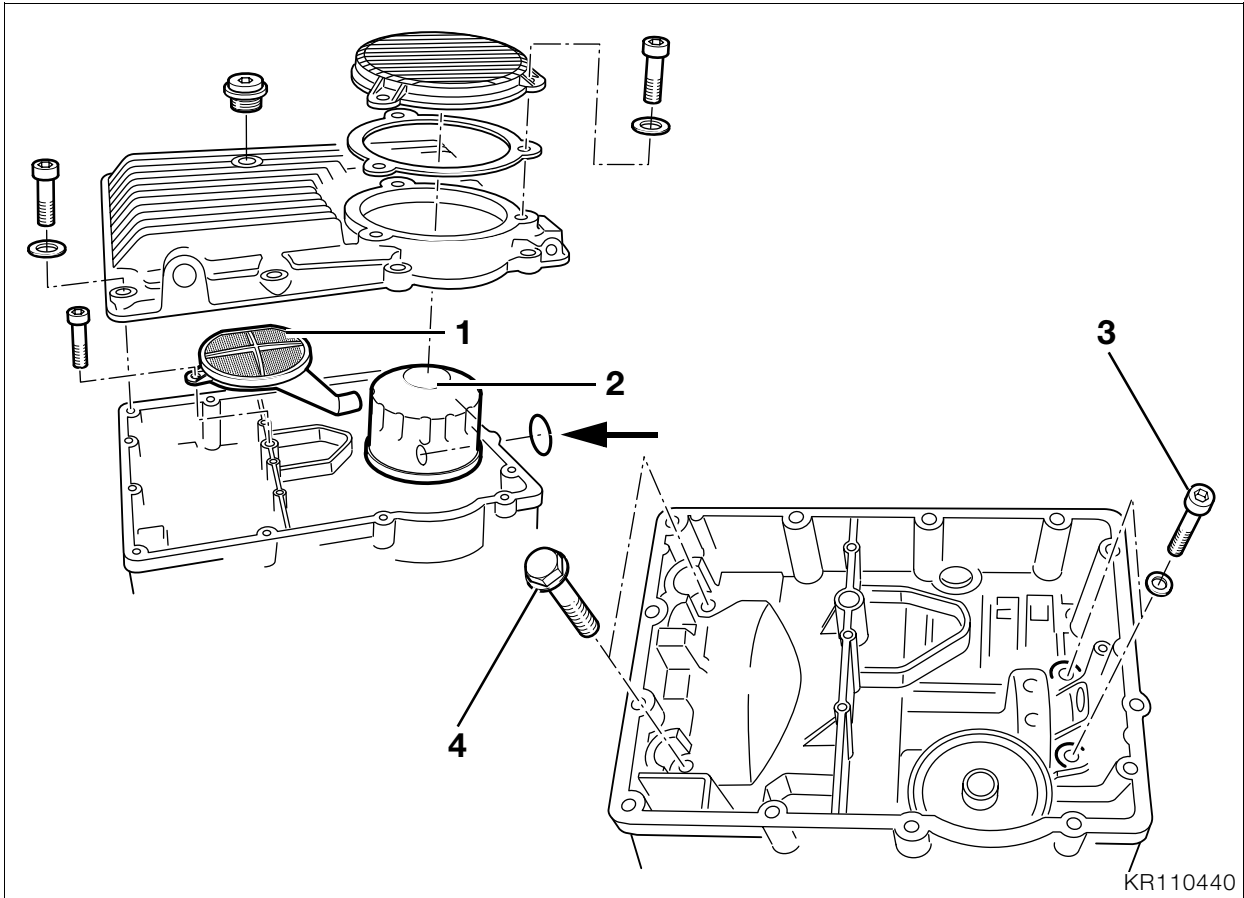
KL110250

- Check that sealing face is clean and degreased and apply a thin coat of **Omni VISC 1002**, see black line on sealing face with grey shading.
- Fill the expansion grooves (arrows) with sealing compound.



Note:

Remove excess sealant with a spatula.



- Mate the two halves of the housing.
- Insert screws (4) for shouldered bearing and screws (3) for needle roller bearing, and tighten alternately.
- Tighten the screws for the lower part of the crankcase.

Tightening torque:

Shouldered bearing.....	40 Nm
Needle roller bearing.....	20 Nm
Lower part of crankcase.....	10 Nm

Installing oil mesh strainer

- Install a new O-ring (arrow) and place oil mesh strainer (1) in position.

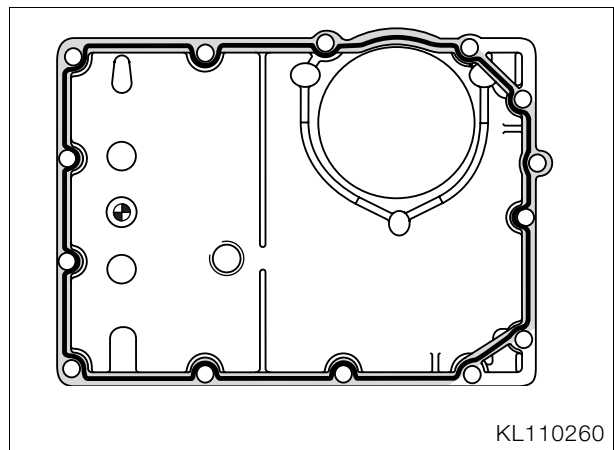
Installing oil filter

- Coat the oil filter sealing ring with oil.
- Install the oil filter (2), using oil-filter wrench, **BMW No. 11 4 650**.

Tightening torque:

Oil mesh strainer	10 Nm
Oil filter.....	11 Nm

Installing oil sump



- Check that sealing face is clean and degreased and apply a thin coat of **Omni VISC 1002**, see black line on sealing face with grey shading.
- Install oil sump and cover for oil filter, if necessary.

Tightening torque:

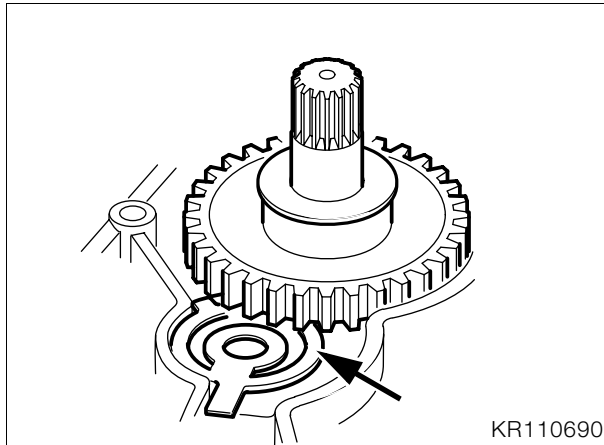
Oil sump	10 Nm
Oil filter cover	10 Nm
Oil drain plug.....	30 Nm

Installing intermediate flange

Installing freewheel

- Oil the needle roller bearing well.
- Insert the freewheel into the crankcase helical-cut gear first.

Installing countershaft

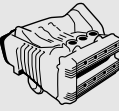
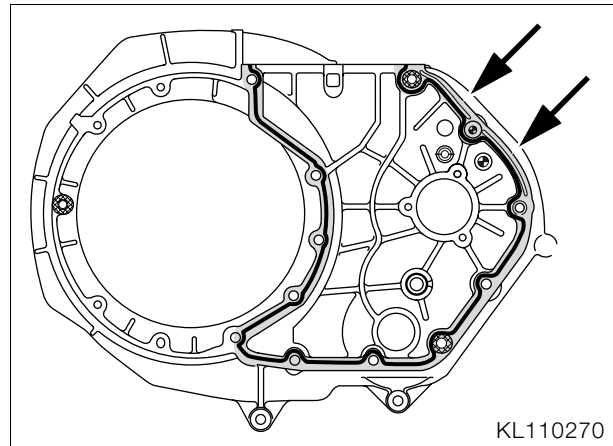


Caution:

Insert the spring so that the large external diameter (arrow) projects upwards and is pre-loaded against the freewheel gear.

- Insert the countershaft into the crankcase with the small gearwheel facing down.

Installing intermediate flange



- Check that sealing face is clean and degreased and apply a thin coat of **Omni VISC 1002**, see black line on sealing face with grey shading.
- Fill the expansion groove (arrow) with sealing compound.



Note:

Remove excess sealing compound with a spatula.

- Install the intermediate flange (with locating sleeves).
- Use Torx socket T 30, **BMW No. 00 2 600**, to tighten the screws.



Tightening torque:

Intermediate flange..... 9 Nm

Installing output shaft sealing ring



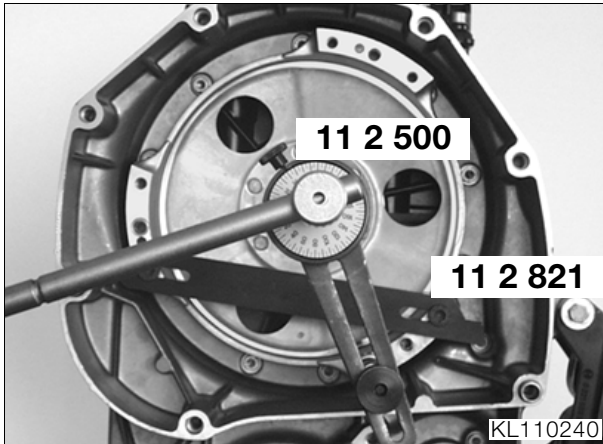
Note:

Clean the sealing ring seat. Oil the sealing ring and, with the aid of a guide, slip it onto the drift.

- Drive in shaft sealing ring with drift, **BMW No. 11 1 630**, and handle, **BMW No. 00 5 500**.

Installing clutch housing

- Oil the internal splines of the clutch housing.
- Place thrust washer in position between output shaft and intermediate flange; if necessary use a blob of grease to hold the thrust washer in position.



- Manoeuvre the clutch housing into position.
- Mount the retaining device, **BMW No. 11 2 821**, on the clutch housing in the position shown.

Caution:

Secure with new nuts. Always use a new O-ring.

- Place O-ring and thrust ring in position.
- Install the nut with the collar to the outside and tighten to specified torque (140 Nm), the damper is compressed.
- Slacken and then retighten the nut (50 Nm).
- Use angle-of-rotation gauge, **BMW No. 11 2 500**, to tighten the nut fully.

Tightening torque:

- | | |
|-----------------------------|--------|
| 1. Clutch housing nut | 140 Nm |
| 2. Slacken off | |
| 3. Retighten to | 50 Nm |
| 4. Wrench angle | 60° |

Installing driver

Note:


The driver can be installed only with the crankshaft installed.

- Push driver on to layshaft.
- Tighten the securing screws.

Tightening torque:

Driver 50 Nm

- Remove the retaining fixture, **BMW No. 11 2 821**.
- Install the clutch.

 See Group 21

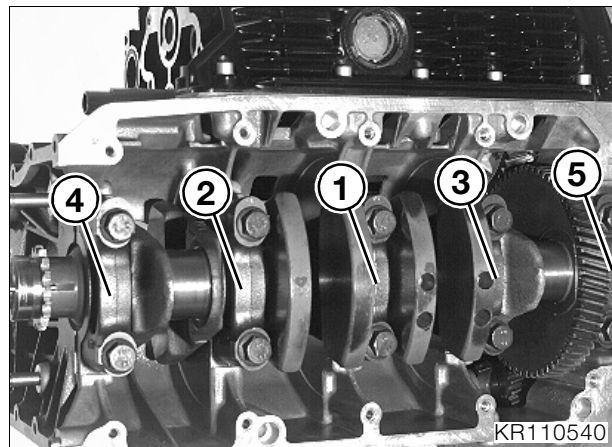
Installing crankshaft

- Clean and lightly oil the bearing journals of the crankshaft.

Note:

Bearing caps 1 - 3 are marked for identification; bearing 4 (thrust bearing) and bearing 5 are not marked.

- Place the crankshaft in position in the crankcase and position the bearing caps in their grooves.



- Tighten the bearings in the order shown, starting from the centre and working outwards.

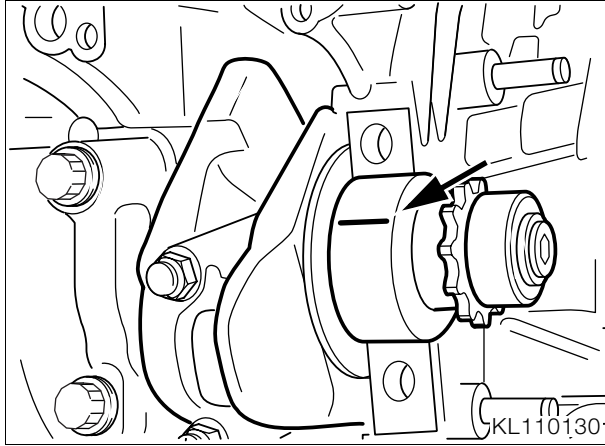
Tightening torque:

Main bearings 50 Nm

Measuring crankshaft bearing play

Measuring radial play

- Turn the crankshaft to top dead centre at the bearing to be measured.
- Take off the bearing cap.
- Wipe off oil at the bearing journal and bearing shell.
- Measure bearing play with Plastigage, **BMW No. 00 2 590**.



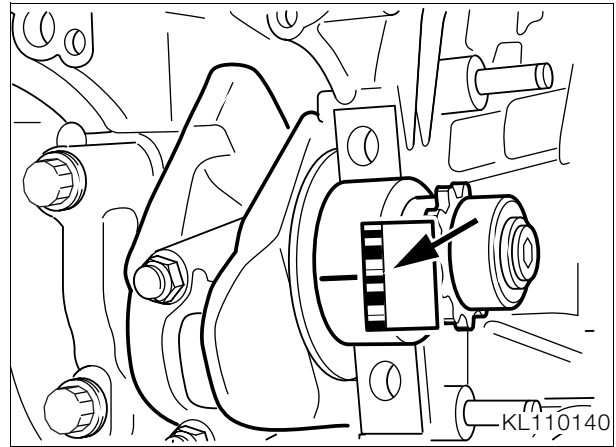
- Place the Plastigage strip (arrow) over the entire bearing width and 6 to 8 mm (0.2 to 0.3 in) off centre.
- Place the bearing cap in position and tighten the securing screws.

Tightening torque:
Main bearings 50 Nm



Note:
Do not turn the crankshaft any more.

- Remove bearing cap.

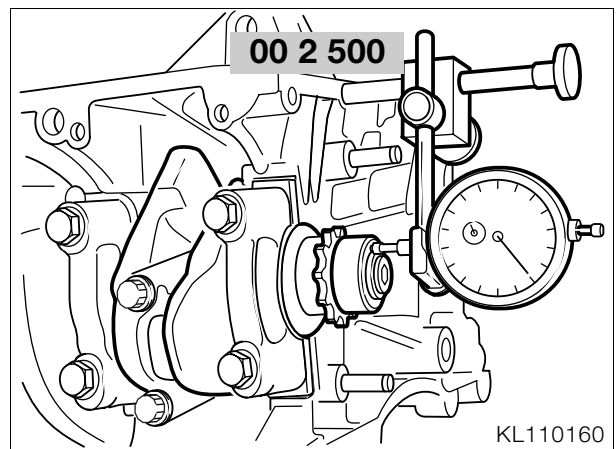


- Compare the width of the strip with the scale (arrow) in order to determine bearing play.
- Remove all traces of Plastigage from the shaft journal and bearing shell.

Radial play .. 0.020...0.056 mm (0.0007...0.0022 in)
Wear limit 0.130 mm (0.0051 in)

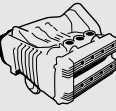
Measuring endplay

- Install the crankshaft.



- Secure dial gauge holder, **BMW No. 00 2 500**, with dial gauge in tapped bore for timing case cover.
- Move the crankshaft backwards and forwards as far as it will go and take the dial gauge readings.

Axial play..... 0.080...0.173 mm (0.0031...0.0068 in)
Wear limit 0.250 mm (0.0098 in)



Installing piston with conrod

- Turn the crankpin in question to bottom dead centre.
- Make sure that the pistons are in the same weight category.



Caution:

Note the pin for locating the end gap of the taper-face oil-control ring in the 2nd groove.

- Space the piston ring gaps at approx. 120° offsets.
- Thoroughly oil the piston rings, piston skirt and cylinder wall.
- Insert the piston into the sliding sleeve, **BMW No. 11 6 700**.
- The arrow on the piston crown must point towards the timing end of the engine (cylinder 1).
- Insert the piston with conrod into the cylinder until the sliding sleeve is touching the crankcase.
- Carefully push the piston by hand out of the sleeve and into the cylinder.

Installing big end bearing

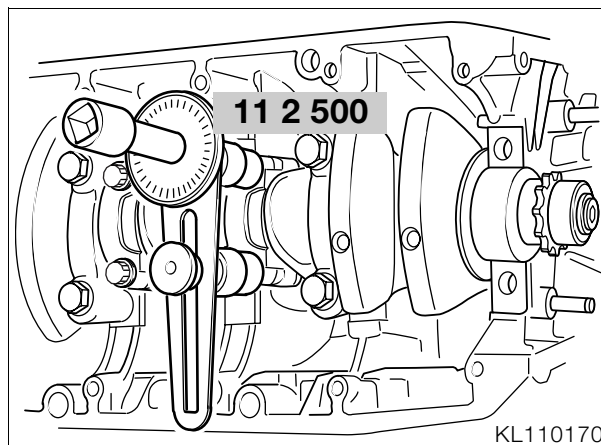


Caution:

Do not accidentally interchange conrods or bearing shells. Take great care to reinstall the bearing shells in their original positions.

Always use new big-end bearing screws.

- Turn the crankpin of the cylinder in question to bottom dead centre.
- Oil the crankpin and move the conrod into position.
- Place the big-end bearing cap in position and tighten the securing screws to 20 Nm.



- Use angle-of-rotation gauge, **BMW No. 11 2 500**, to tighten the big-end bearing screws another 80°.

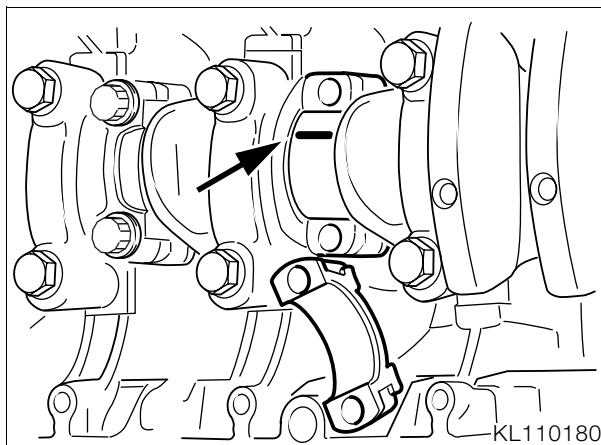


Tightening torque:

Big end bearings 20 Nm
Wrench angle 80°

Measuring big end bearing play

- Remove the screws and remove the bearing cap and clean the crankpin and bearing cap to remove oil.
- Measure bearing play with Plastigage, **BMW No. 00 2 590**.



- Place the Plastigage strip (arrow) over the entire bearing width and 6 to 8 mm (0.2 to 0.3 in) away from the centre of the crankpin.

- Place the bearing cap in position and tighten the securing screws to 20 Nm.



Note:

Do not turn the crankshaft any more.

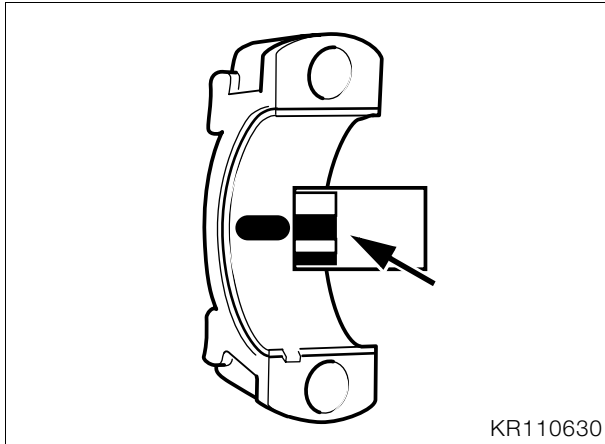
- Use angle-of-rotation gauge, **BMW No. 11 2 500**, to tighten the big-end bearing screws another 80°.



Tightening torque:

Big end bearings 20 Nm
Wrench angle 80°

- Remove the screws and remove the bearing cap.



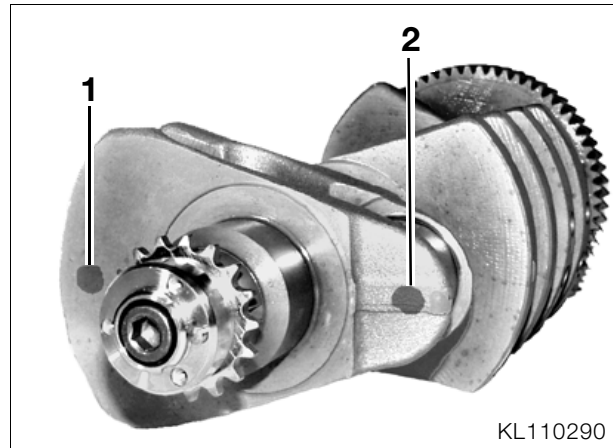
KR110630

- Use the comparison scale (arrow) to determine bearing play.

Bearing play 0.030...0.066 mm (0.0012...0.0026 in)
Wear limit 0.130 mm (0.0051 in)

Checking dimensions of crankshaft

- If measurement reveals that bearing clearance is excessive, the crankshaft must be measured.
 - The crankshaft can be ground to repair size “1”; the crankshaft is marked with the appropriate number of paint spots at the bearing journal.



KL110290

Colour code at timing end of crankshaft:

Grinding stage 1 at crankshaft bearing journal (1).
Grinding stage 1 at crankpin (2).
The absence of paint spots identifies the grinding stage as “0”.

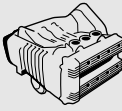


Note:

Only a crankshaft marked as grinding stage “0” can be ground.

Crankshaft dimensions..... See Technical Data

- Grinding must be followed by heat treatment and finishing before the crankshaft is reinstalled.
- When renewing the bearing shells, make sure that the colour marks on the crankpins and big end bearings match.



Installing cylinder head



Note:

Remove the bucket tappets before installing the cylinder head. Make a note of which bucket tappets belong to which valves.

- Clean the cylinder head bolts and the threads in the engine block.
- Clean the sealing faces and check for surface irregularities and damage.



Caution:

When installing a new cylinder head, check the sealing faces and make sure they are free of burrs, paying particular attention to the vicinity of the half-moon; deburr if necessary.

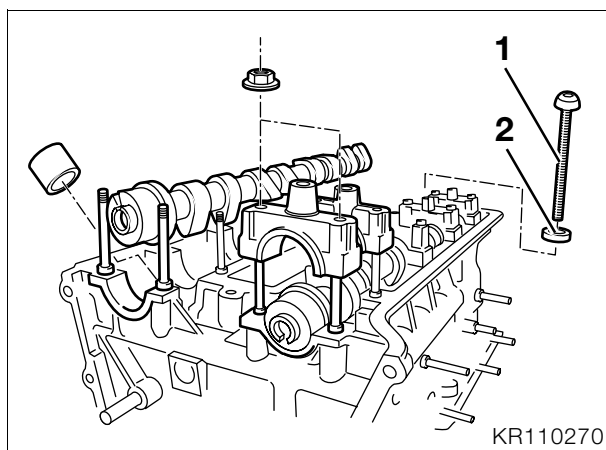
- Set the piston in cylinder 1 to approx. 90° before top dead centre (cylinder 1 = at timing end of engine).
- Clean the cylinder head bolts and the threads in the engine block.



Note:

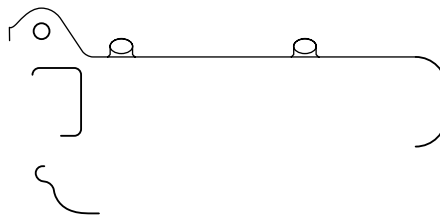
The bolts must screw easily into their tapped bores without the assistance of tools: chase the threads if necessary.

- Place the cylinder head gasket in position; make sure that no holes or passages are obstructed.
- Place the cylinder head in position, noting the locating sleeves.



- Oil bolts (1) and washers (2) and screw them in as far as possible.

- Check that the engine block and cylinder head gasket are correctly aligned; if necessary use a whetstone to remove protruding edges of the gasket.



- Tighten the cylinder head bolts in the correct sequence as shown to 20 Nm.
- Install angle-of-rotation gauge, **BMW No. 11 2 500**, with two Torx inserts T 50, **BMW No. 00 2 630**.
- Tighten the cylinder head bolts in the correct sequence as shown through a further 90°.
- Install the bucket tappets.
- Install the camshafts.
- ➔ See below
- Install the temperature sensor.
- ➔ See Group 61

Tightening torque:

Cylinder head bolts	
Initial tightening	20 Nm
Wrench angle	90°
Bearing caps, camshaft	10 Nm
Temperature sensor	30 Nm

Installing camshafts

Identification marks, camshafts

Inlet 2 grooves behind the thrust bearing
 Exhaust 1 groove behind the thrust bearing

Identification marks, camshaft bearing caps

Inlet side odd numbers
 Exhaust side even numbers
 Consecutive numerical order from front (timing end) to rear.



Caution:

Centre the pistons in the cylinders (cylinder 1 approx. 90° before top dead centre) to avoid damaging the valves and pistons.

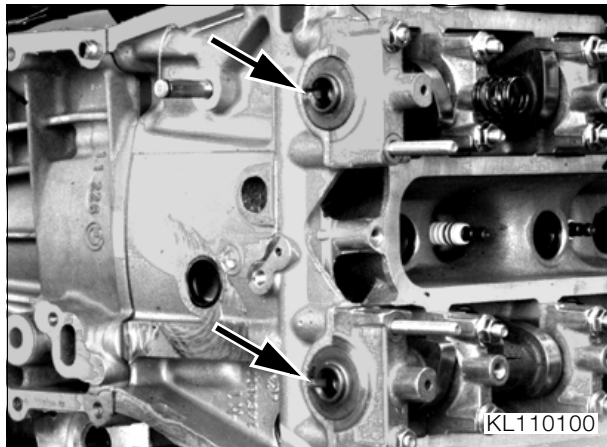
- Oil the camshaft bearing journals.
- Insert the camshafts so that the tips of the cams are clear.
- Install the inner bearing caps first.
- Install the thrust bearing (timing end) with slide rail last and do not tighten it until the chain sprockets have been installed.
- Tighten the bearing caps uniformly, working from the inside outwards.



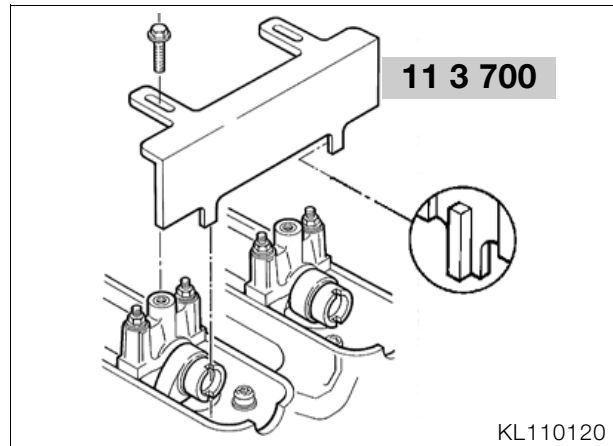
Tightening torque:

Bearing cap 10 Nm

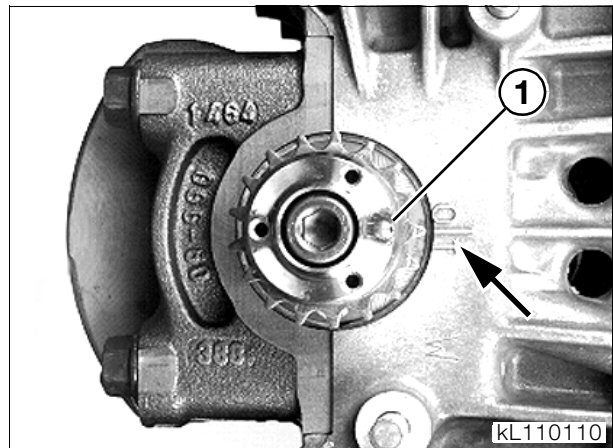
Installing timing chain



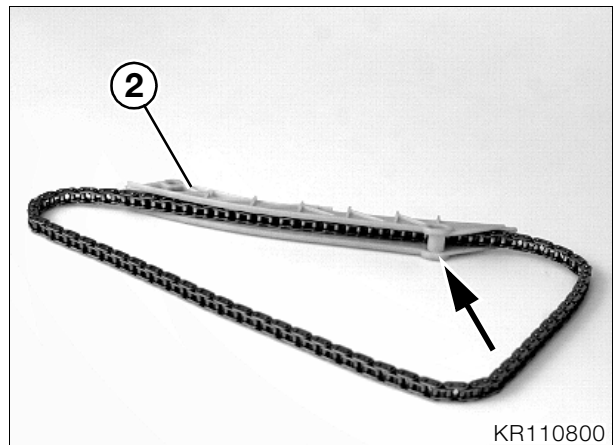
- Turn the camshafts until the grooves at the timing end (arrows) point toward the crankshaft.



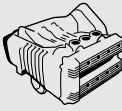
- Place aligning device, **BMW No. 11 3 700**, in position and secure it to the camshaft bearing caps.

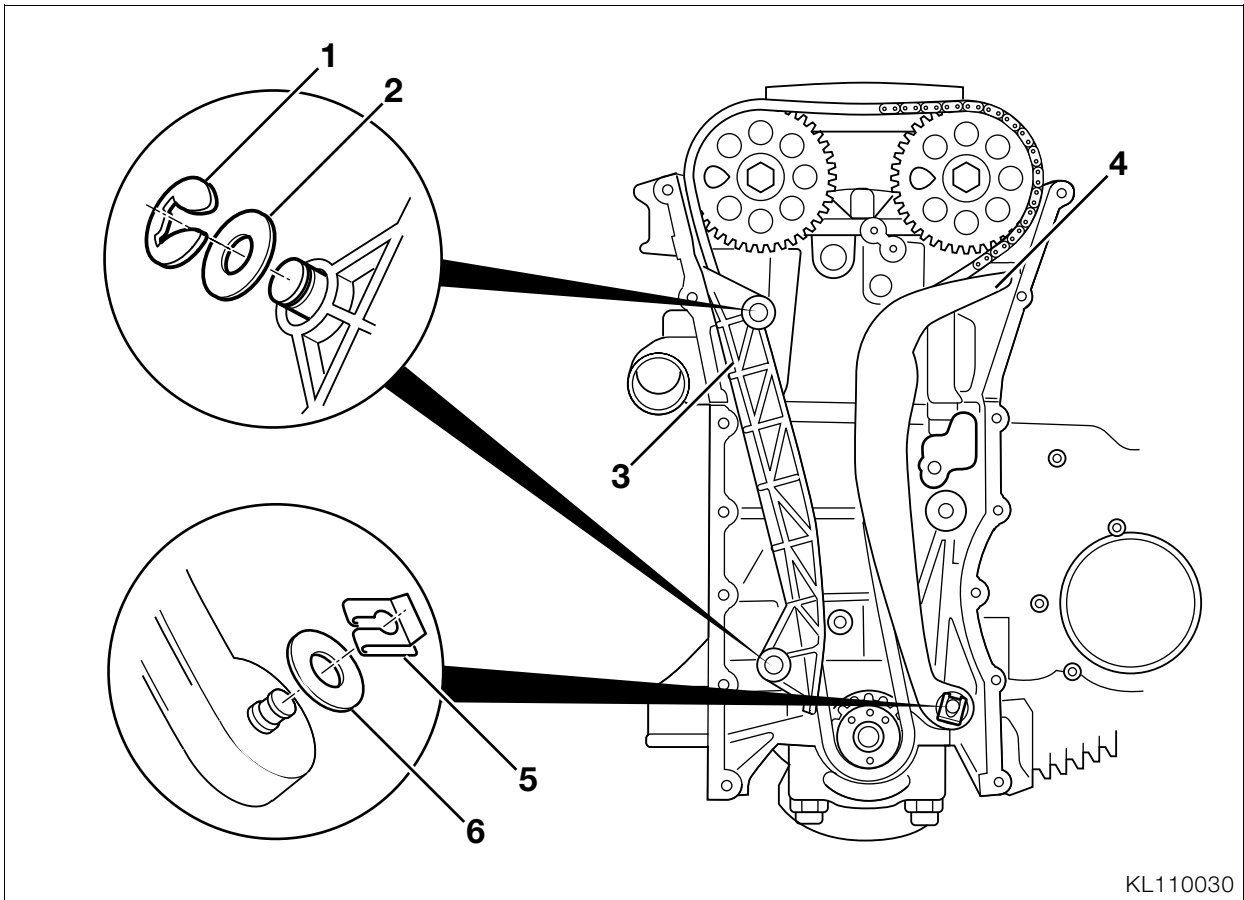


- Turn the crankshaft another 90° in the normal direction of rotation. The piston of cylinder 1 must now be at top dead centre. The pin (1) on the crankshaft is aligned with the mark (arrow) on the crankcase.



- Place the timing chain in guide rail (2).
- Insert bushing (arrow) between slots of guide rail.

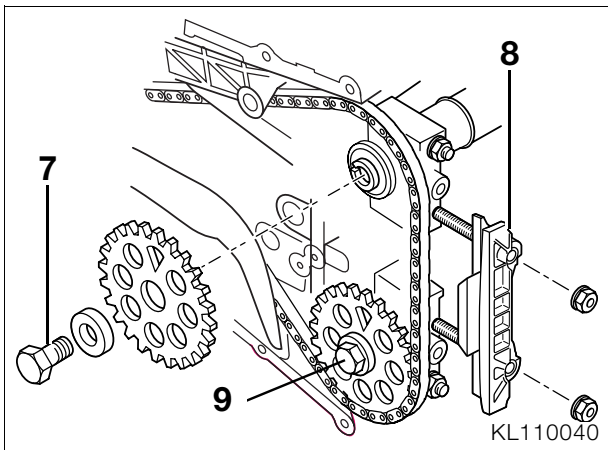




KL110030

- Press the guide rail (3) with timing chain and bushing onto the locating pin.
- Install the snap rings (1) and washers (2) for the guide rail on the two locating pins.
- Slip the chain onto the crankshaft gear.

- Install screw (7) until seated.
- Install guide rail (8).
- Press the tensioning rail (4) onto the locating pin and install washer (6) and keeper (5).
- Install the sprocket of the exhaust camshaft such that the timing chain is correctly tensioned between the two sprockets.
- Install screw (9) until seated.
- Tighten the bearing caps with guide rail (8).
- Remove the aligning device, **BMW No. 11 3 700**.
- Tighten the chain sprockets, holding the hexagon on the camshaft to prevent it from turning.

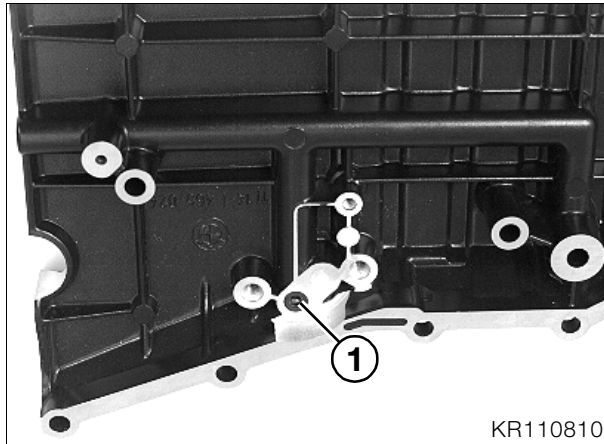


KL110040

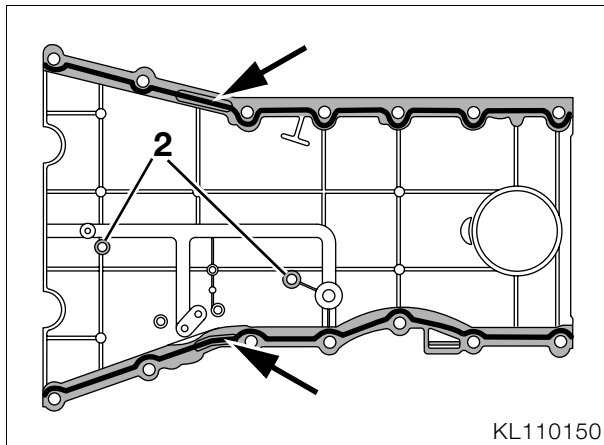
- Install the sprocket of the inlet camshaft such that the timing chain is tensioned between the sprocket and the crankshaft gear.

- ! **Tightening torque:**
- Bearing cap..... 10 Nm
 - Chain sprockets..... 56 Nm

Installing timing case cover



- Insert O-ring (1) for chain tensioner into timing case cover.
- Install chain tensioner in timing case cover.
- Prevent chain tensioner from moving with pin, **BMW No. 11 6 740**.

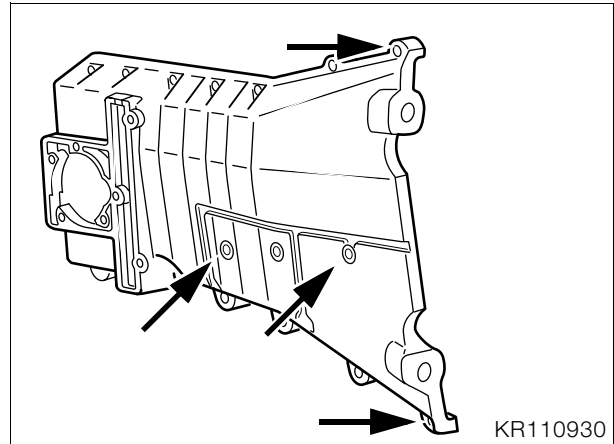


- Clean and degrease the sealing face, apply a thin coat of **Omni VISC 1002**, taking care not to omit the area around the bores marked above (2), see black line on sealing face shaded grey.
- Fill the expansion grooves (arrows) with sealing compound.



Note:
Remove excess sealing compound with a spatula.

- Introduce the cables for the oil-pressure switch and water temperature switch through the cable duct.



- Install the timing case cover and tighten the securing screws. Make sure that the long screws are installed in the correct positions (arrows).
- Remove the chain tensioner pin and tighten the screw plug.
- Turn the engine over and check the relative positions of the camshaft sprockets and the crankshaft gear.

! Tightening torque:

Chain tensioner to timing case cover	9 Nm
Timing case cover	9 Nm
Screw plug for pin	9 Nm

Checking valve clearances

- Turn the engine over by turning the crankshaft (counter-clockwise).
- Measure valve clearance with feeler gauge.

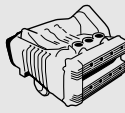
Valve clearances:

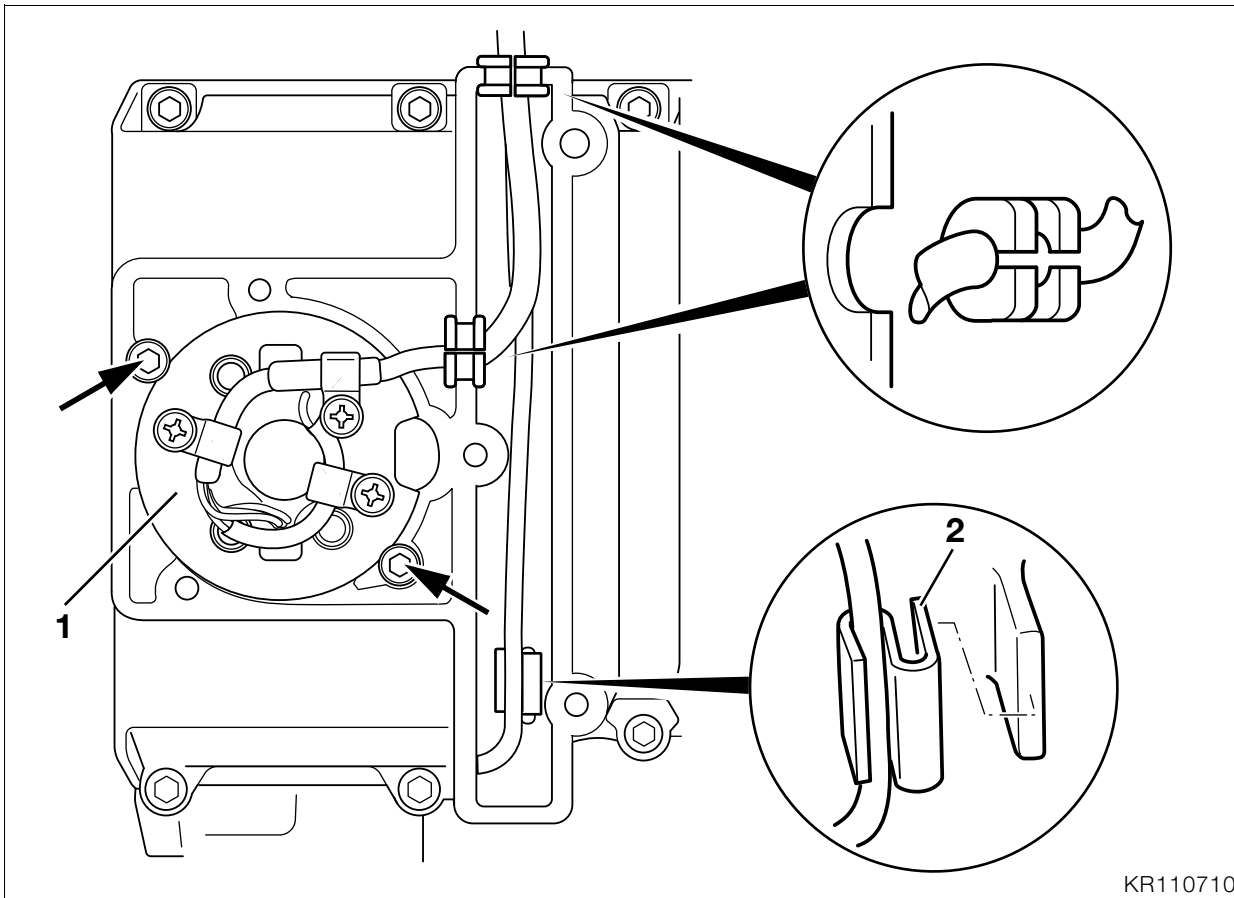
Inlet	0.15...0.20 mm (0.005...0.007 in)
Exhaust	0.25...0.30 mm (0.009...0.011 in)

- Remove the camshaft if valve clearance has to be adjusted.
- Replace the corresponding bucket tappets.

Adjusting valve clearances

➡ See Group 00






KR110710

Installing ignition pulse generator

- Mount adjusting disc and rotor on crankshaft and tighten.
- Reinstall magnetic gate (1) in its original position, as marked.
- Tighten screws (arrows) with washers and semi-circular washers.

 **Tightening torque:**

Rotor 4 Nm
 Magnetic gate 6 Nm

 **Caution:**
 Set the ignition timing.

Installing ignition pulse generator cover

- Run the wire to the ignition pulse generator through a rubber grommet in the timing case cover.
- Secure the wires for the oil pressure telltale and water pump temperature sensor with clip (2).
- Install the cover with gasket.

 **Tightening torque:**

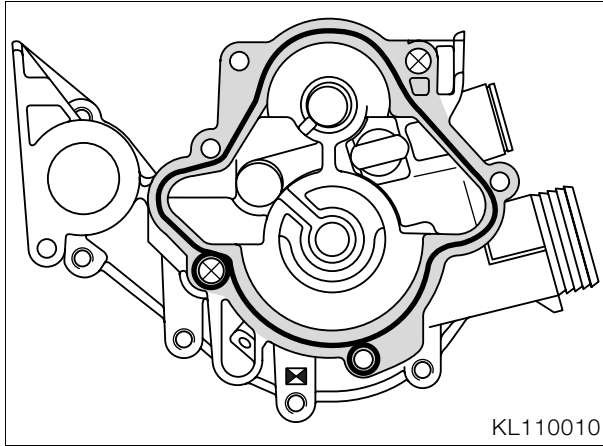
Ignition pulse generator cover 9 Nm

Installing combined oil/water pump



Caution:

Tighten the clutch housing before installing the oil/water pump, so that the output shaft cannot damage the pump housing.



- Check that sealing face of the pump housing is clean and degreased and apply a thin coat of **Omni VISC 1002**, see black line on sealing face with grey shading.
- Place O-ring on water passage.
- Position the drive pinion on the output shaft.
- Place pump housing in position and install screws, but do not tighten.



Note:

Turn the crankshaft to centre the gearwheels, tightening the screws further at the same time.

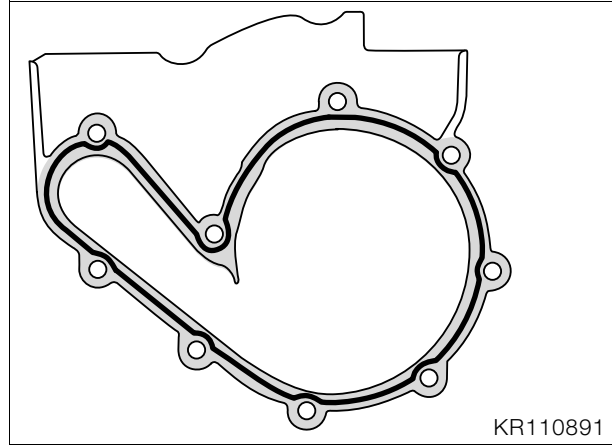
- Fully tighten the screws.
- Check for any noticeable play at any position of the water pump gearwheel.



Tightening torque:

Pump housing to crankcase 10 Nm

- Run the wires for the oil pressure telltale and water pump temperature sensor through the hole in the pump housing and connect them.



- Check that sealing face of the pump housing cover is clean and degreased and apply a thin coat of **Omni VISC 1002**, see line on sealing face with grey shading.
- Install the pump housing cover and tighten the securing screws.



Tightening torque:

Pump housing cover 10 Nm

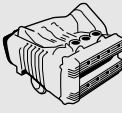
Installing crankcase cover

- Apply a thin coat of **Three Bond 1209** to the areas where the crankcase, intermediate flange and crankcase cover meet, and to the sealing faces on the crankcase, timing case cover and crankcase cover.
- Install the crankcase cover with gasket.
- Install all bolts until seated.
- Tighten the bolts in diagonally opposite sequence, working from the inside outwards.





Tightening torque:

Crankcase cover 9 Nm

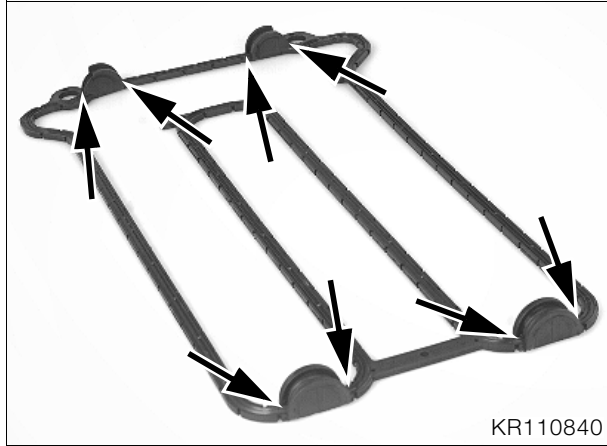


Installing cylinder head cover

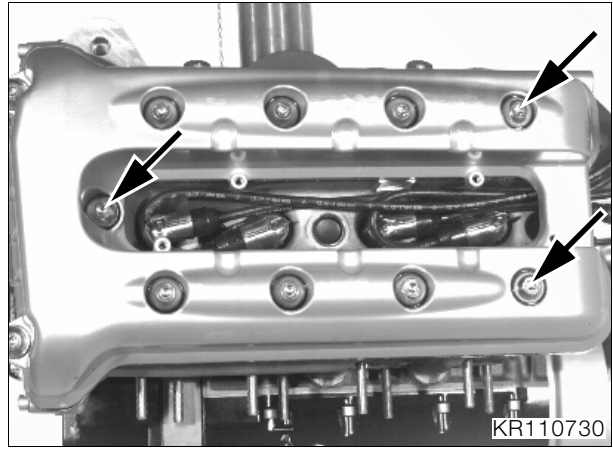
- Install the spark plugs and ignition leads.
See Group 12

 **Tightening torque:**
 Spark plug..... 20 Nm

- Install the cylinder head cover gasket with the half moons first. The marks at the front and rear of the gasket and the cylinder head cover must coincide.



- Apply a thin coat of **Three Bond 1209** at the areas where the cylinder head, timing case cover and cylinder head cover meet and at the half moons (arrows).



 **Note:**

Do not forget the contact springs

- Install the cylinder head cover. Insert the front centre screw (timing end, arrow) and both rear screws (arrows) in order to locate the gasket.
- Install all screws until seated.
- Tighten the screws in diagonally opposite sequence, working from the inside outwards.
- Mount the heat shield on the cylinder head cover.

 **Tightening torque:**

Cylinder head cover 9 Nm
 Securing screws for heat shield 5 Nm

12 Engine electrics

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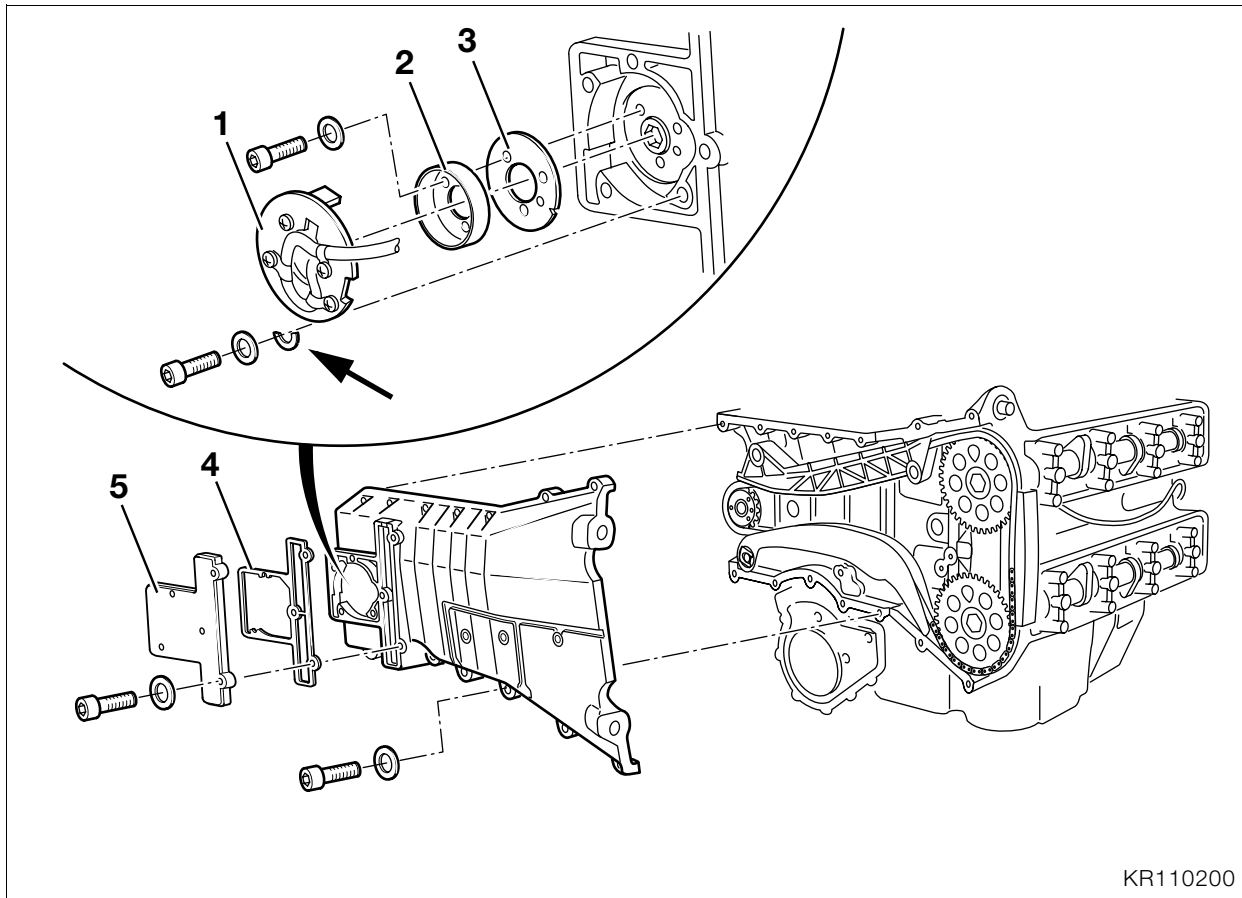




Technical Data		K 1200 LT
Starter motor		
Type		Permanent-magnet motor
Gear ratio		27:1
Power rating	kW	0.7
Three-phase generator		
Type		Three-phase AC generator
Gear ratio		1:1.5
Drive		direct
Maximum output rating	W/V	840/14
Maximum current	A	60
Three-phase generator speed for start of charge	min ⁻¹	1000 (24 A charge current)
Max. operating speed	min ⁻¹	18000
Spark plug		
Bosch		XR 7 LDC
Thread	metric	M 12 x 1.25
Electrode gap		no adjustment necessary
Ignition		
Ignition system		Motronic (mapped characteristic control)
Ignition trigger		Two magnetic gates (Hall-effect transmitter) driven by crankshaft
Static ignition timing	°CS	6° = 0.24 mm (0.010 in) before TDC
Speed governing	min ⁻¹	8500
Ignition coil		
Twin coils		
Resistance: Primary	Ω	0.5 ± 0.05
Secondary	kΩ	13.3 ± 1.3







KR110200

Removing and installing Hall-effect transmitters

Removing magnetic gate

Preparatory work

- Remove left and right fairing side sections.
 ➡See Group 46
- Remove centre and right sections of engine spoiler.
- Remove right skirt bracket.



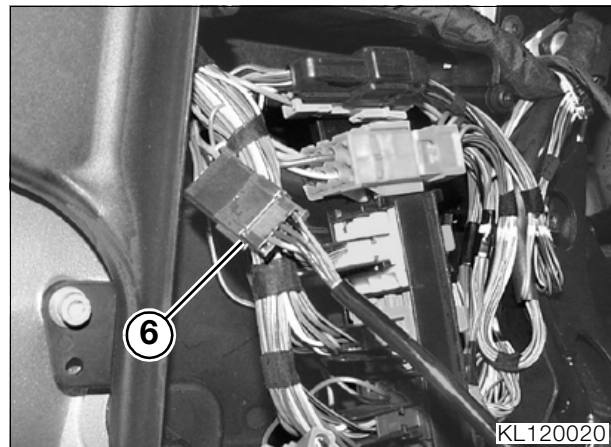
Caution:

Switch off the ignition and disconnect and insulate the earth (ground) lead at the battery.

- Remove fuel tank.
 ➡See Group 16
- Remove the right-hand air outlet duct from the radiator.
 ➡See Group 17
- Press the right-hand radiator forward out of its holder.

Removing cover from Hall-effect transmitter

- Remove cover (5) and lift out gasket (4).



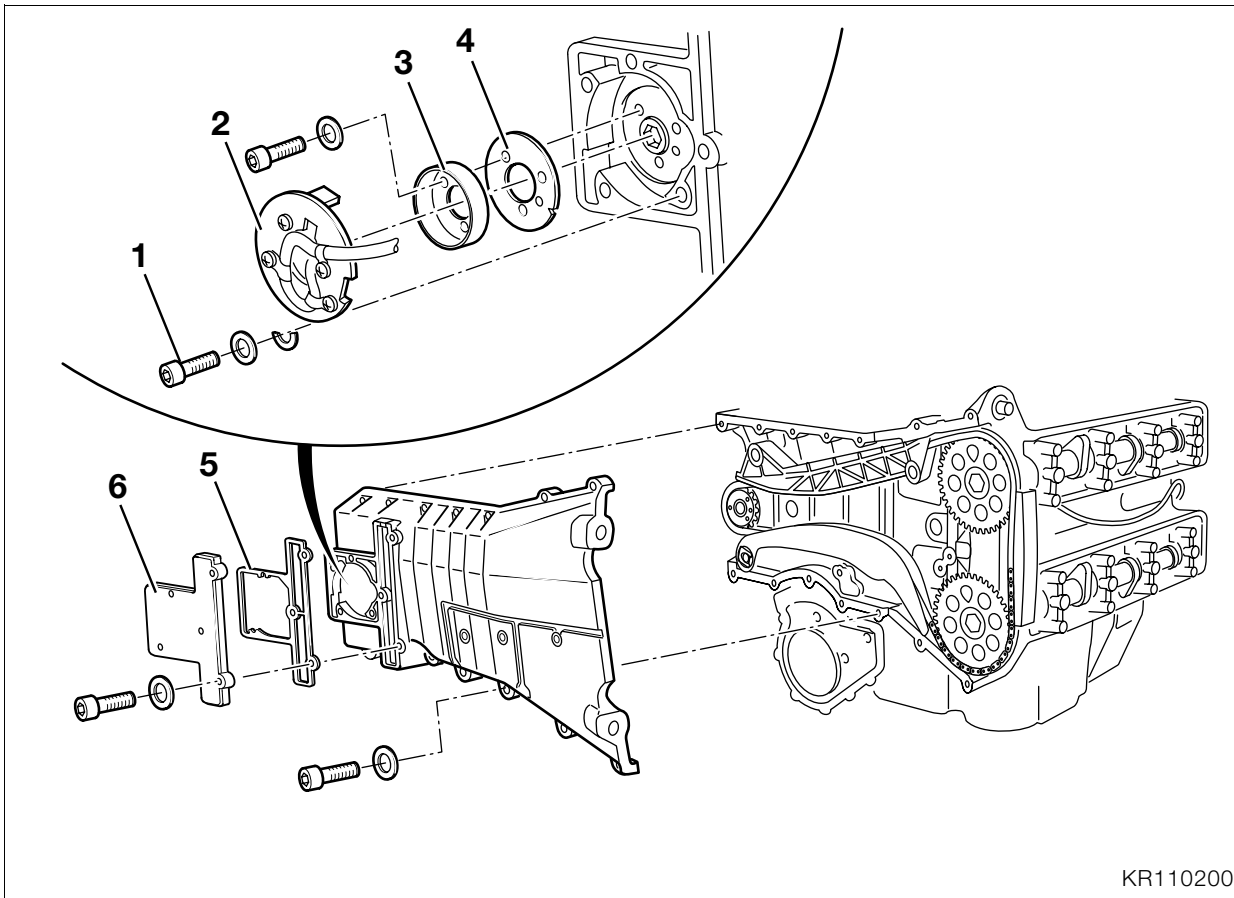
KL120020



Note:

Mark the position of the magnetic gate in relation to the engine block, or remove it in the top dead centre (TDC) position.

- Remove magnetic gate (1), noting the presence of semi-circular washers (arrow).
- Remove rotor (2) and take off adjusting disc (3).
- Open the cover of the electronic equipment box.
- Disconnect the plug (6) in the electronic equipment box.



KR110200

Installing the magnetic gate

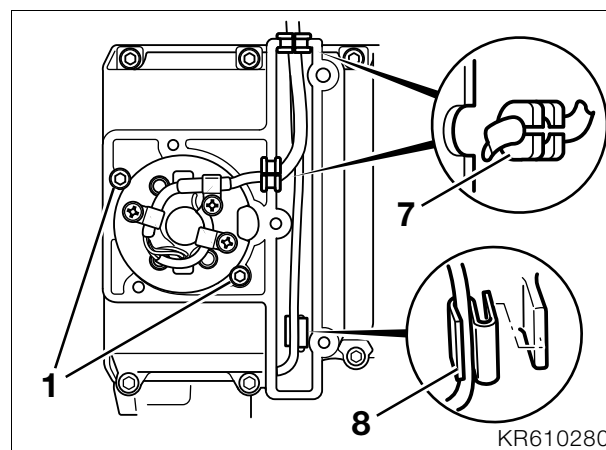
- Place adjusting disc (4) and rotor (3) on crankshaft, and tighten.
- Install magnetic gate (2) in the same position as previously marked.
- Install screws (1) with washers and semi-circular washers and tighten.
- Reconnect the plug connector in the electronic equipment box.
- Reinstall cables in their original positions and use cable ties to secure.
- Install the cover on the electronic equipment box.

Tightening torques:

Rotor	4 Nm
Magnetic gate	6 Nm

Caution:
Correct the ignition timing.

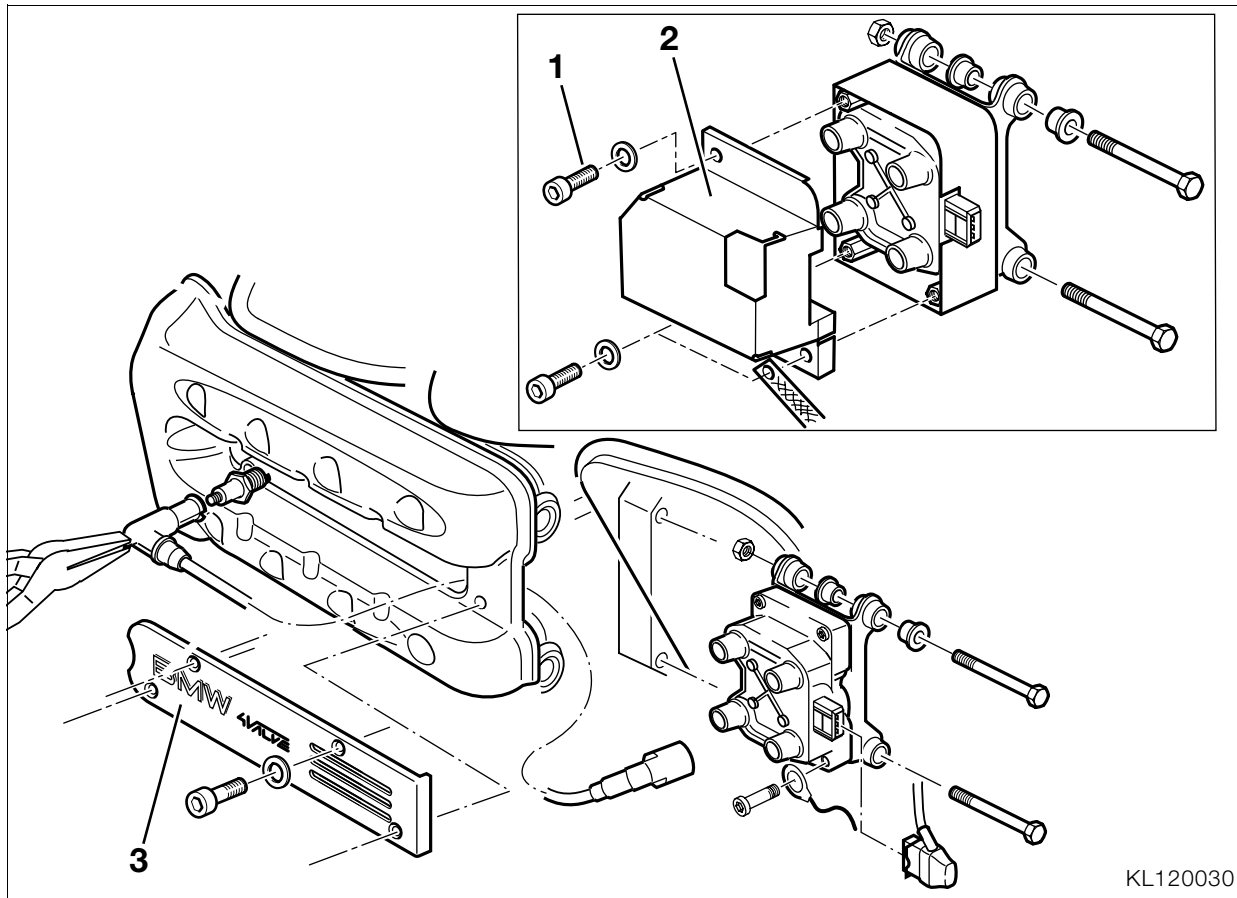
Installing the cover of the Hall-effect transmitter



KR610280

- Run the cable to the magnetic gate through the timing case cover with a rubber sleeve (7).
- Secure the cables for the oil pressure telltale and temperature indicator with clip (8).
- Install cover (6) with gasket (5).
- From this point on, installation is the reverse of the removal procedure.

Tightening torque:
Cover of Hall-effect transmitter..... 9 Nm



KL120030

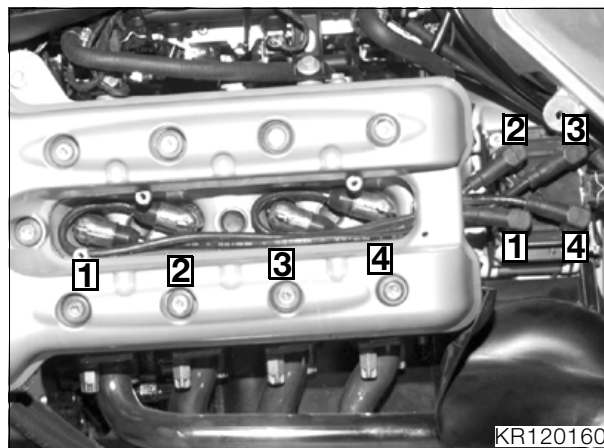
Replacing spark plugs/ignition leads

- Remove left-hand side of engine spoiler.
- ➔See Group 46
- Remove heat shield (3).
- Pull off spark plug caps with flat pliers.

Removing and installing spark plugs

- Remove spark plugs with spark plug wrench, **BMW No. 12 3 500**.
- Installation is the reverse of the removal procedure.

⚠ Tightening torques:
 Spark plugs..... 20 Nm



KR120160

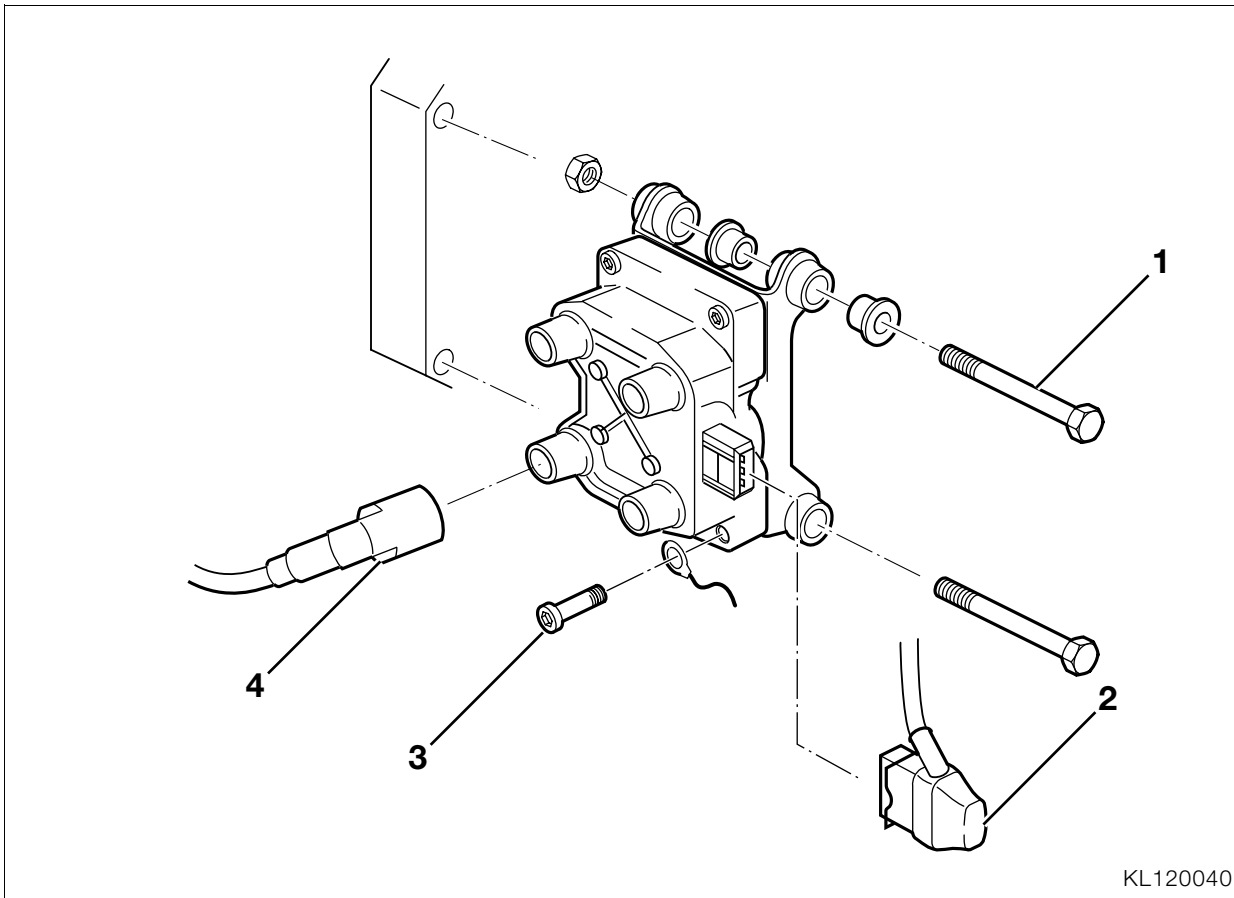
Removing and installing ignition leads

- **[Shield housing]** Remove screws (1) and lift off cover (2).
- Disconnect ignition leads from ignition coil.
- Remove ignition leads.

⚠ Note:
 When installing, make sure that the ignition leads are correctly routed.

- Installation is the reverse of the removal procedure.

⚠ Tightening torques:
 Cover of shield housing..... 5 Nm



Removing and installing coil

Motorcycles without shield housing



Caution:

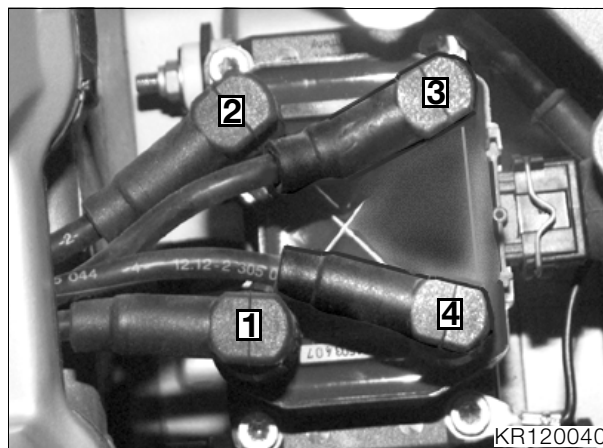
Switch off the ignition and disconnect and insulate the earth (ground) lead at the battery.

- Remove left side section of fairing and engine spoiler.
- ➔See Group 46
- Remove left-hand skirt bracket.
- Disconnect ignition leads (4) from ignition coil.
- Press in the clips of the primary connection (2) and unplug the connector.
- Remove screws (3) and remove the ignition coil.
- If necessary, remove screws (1) and remove the mounting plate.



Caution:

Note positions of ignition leads at coil.

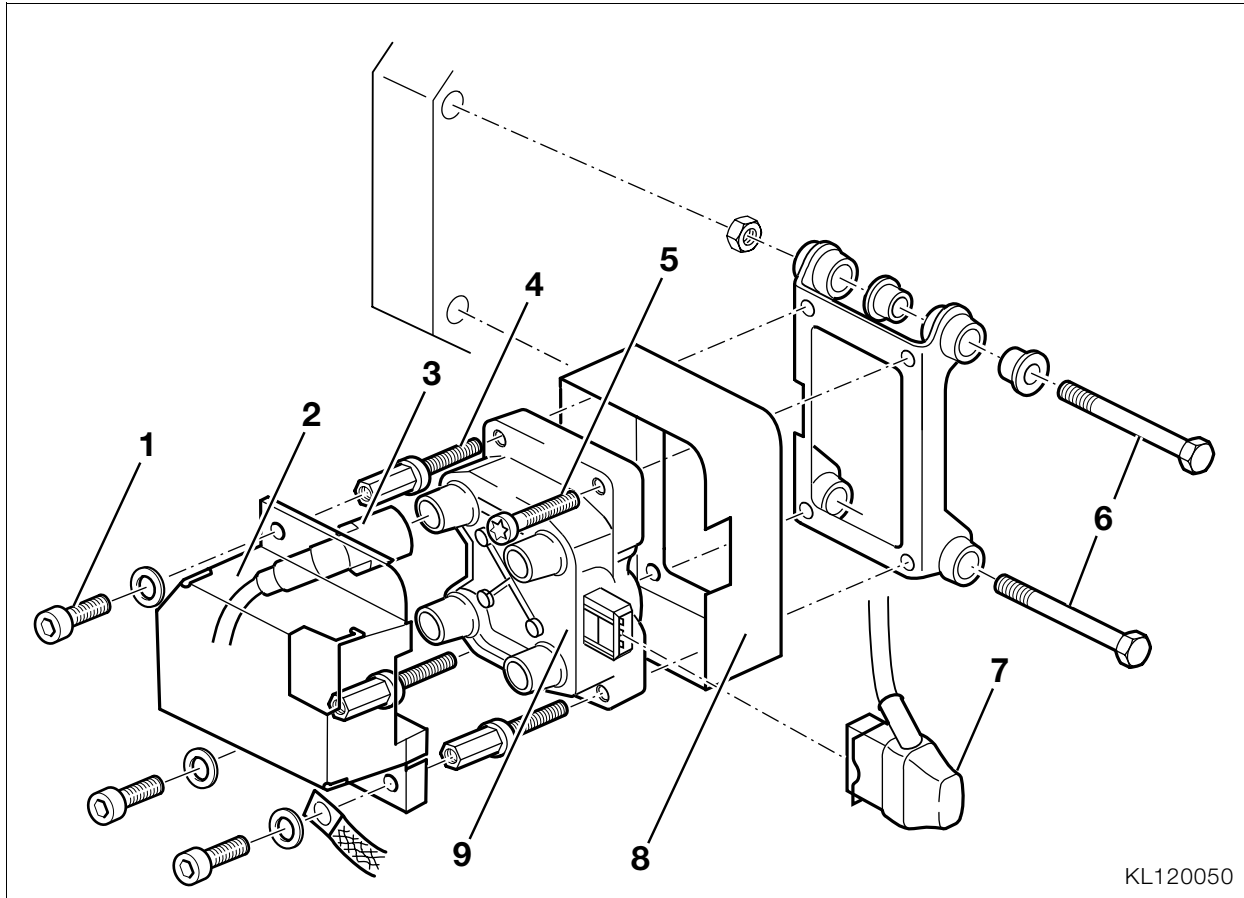


- Installation is the reverse of the removal procedure.



Tightening torques:

Ignition coil to mounting plate 8 Nm
 Mounting plate to intermediate flange 9 Nm



KL120050

Motorcycles with shield housing

Caution:

Switch off the ignition and disconnect and insulate the earth (ground) lead at the battery.

- Remove left side section of fairing and engine spoiler.
- ➔ See Group 46
- Remove left-hand skirt bracket.
- Remove screws (1) and lift off cover (2).
- Disconnect ignition leads (3) from ignition coil.
- Press in the clips of the primary connection (7) and unplug the connector.
- Remove the stud bolts (4) and Torx screw (5) and lift off ignition coil (9) and housing (8).
- If necessary, remove screws (6) and remove the mounting plate.
- Installation is the reverse of the removal procedure.

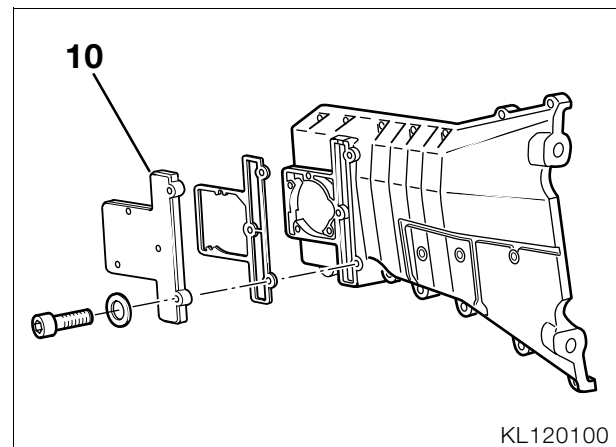
Tightening torques:

Mounting plate to intermediate flange 9 Nm
 Ignition coil to mounting plate/stud bolts 8 Nm
 Cover to stud bolts 5 Nm

Timing the ignition

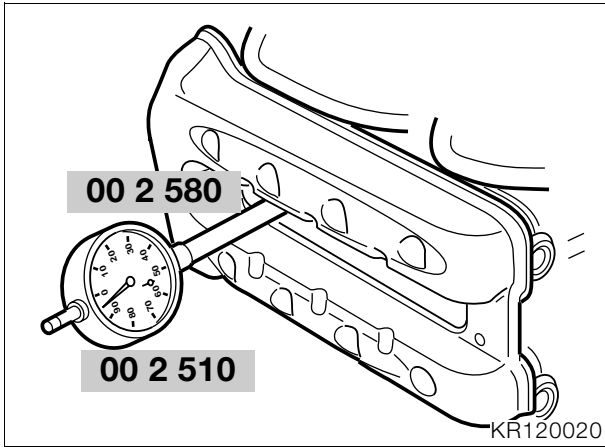
Preparatory work

- Remove left and right fairing side sections.
- ➔ See Group 46
- Remove left and right engine spoilers.
- Remove right skirt bracket.
- Remove fuel tank.
- ➔ See Group 16
- Remove the right-hand air outlet duct from the radiator.
- ➔ See Group 17
- Press the right-hand radiator forward out of its holder.
- Remove the spark plugs.



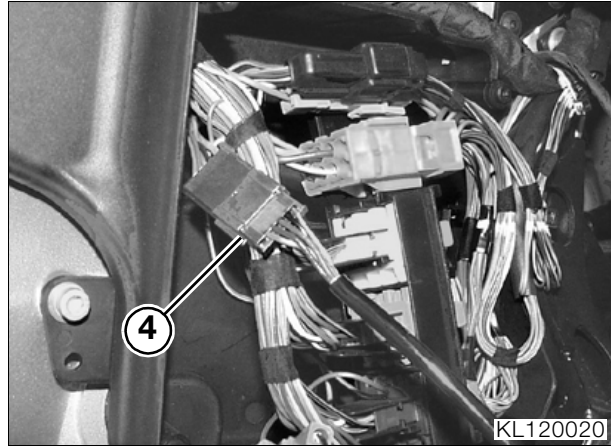
KL120100

- Remove cover (10) for Hall-effect transmitter.



- Retighten magnetic gate (2, 3).
- Check that ignition timing is correct.
- Turn the engine in its normal direction of rotation. With the piston at 0.24 mm (0.010 in) before TDC, the **BMW** MoDiTeC must display the correct ignition firing point.
- Installation is the reverse of the removal procedure.

Setting timing without Motronic



- Screw dial gauge, **BMW No. 00 2 510**, with extension, **BMW No. 00 2 580**, into cylinder No. 1.
- Set the piston to TDC.
- Set the dial gauge scale ring to "0".

Setting timing with Motronic

- Connect **BMW** MoDiTeC to diagnosis plug.
- Call up the TOOLBOX menu on the diagnostic unit and select the HALL TRANSMITTER SETTING item.
- Crank the engine to bring the piston to the ignition firing point.

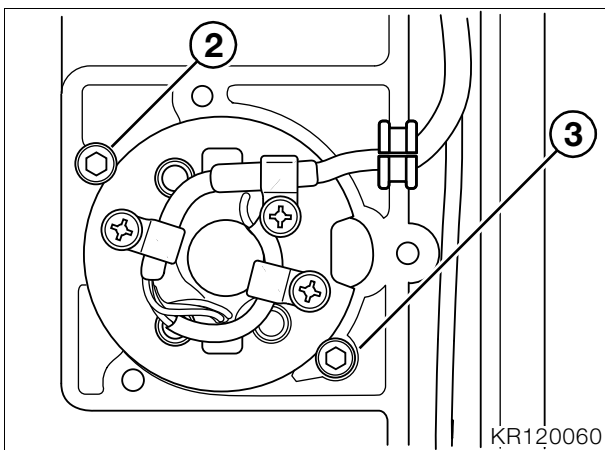
Setting:

Ignition timing

... 6° before TDC = 0.24 mm (0.010 in) before TDC

- Follow the MoDiTeC instructions.

- Open the electronic equipment box.
- Connect the **BMW** MoDiTeC to plug connector (4) for the Hall-effect transmitter.
- Perform the HALL TRANSMITTER SETTING routine with the MoDiTeC.



- Slacken the screws securing the magnetic gate (2, 3) and turn it to the left or right until the **BMW** MoDiTeC displays the correct ignition firing point.

Adjusting ignition timing:

Turned counter-clockwise retard ignition

Turned clockwise advance ignition

! Tightening torques:

Magnetic gate	6 Nm
Ignition trigger cover	9 Nm
Spark plugs.....	20 Nm

Replacing three-phase generator

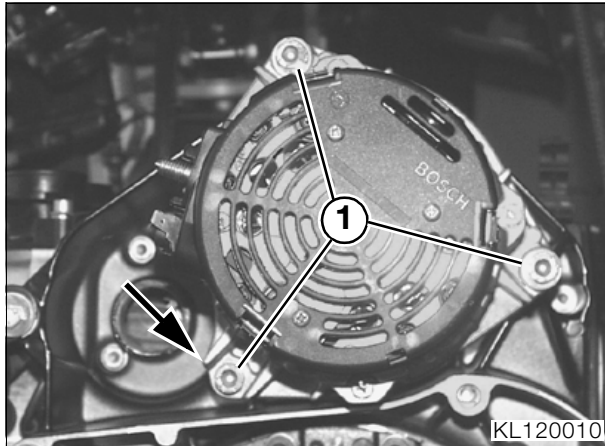
Removing and installing three-phase generator



Note:

It is not necessary to remove the gearshift linkage, gearbox and clutch slave cylinder.

- Raise the frame.
- ➔ See Group 23, Removing gearbox



- Remove the three securing screws (1).
- Pull the three-phase generator off the intermediate flange.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

Apply tyre mounting paste or similar to the rubber dampers; do not use oil or grease. Use a hex socket with universal joint to tighten the bottom securing screw (arrow), increase tightening torque by approx. 10 %.

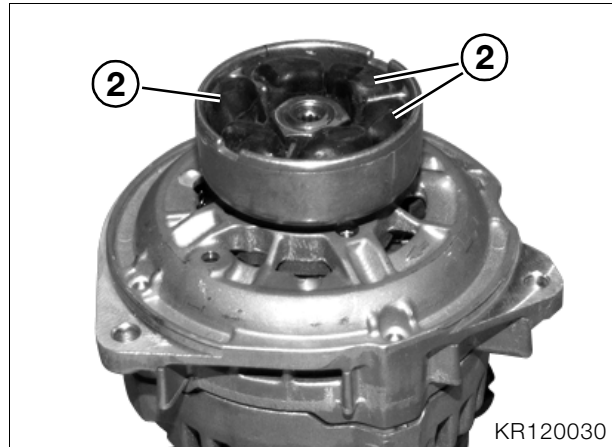


Tightening torque:

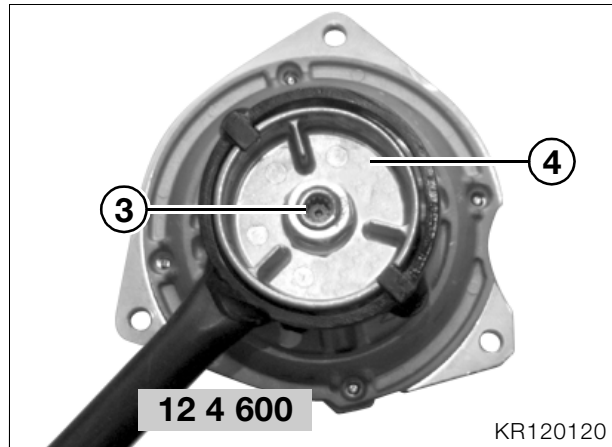
Generator to intermediate flange 20 Nm
 Screw for cable B+ 10 Nm
 Screw for cable D+ 2 Nm

Disassembling the three-phase generator

Removing and installing drive housing



- Take out rubber dampers (2).



- Hold drive housing (4) with retaining device, **BMW No. 12 4 600**, to prevent it from turning, slacken screw (3) and remove it together with the spring washer.
- Remove the drive housing (4).
- Installation is the reverse of the removal procedure.

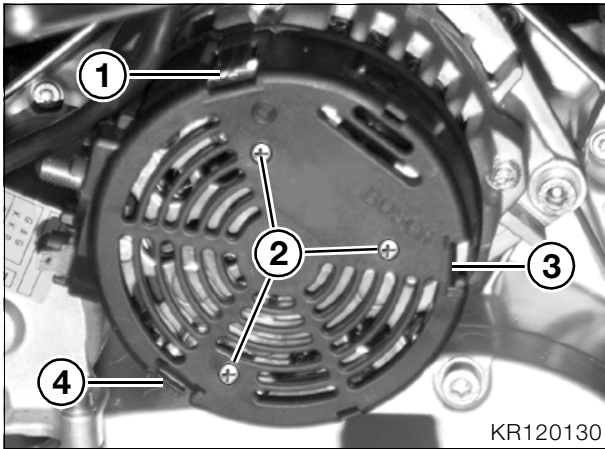


Tightening torques:

Drive housing 50 Nm
 Screw for cable B+ 10 Nm
 Screw for cable D+ 2 Nm

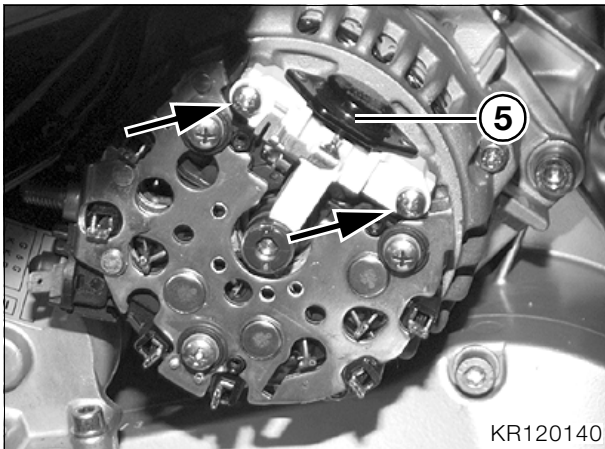


Removing and installing voltage regulator



KR120130

- Remove screws (2).
- Carefully open clips (1, 3, 4) and remove the housing cover.



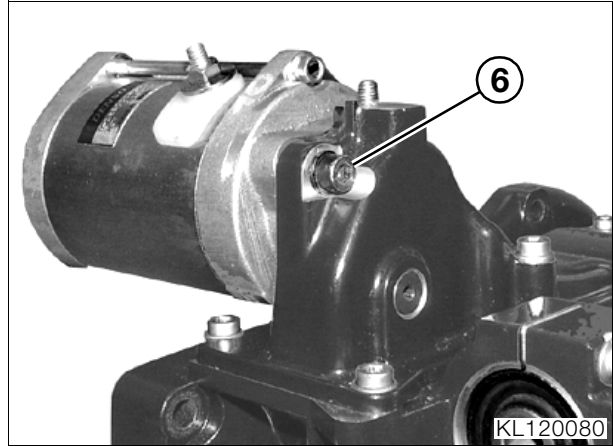
KR120140

- Remove the retaining screws (arrows).
- Remove voltage regulator (5) with carbon brushes.
- Installation is the reverse of the removal procedure.

Replacing starter motor

Removing and installing starter motor

- Remove gearbox complete with starter motor.
 ➡ See Group 23

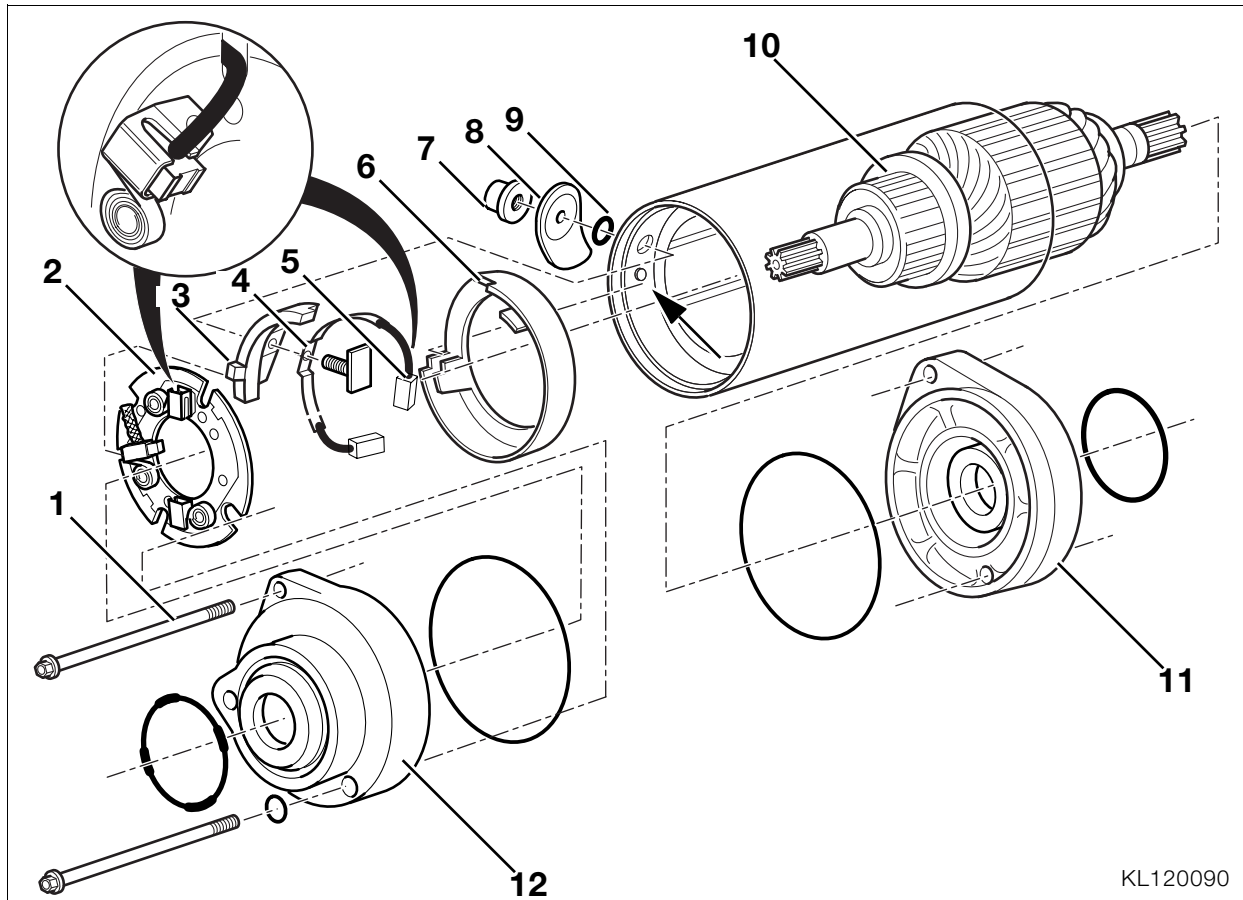


KL120080

- Remove screw (6) and remove the starter motor.
- When reinstalling begin by introducing the starter motor into the intermediate flange, then install the gearbox and tighten screw (6).

⚠ Tightening torques:

Starter to gearbox	6 Nm
Positive cable to starter motor.....	6 Nm
Earth (ground) lead to cross-tube.....	6 Nm



KL120090

Disassembling/assembling starter motor

- Clamp the starter motor into a vise with soft jaws.
- Unscrew tie-rods (1).

Caution:

Before removing or installing the housing cover, always fit a length of shrinkable PVC tubing over the splines on the armature.

- Remove gearbox-side housing cover (12).
- Remove engine-side housing cover (11).
- Pull out armature (10).
- Remove 2 carbon brushes (5) from brush-holder plate (2).
- Remove brush-holder plate (2).
- Remove nut (7) from starter-motor housing and remove rubber ring (9) and outer insulator (8).
- Remove inner insulator (3) with carbon-brush holder.
- Remove plastic retainer (6).

Replacing carbon brushes

- Replace brush-holder plate (2) and 2 carbon brushes (5).
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

Align plastic retainer (6), brush holder (4) and inner insulator (3) with the stud (arrow) inside the housing.

- Install plastic retainer with insulator, carbon brush holder and screw in the housing.
- Hand-tighten nut (7).
- Install brush-holder plate (2) aligned with lug of insulator (3).



Note:

Insert the carbon brushes with the angled side towards the spring.
Do not damage the carbon brushes when installing.

- Carefully press back the brushes and insert the armature.
- Mount the gearbox-side housing cover with tie rods and O-rings in the housing.
- Install the engine-side housing cover.



Tightening torques:

Tie rods, starter-motor housing 6 Nm
Nut on housing 6 Nm

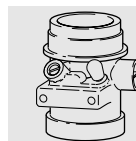


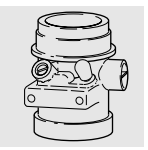
13 Fuel preparation and control

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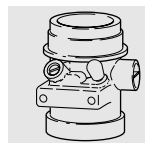
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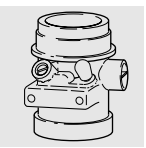
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Technical Data		K 1200 LT
Fuel grade		Super (premium), unleaded, 95 octane (RON)
Mixture preparation		Motronic MA 2.4
Fuel pressure	bar (psi)	3.5 (49.80)
Throttle valve stub inside dia.	mm (in)	34 (1.34)
Air filter		Multi-layer paper element
Intake stub pipe		With resonance damper
Throttle cable play (engine warm)		
[without cruise-control system]	mm (in)	0.5 (0.02)
[with cruise-control system] Total play, throttle-opener and throttle-closer cables	mm (in)	1 ... 1.5 (0.04 ... 0.06)
Bowden cable, cruise-control system	mm (in)	2 ... 3 (0.08 ... 0.12)






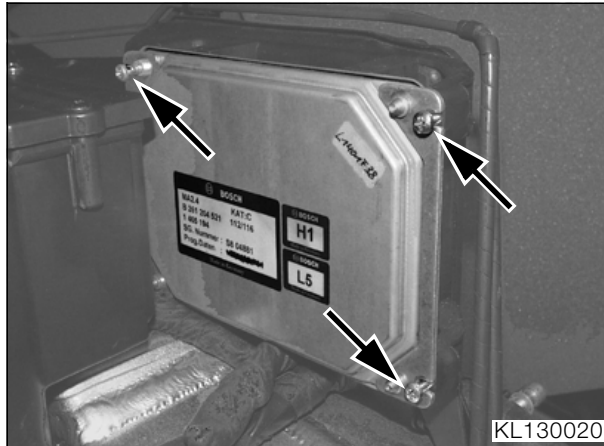
Removing and installing Motronic control unit



Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

- Remove fuel tank.
See Group 16



Caution:

Disconnect ground lead from battery and insulate.

- Remove the fasteners (arrows).
- Pull Motronic control unit out of central plug.
- Installation is the reverse of the removal procedure.





Note:

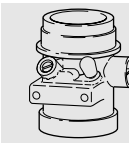
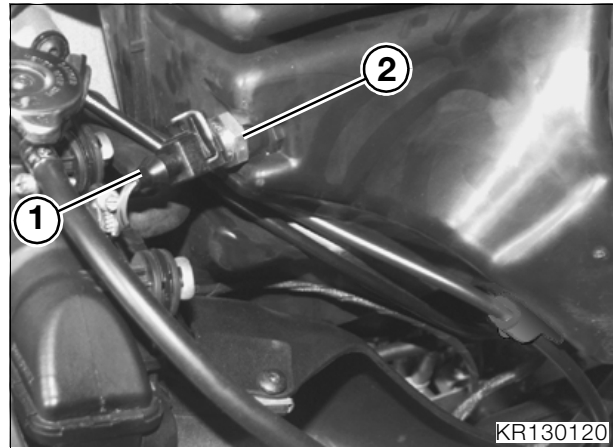
Make sure that the seal at the central plug is correctly seated.

Replacing intake air filter element

See Group 00

Replacing air temperature sensor

- Remove left and right fairing side sections.
See Group 46
- Remove front seat with bridge.
See Group 52
- Remove fastener securing fuel tank to frame.
- Pull fuel tank toward rear to disengage it from its holder.



- Disconnect plug (1) of temperature sensor.
- Remove temperature sensor (2).
- Installation is the reverse of the removal procedure.



Tightening torque:

Temperature sensor in intake air silencer 15 Nm

Removing and installing intake air silencer

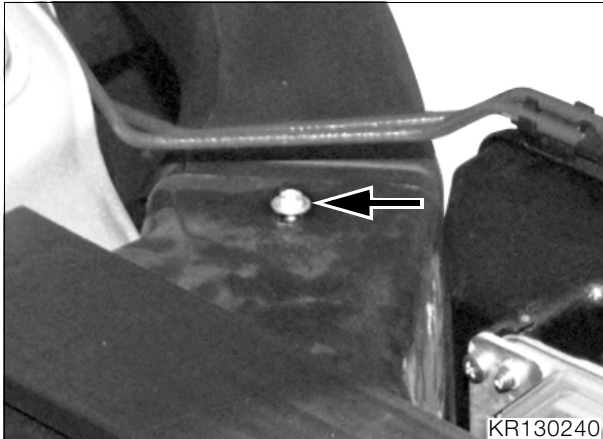
- Remove left and right fairing side sections.
 ➔See Group 46



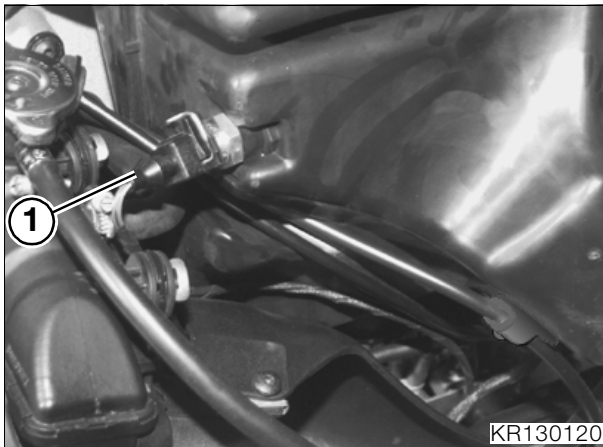
Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

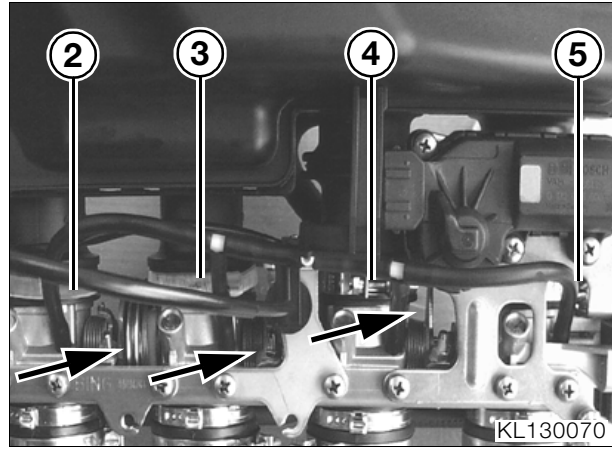
- Remove fuel tank.
 ➔See Group 16



- Remove screw (arrow) securing suction pipe.
- Remove air outlet duct for left radiator.



- Disconnect plug (1) of temperature sensor.



- Open non-reusable hose clips (2, 3) and screw-type hose clamps (4, 5) at throttle valve stubs.
- **[Activated charcoal filter]** Remove timing valve from its holder.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Secure non-reusable hose clips (2, 3) with pliers, **BMW No. 13 1 510**.
- Make sure that screw of hose clamp (4) on cylinder No. 3 is aligned exactly in forward direction of travel.



Caution:

After installing, check that Bowden-cable pulls (arrows) at throttle valve stubs move freely.

Removing and installing fuel injection rail

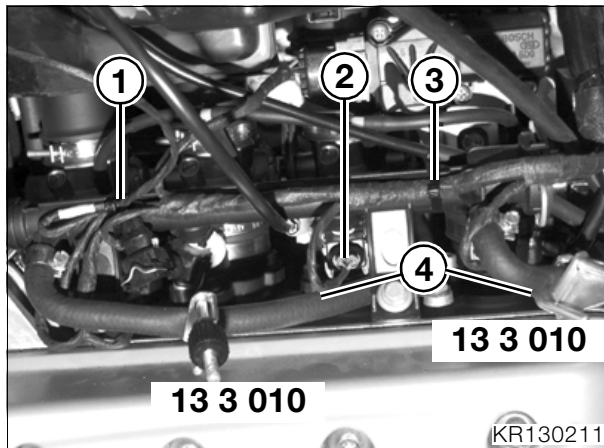
- Remove left and right fairing side sections.
 ➔See Group 46



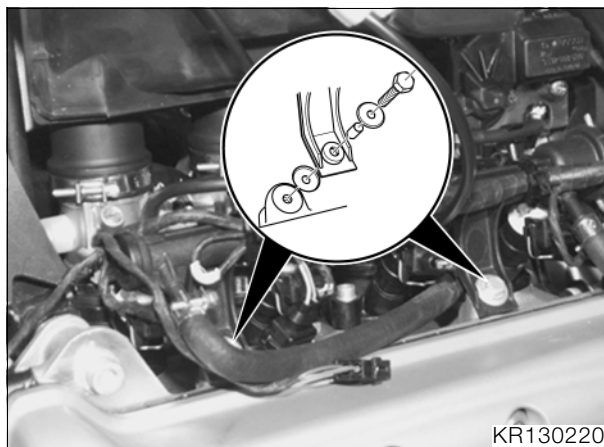
Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

- Remove fuel tank.
 ➔See Group 16
- Remove air outlet duct for left radiator.



- Use hose clamps, **BMW No. 13 3 010**, to close off fuel hoses (4).
- Slacken hose clamps securing fuel hoses and disconnect fuel hoses.
- Remove vacuum hose from cable ties (1, 3) and slacken cable ties.
- Disconnect all four plugs of injection valves (2).



- Slacken screws and remove fasteners.
- Pull the injection rail with the injectors out of the intake stubs.

- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

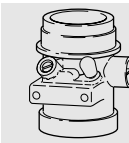
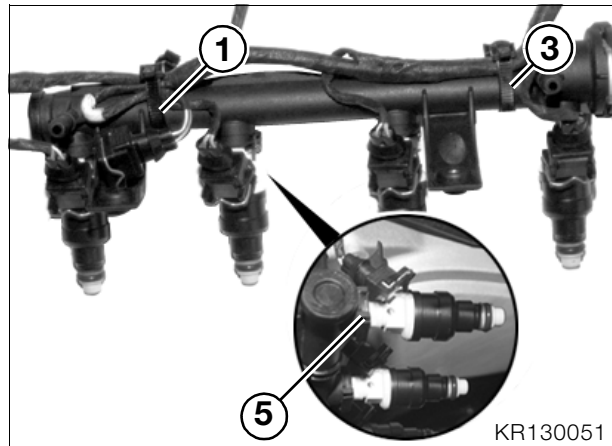
Make sure that the O-ring at the injector is in good condition. Lightly oil the O-rings.



Tightening torques:

Fuel injection rail to cylinder head 9 Nm

Removing and installing injectors



Note:

It is not necessary to slacken the cable ties (1, 3).

- Remove fuel injection rail.
- Slacken clamp (5) at fuel injector and remove fuel injector.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

Make sure that the O-ring at the injector is in good condition.

Note the correct installed position of the injectors.

Removing and installing pressure regulator

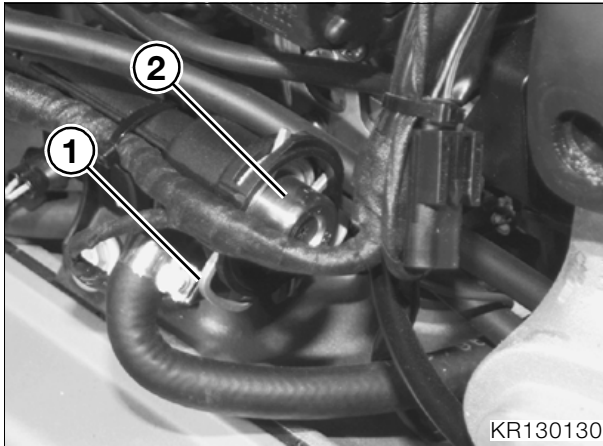
- Remove left and right fairing side sections.



Warning:

Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
 ↳See Group 16
- Use hose clamps, **BMW No. 13 3 010**, to close off fuel hoses at injection rail.



- Pry out clip (1) at fuel injection rail.
- Using pliers, remove pressure regulator (2).
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

Before installing, coat the sealing rings with clean engine oil (silicone-free) or rub them with Vaseline.

Removing and installing throttle valve rail



Caution:

Do not slacken the fasteners securing the throttle valve stubs to the throttle valve rail.

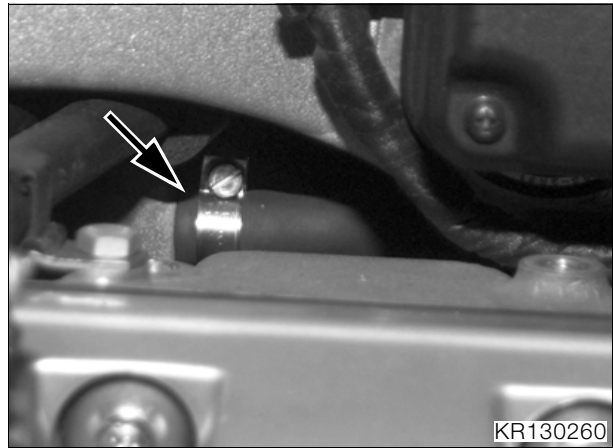
- Remove left and right fairing side sections.
 ↳See Group 46



Warning:

Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
 ↳See Group 16
- Remove left air outlet duct.



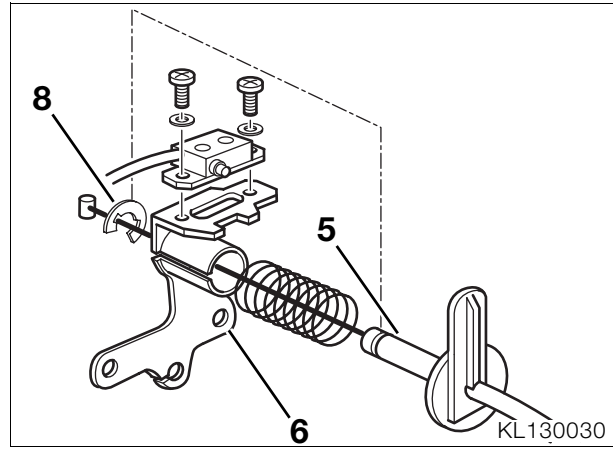
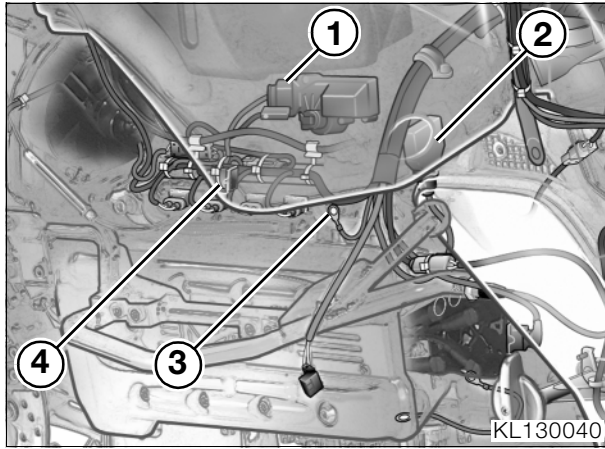
- Disconnect hose (arrow) from crankcase breather.
- Remove intake air silencer.



Note:

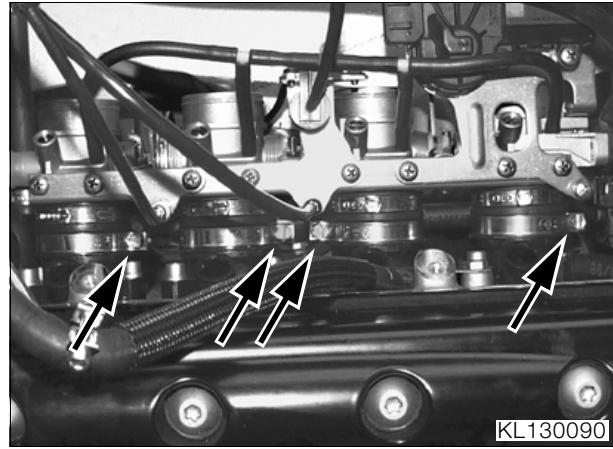
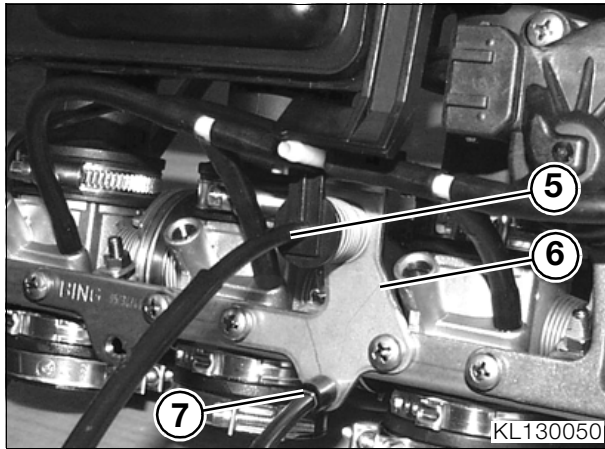
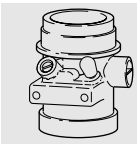
It is not necessary to disconnect the fuel hoses or remove the cable ties from the fuel injection rail.

- Remove fuel injection rail.



- Disconnect plug (4) for switch of cruise-control system.
- Disconnect the earth (ground) cable (3) from the throttle valve rail.
- Disconnect plug of throttle-valve potentiometer (2).
- Disconnect plug of throttle-valve actuator (1).
- **[Activated charcoal filter]** Disconnect breather hose to timing valve from y-piece.
- Slacken screws securing hose clips at intake stubs.
- Remove throttle-valve rail from intake stubs.

- Remove circlip (8).
- Disengage throttle-closer cable (5) from its pull at the throttle valve rail and remove throttle-closer cable (5).
- Disengage Bowden cable of cruise-control system.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



⚠ Caution:
Do not remove retaining plate (6): the screws locate the throttle valve stubs.

📷 Note:
Note the installed positions of the hose-clamp screws (arrows).

- Disengage throttle-opener cable (7) from its pull at the throttle valve rail.

⚠ Caution:
After installing, check that Bowden-cable pulls at throttle valve stubs move freely.

- Check play of Bowden cables, adjust if necessary
- ➡See Group 00

🔧 Tightening torques:
Fuel injection rail to cylinder head 9 Nm

Removing and installing throttle valve actuator

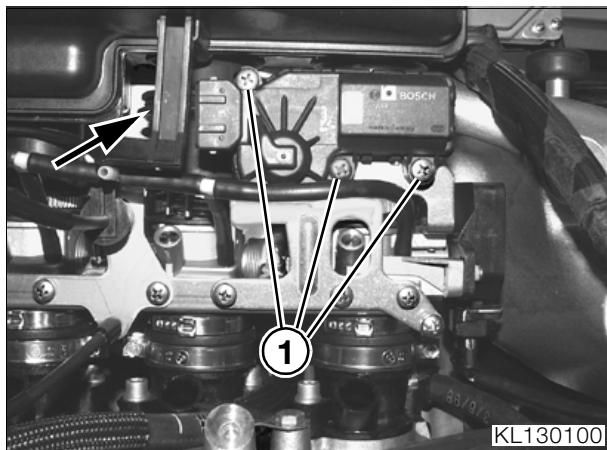
- Remove left and right fairing side sections.



Warning:

Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
- ➔See Group 16
- Remove fuel injection rail.



- Disconnect plug of throttle valve actuator (arrow).



Caution:

Take care not to bend the retaining bracket for the throttle valve actuator.

Screws (1) are secured with Loctite 270.

- Remove screws (1).
- Remove the throttle valve actuator.



Caution:

The throttle valve actuator operates on 5 volts supplied by the control unit. Do not attempt to operate it with the motorcycle's 12 volt circuit.

- Install throttle valve actuator. Coat threads of screws with **Loctite 270** and tighten.
- Perform function test with **BMW MoDiTeC**, menu item THROTTLE-VALVE POTENTIOMETER or THROTTLE VALVE ACTUATOR.

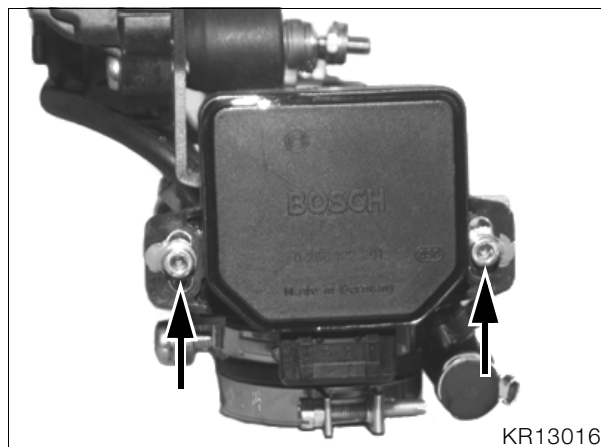


Tightening torque:

Screws of throttle valve actuator 5 Nm (clean thread + Loctite 270)

Replacing and adjusting throttle valve potentiometer

- Remove throttle valve rail.



- Remove screws (arrows). Remove the throttle valve potentiometer.
- Install the new throttle valve potentiometer.



Note:

Throttle valve actuator must be installed and connected. Throttle-valve potentiometer must be connected.

- Connect **BMW MoDiTeC** to diagnosis plug beneath front seat.
- Open the TOOLBOX menu and select THROTTLE-VALVE POTENTIOMETER or THROTTLE VALVE ACTUATOR.
- Follow the instructions of the **BMW MoDiTeC**.
- Tighten screws securing throttle-valve potentiometer.
- Perform function check with **BMW MoDiTeC**, menu item THROTTLE-VALVE POTENTIOMETER or THROTTLE VALVE ACTUATOR.
- Apply sealing lacquer to securing screws.
- Installation is the reverse of the removal procedure.

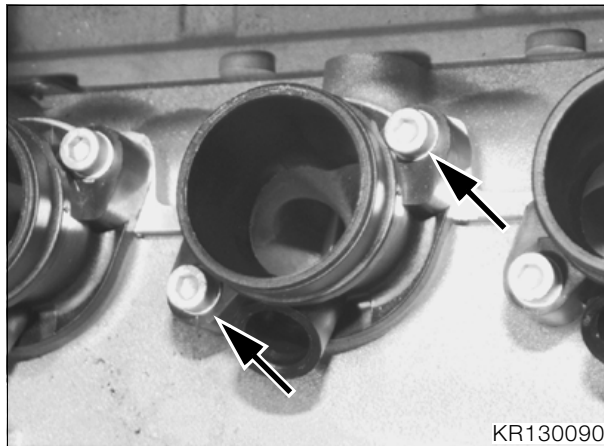


Tightening torque:

Screws of throttle-valve potentiometer 2 Nm

Removing and installing intake stubs

- Remove throttle valve rail.



- Remove screws (arrows) and remove intake stubs complete with sealing rings.



Note:

When installing the rear intake stub, do not forget the clip for the fuel hose.

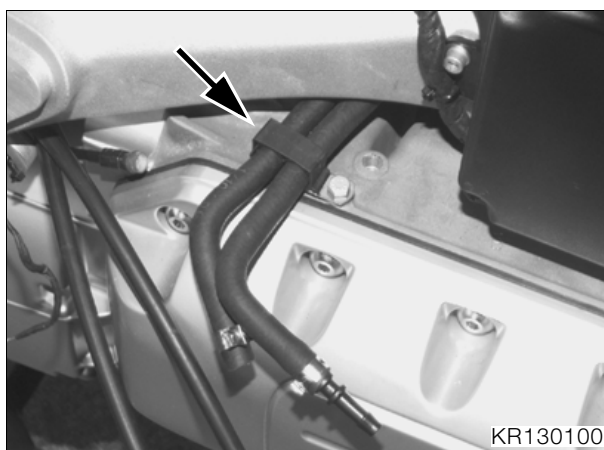


Tightening torque:

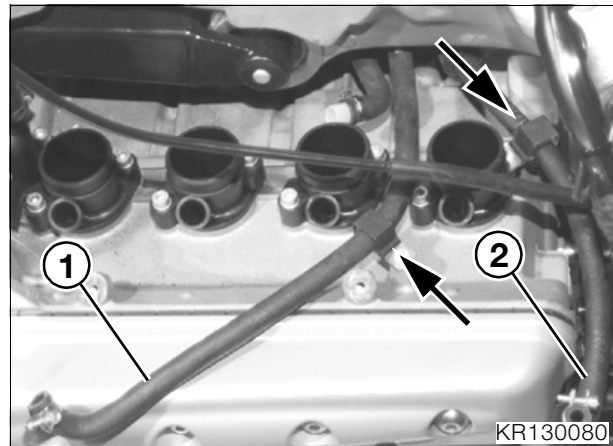
Intake stub to cylinder head 9 Nm

Replacing fuel hoses

- Remove throttle valve rail.



- Open the retaining clip (arrow).



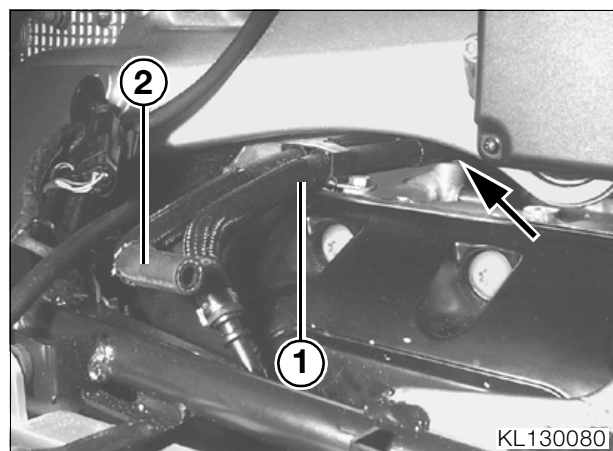
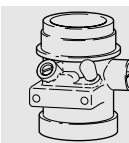
- Open clip (arrow) securing fuel-supply hose (1) and fuel-return hose (2).



Warning:

Comply with safety precautions when handling or working with fuel.

- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:

Make sure that the fuel-supply and fuel-return hoses (1 and 2, respectively) and protective sleeve (arrow) are routed correctly between the frame and the engine.

- Route fuel hoses such that coloured marks are at the clips.

Coloured marks

Blue Fuel return
White Fuel supply



Tightening torque:

Retaining clip to engine 9 Nm

Removing and installing throttle cables

Preparatory work for all Bowden cables

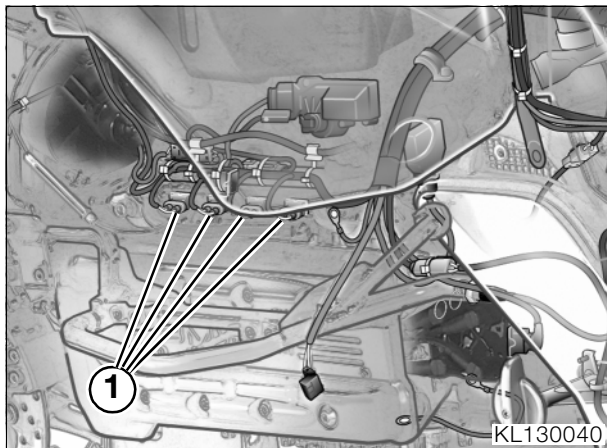
- Remove left and right fairing side sections.
 ➡See Group 46
- Remove tank cover.



Warning:

Comply with safety precautions when handling or working with fuel.

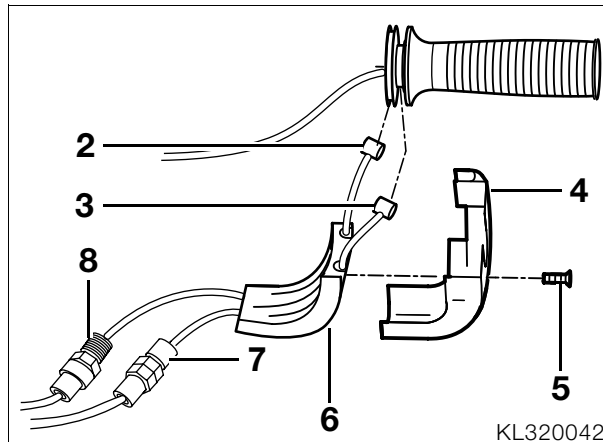
- Remove fuel tank.
 ➡See Group 16
- Remove left air outlet duct.



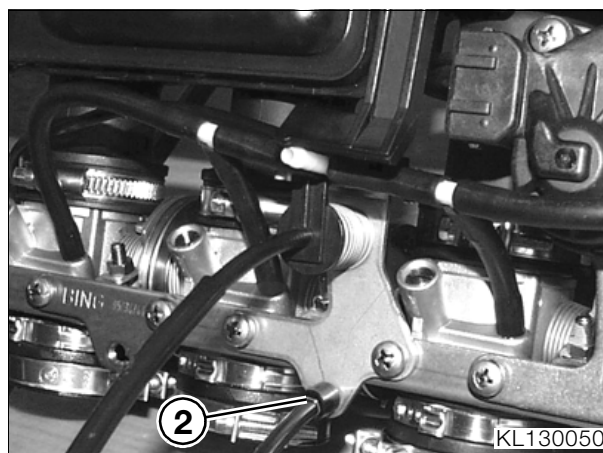
- Disconnect plugs (1) of injection valves.
- Remove fuel injection rail.
- **[Activated charcoal filter]** Remove timing valve from its holder.
- Remove intake air silencer.

Removing and installing throttle-opener and throttle-closer cables

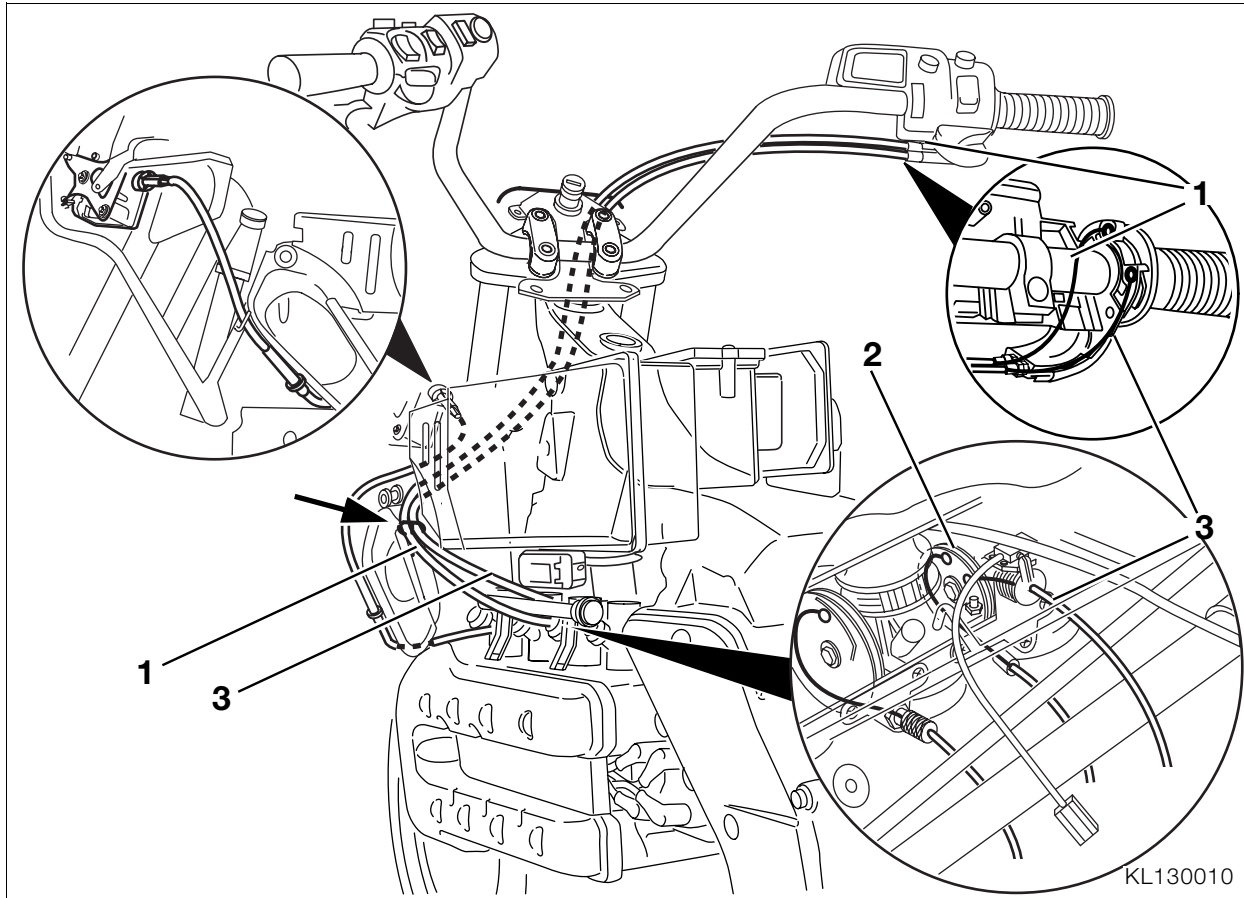
- Remove left and right handlebar trim sections.
 ➡See Group 46
- Remove cover of fork bridge.



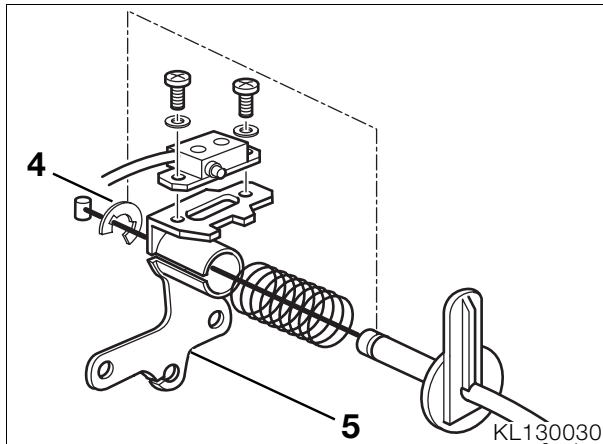
- Remove screw (5) and remove cover (4).
- Disengage adjusting screw (7) for throttle-closer cable (3).
- Open adjusting screw (8) for throttle-opener cable (2).
- Remove throttle-cable relay (6).
- Disengage throttle-opener cable (2) from its pull and remove.
- Disengage throttle-closer cable (3) from its pull.
- **[Chrome grips]** Turn throttle twist grip clockwise as far as it will go and disengage throttle-closer cable (3).
- Release cable ties at fairing bracket and pull throttle cables down toward fuel injection rail to remove.



- Disengage throttle-opener cable (2) from its pull at throttle-valve rail.



KL130010



KL130030

⚠ Caution:

Do not remove retaining plate (5): the screws locate the throttle valve stubs.

- Disengage throttle-closer cable (3) from its pull (2) at the throttle valve rail.
- Remove circlip (4) and remove throttle-closer cable.

- Installation is the reverse of the removal procedure: pay particular attention to the following.

⚠ Caution:

Route Bowden cables so as to avoid tight bends and make sure they are not kinked or pinched.

- Route the two cables parallel; the throttle-opener cable (1) with green mark always to the outside.
- Clip Bowden cables at marks into holder (arrow) on air outlet duct.
- Check that Bowden-cable pulls at throttle valve stubs move freely.
- Check play of Bowden cables, adjust if necessary

➡ See Group 00

Settings:

[Without cruise control system]

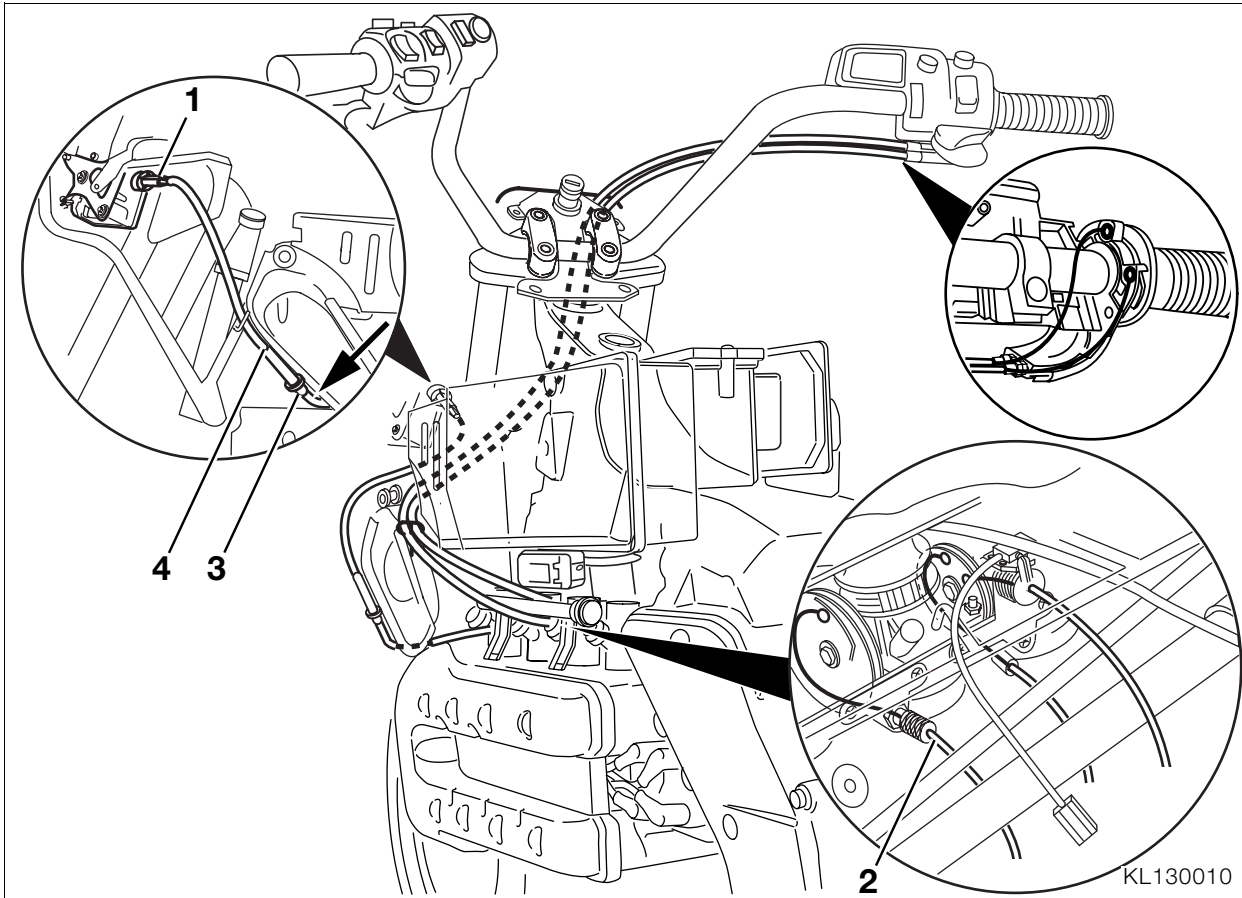
throttle-cable play, engine warm ... 0.5 mm (0.02 in)

[With cruise control system]

total play of Bowden cables at throttle twist grip, engine warm 1 mm ... 1.5 mm (0.04 in ... 0.06 in)

🔧 Tightening torques:

Fuel injection rail to cylinder head 9 Nm



Removing and installing Bowden cable of cruise-control system

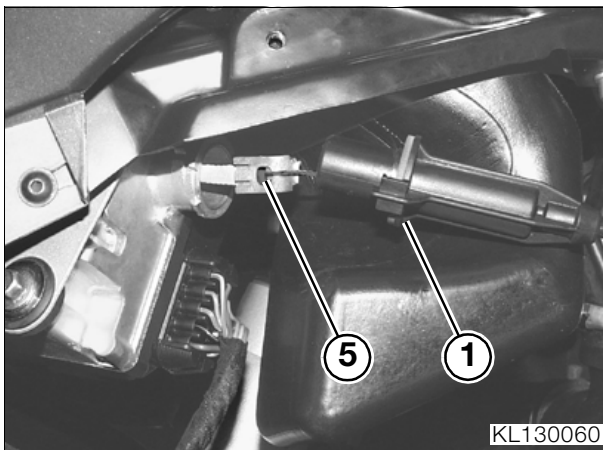
- Carefully pull apart sleeve (4) and lower cable sheath (arrow) and remove insert (3).
- Disengage Bowden cable (2) from its pull at throttle-valve rail.

- Installation is the reverse of the removal procedure: pay particular attention to the following.

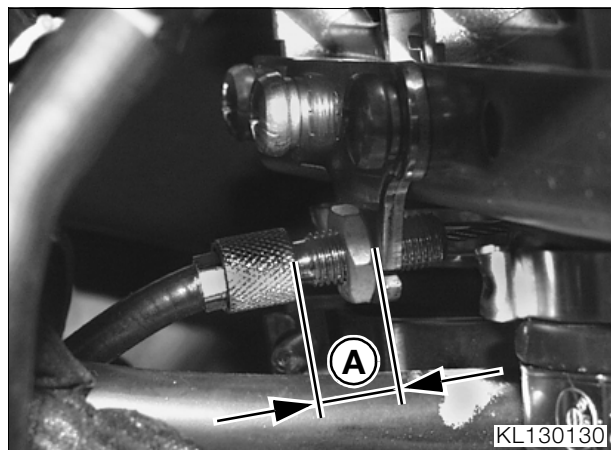


Caution:

After installing, check that Bowden-cable pulls at throttle valve stubs move freely.



- Disconnect bayonet-type plug (1) from control unit of cruise-control system.
- Disengage nipple (5) and remove Bowden cable.



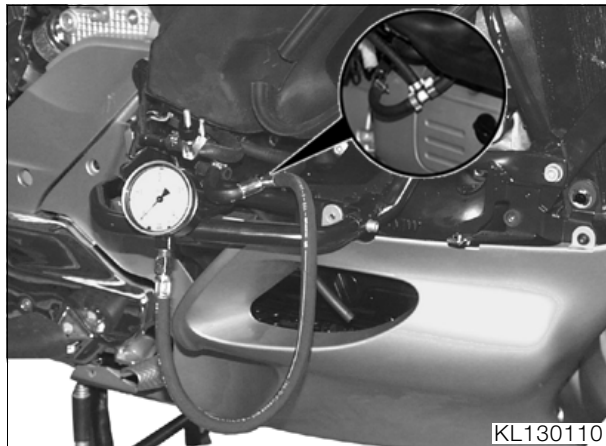
- Preadjust Bowden-cable play to obtain specified distance "A" by turning adjusting screw at throttle-valve rail.
- Check play of Bowden cable, adjust if necessary
 ➔See Group 00

Settings:

Distance "A" 9 mm (0.35 in)
 Bowden cable play
 (engine warm).....2 mm ... 3 mm (0.08 in ... 0.12 in)

Checking fuel pressure

- Remove right side section of fairing.
➔ See Group 46



Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

- Connect a test pressure gauge, **BMW No. 16 1 500**, to fuel-supply line (inner hose, with white mark for identification).
- Start engine and allow to idle.

Fuel pressure:

Specification 3.5 bar (49.80 psi)



Note:

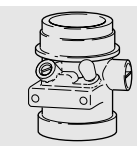
If fuel pressure is lower than this, check the fuel pump, fuel filter, pressure regulator and lines.

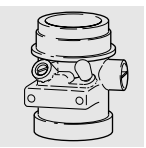
Removing and installing control unit of cruise-control system

See Group 65

Checking throttle cable play, adjusting if necessary

See Group 00





16 Fuel tank and lines

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Removing/installing immersion-tube sensor	8
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Removing/installing roll-over valve	8

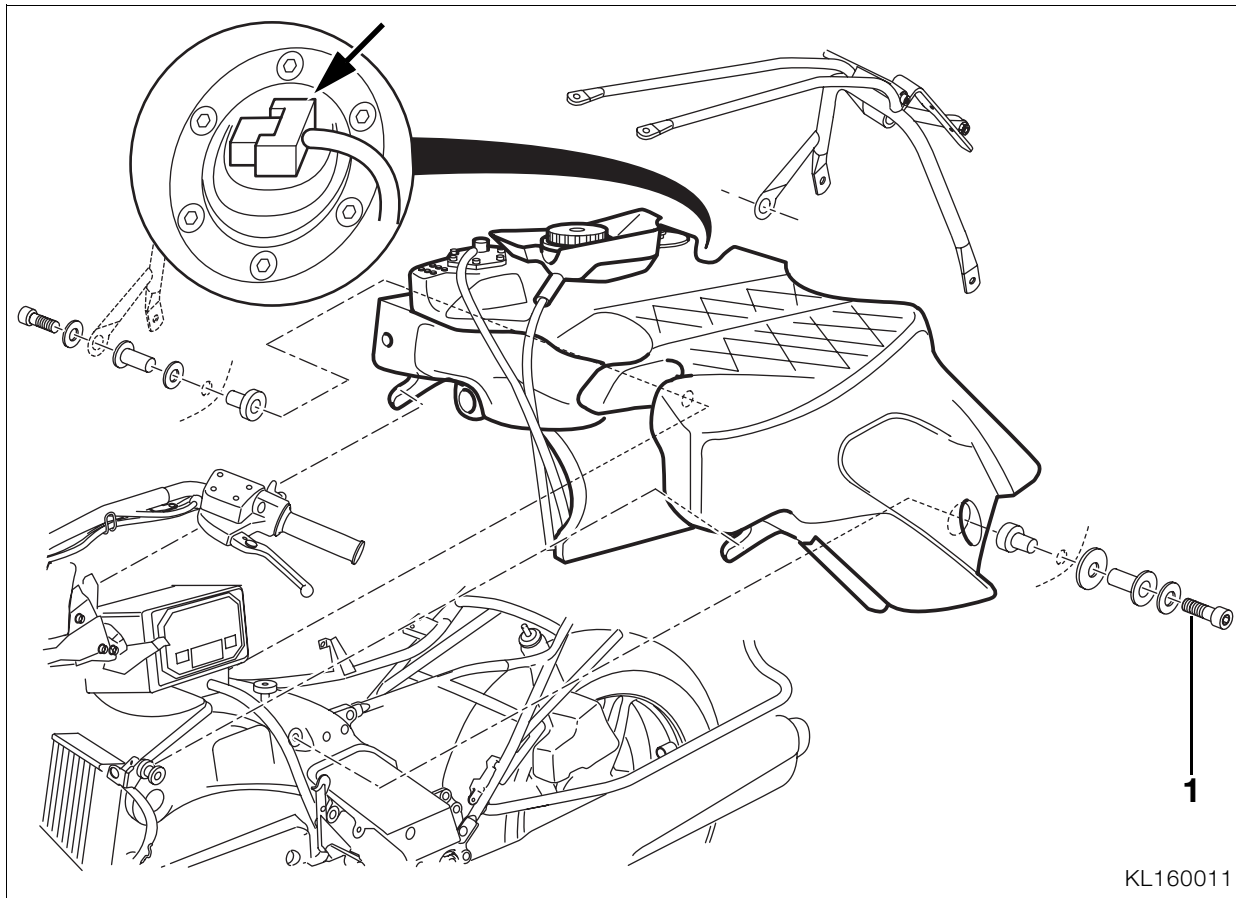




Technical Data		K 1200 LT
Tank capacity		
Motorcycle on side stand	l (Imp. gal/ US gal)	approx. 23.5 (5.17/6.21)
Motorcycle on main stand	l (Imp. gal/ US gal)	approx. 22 (4.84/5.81)
including reserve of	l (Imp. gal/ US gal)	4 (0.88/1.06)
Type of fuel		Super (premium), unleaded. 95 octane (RON)
Fuel pump		
Type		peripheral-gear pump
Operating voltage	V	12
Fuel pressure	bar (psi)	3.5 (49.80)
Delivery volume	l/h (Imp. gal/h; US gal/h)	110 (24.21; 29.06)







Removing and installing fuel tank



Note:

The immersion-tube sensor has to be calibrated if it or the fuel tank has been replaced.



Caution:

Disconnect ground lead from battery and insulate.

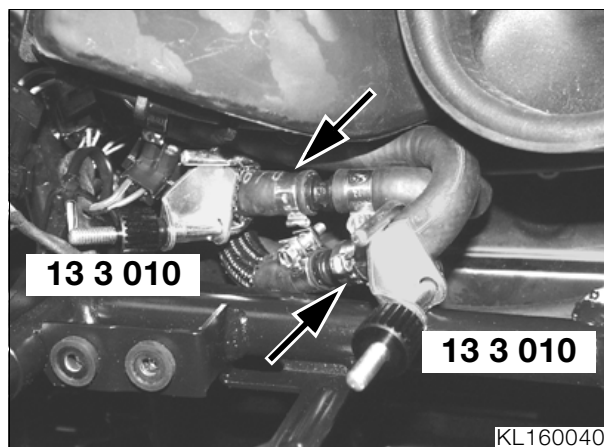
- Remove left and right fairing side sections.
- Remove tank cover.
- ➡See Group 46
- Remove bridge for saddle, front.
- ➡See Group 52



Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

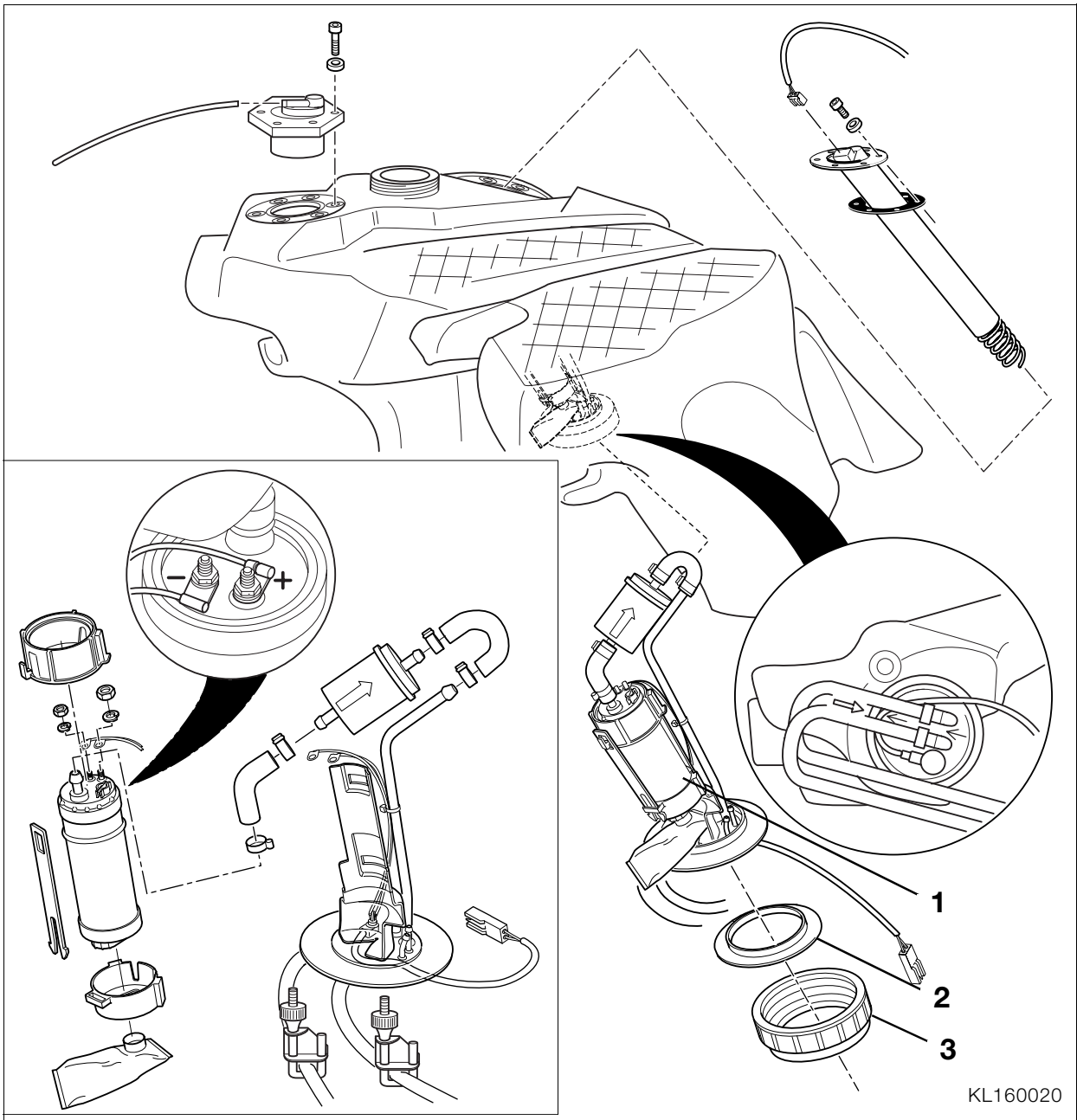
- Disconnect hoses for tank breather and roll-over valve at junctions.
- Disconnect plug of fuel pump.
- Disconnect plug of immersion-tube sensor (arrow).



- Use hose clamps, **BMW No. 13 3 010**, to close off fuel hoses behind non-opening hose clips (arrows).
- Slacken screw-type hose clips and disconnect fuel hoses.
- Release attachment (1) for fuel tank on left and pull fuel tank toward rear to disengage it from its rubber mount.
- Installation is the reverse of the removal procedure.

Tightening torques:

Fuel tank to frame M 8	21 Nm
Bridge to frame M 8	21 Nm
Bridge to frame M 6	9 Nm



Renewing fuel filter

- Remove fuel tank.



Warning:

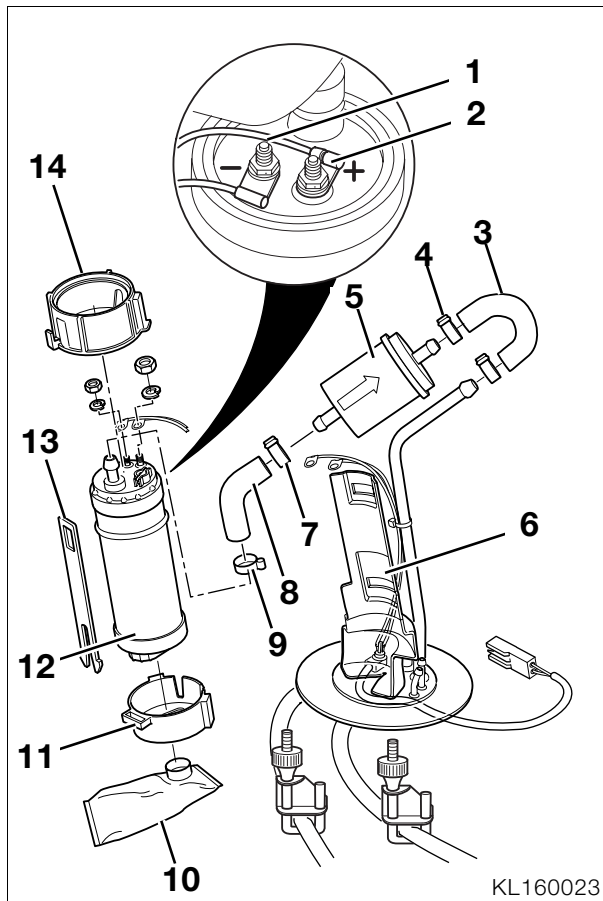
Comply with safety precautions when handling or working with fuel.

- Drain fuel tank.

Removing the fuel pump unit

- Release union nut (3) using wrench, **BMW No. 16 1 710**.
- Remove fuel-pump unit (1) with seal (2).

Removing/installing fuel filter



- Open clips (4, 7).
- Disconnect fuel hoses (3, 8) from fuel filter (5).



Caution:

Note correct direction of flow through fuel filter.

- Connect fuel hoses (3, 8) to new fuel filter (5).
- Close clips (4, 7) with pliers, **BMW No. 13 1 500**.

Removing/installing fuel pump

- Detach connecting cables (1, 2) from fuel pump.
- Open hose clip (9) and disconnect hose (8).
- Release holder (13).
- Release vibration damper at pump outlet (14).
- Pull fuel pump (12) with pump inlet vibration damper (11) off holder (6).
- Pull pump inlet vibration damper (11) off fuel pump (12).
- If necessary, pry off intake filter (10).
- Installation is the reverse of the removal procedure: pay particular attention to the following.

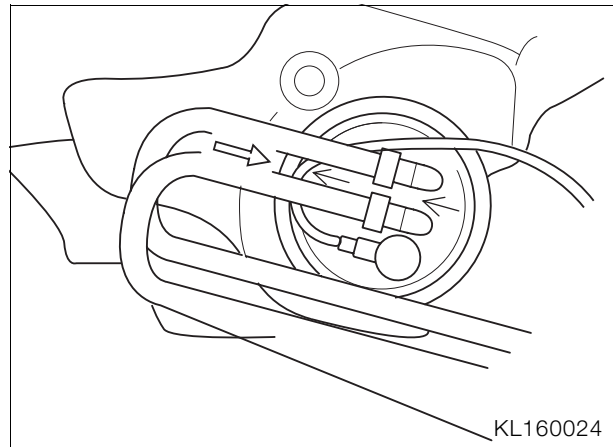


Caution:

Position of intake filter (10): do not damage the filter.

Installing the fuel-pump unit

- Install the fuel-pump unit complete with seal in the fuel tank.



Note:

Make sure that the arrow on the underside of the fuel tank points directly toward the arrows on the fuel-pump unit.

- Tighten the union nut with wrench, **BMW No. 16 1 710**.
- Install the fuel tank.



Tightening torques:

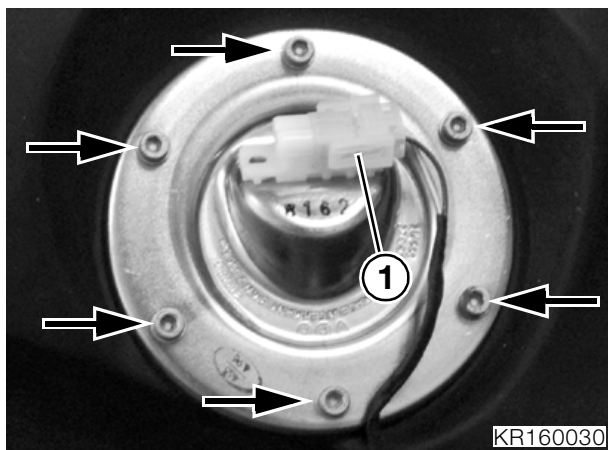
Union nut	30 Nm
Fuel tank to frame M 8	21 Nm
Bridge to frame M 8	21 Nm
Bridge to frame M 6	9 Nm

Removing/installing immersion-tube sensor

- Remove left and right fairing side panels.
- Remove tank cover.
- ⇒See Group 46

Caution:
Disconnect ground lead from battery and insulate.

Warning:
Comply with safety precautions when handling or working with fuel.



- Disconnect the plug of the immersion-tube sensor (1).
- Release the retaining screws (arrows).
- Remove the immersion-tube sensor with gasket.
- Installation is the reverse of the removal procedure.

Tightening torque:
Immersion-tube sensor in fuel tank 6 Nm

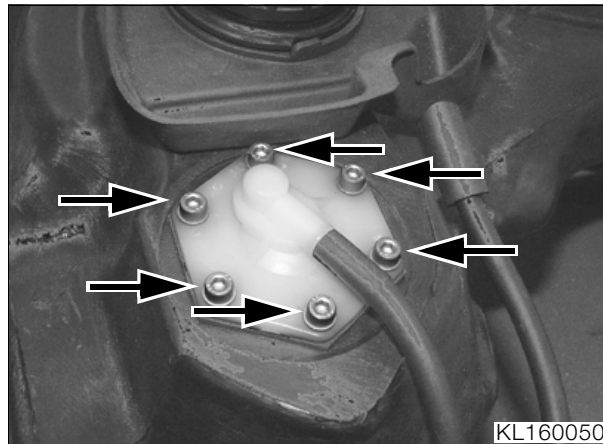
Calibrating the immersion-tube sensor

Note:
The immersion-tube sensor has to be calibrated if it or the fuel tank has been replaced. Calibration allows the reserve fuel capacity of the fuel tank to be adjusted to suit customer preferences.

- Pour 4 litres (0.88 Imp. gal/1.06 US gal) of fuel (or the quantity requested by the customer) into the empty fuel tank.
- Connect the MoDiTeC to the diagnosis connector beneath the saddle.
- Call up the TOOLBOX menu on the diagnostic unit and select the PROGRAM TANK RESERVE item.
- Follow the MoDiTeC instructions.

Removing/installing roll-over valve

- Remove left and right fairing side sections.
- Remove tank cover.
- ⇒See Group 46
- Disconnect the drain hose.

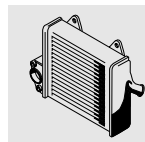


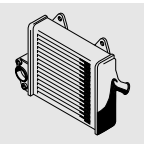
- Release the retaining screws (arrows).
- Installation is the reverse of the removal procedure.

Tightening torque:
Roll-over valve to fuel tank 3 Nm

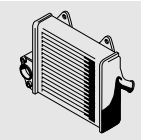
17 Radiator

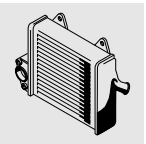
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Connecting hose between left and right radiators	7
Hoses between radiators and coolant stub pipes	7
Hose between coolant stub pipes	7
Coolant hose to water pump	7
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Vapour outlet hose	7
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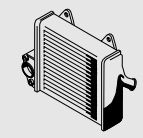
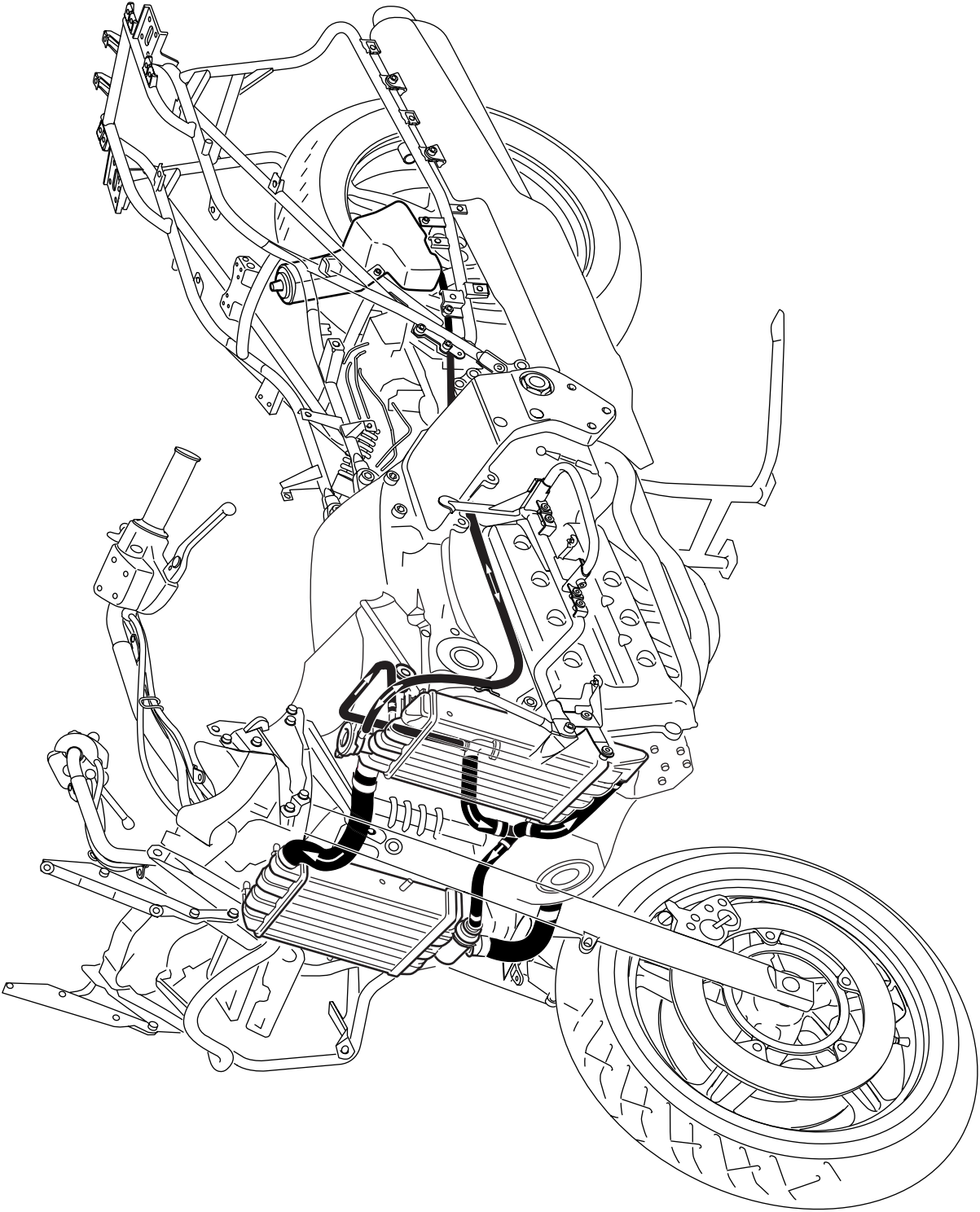


Technical Data		K 1200 LT
Cooling system capacity		
Total capacity	l (Imp. pints/ US quarts)	3.1 (5.46/3.28)
Coolant circuit	l (Imp. pints/ US quarts)	2.5 (4.40/2.64)
Coolant expansion tank	l (Imp. pints/ US quarts)	0.6 (1.06/0.63)
Coolant		Use only nitrite-free long-term antifreeze and corrosion inhibitor.
Thermostat opening temperature	°C (°F)	85 (185)
Fan cut-in temperature	°C (°F)	105 (221)
Cut-in temperature for coolant warning light	°C (°F)	115 (239)
Pressure relief valve in end cover opens at	bar (psi)	1.5 ^{+0.2} (21.3 ^{+2.8})

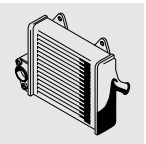


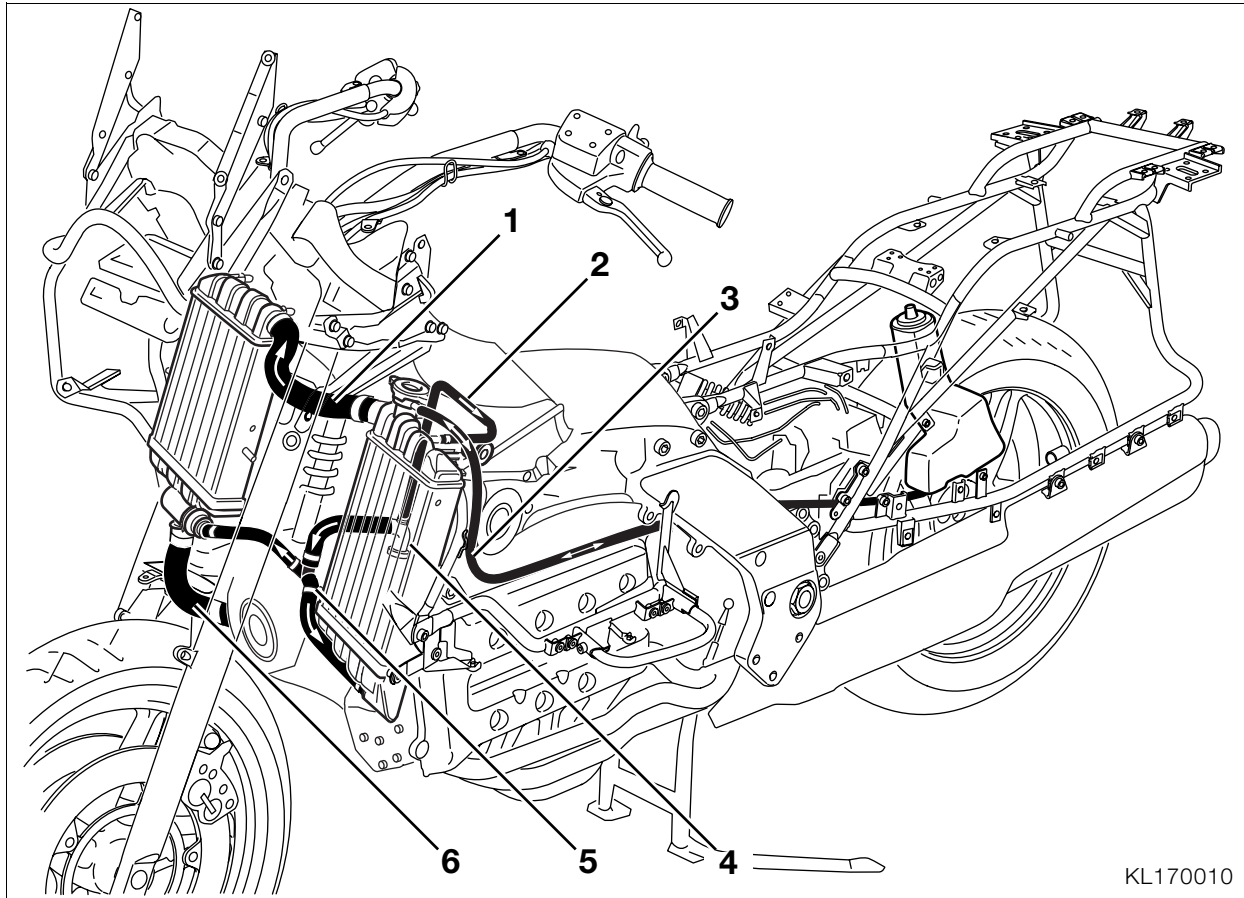


Coolant circuit



KL179000





KL170010

Removing and installing coolant hoses

- Drain coolant.
- ➡See Group 00

Connecting hose between left and right radiators

- Remove left and right fairing side sections.
- Remove connecting hose (1) between left and right radiators.

Hoses between radiators and coolant stub pipes

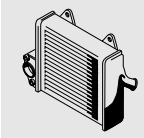
- Remove appropriate coolant hose from coolant stub pipe (5).

Hose between coolant stub pipes

- Remove left-hand radiator.
- Remove hose between coolant stub pipes (4, 5).

Coolant hose to water pump

- Remove right section of engine spoiler.
- Remove coolant hose (6) to oil/water pump.



Removing breather hose



Warning:

Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
- ➡See Group 16
- Press left radiator out of its holder.
- Remove breather hose (2).

Vapour outlet hose

- Remove left side section of fairing.
- Remove the left-hand battery cover.
- Remove vapour outlet hose (3) leading to expansion tank.

- Installation is the reverse of the removal procedure.



Tightening torque:

Coolant hose clipshand-tight

Changing coolant

See Group 00

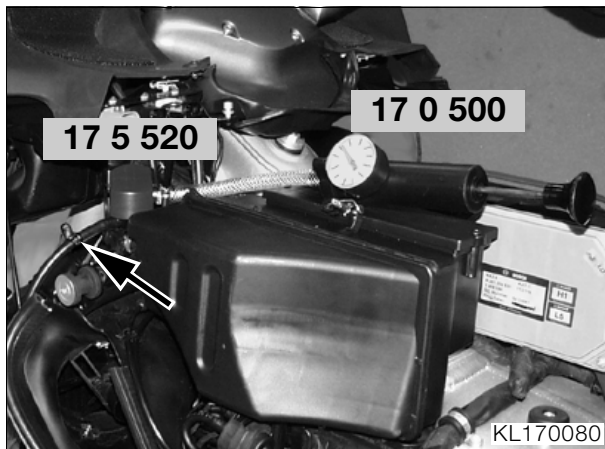
Checking cooling system for leaks

- Remove left and right fairing side sections.
 ↳See Group 46

 **Warning:**

Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
 ↳See Group 16
- Open the filler cap on the left radiator.



- Slacken hose clip of vapour outlet hose and push to the left (arrow).
- Connect pump, **BMW No. 17 0 500**, with adapter and neck, **BMW No. 17 5 520**, to filler neck.
- Pressure-test the system; the pressure must remain unchanged for at least 5 minutes.

Setting:

Test pressure 1.5 bar (21.3 psi)

- Installation is the reverse of the removal procedure.

Removing and installing radiator with fan

Removing and installing left radiator

- Remove left and right fairing side sections.
 ↳See Group 46



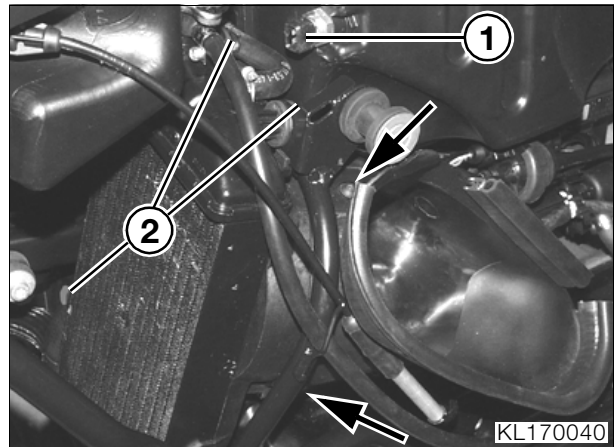
Remove projecting nuts from left and right engine spoiler sections to avoid the risk of injury to the hands.

- Remove centre section of engine spoiler.
 ↳See Group 00



Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
 ↳See Group 16



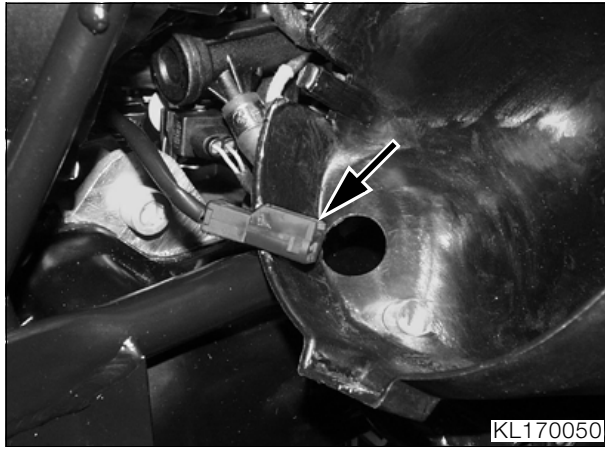
If necessary, disconnect plug (1) of temperature sensor.

- Remove retaining clips (2) with washers.



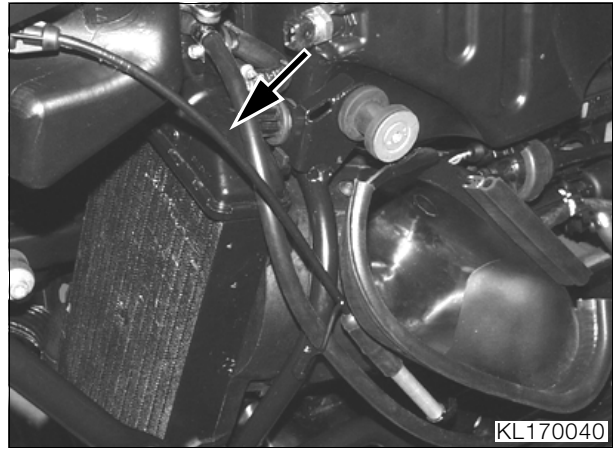
Press the radiator out of the holder at the top.

- Remove 2 screws (arrows) for air outlet duct and disconnect air outlet duct from fan.



- Disconnect plug (arrow) for fan and remove air outlet duct.

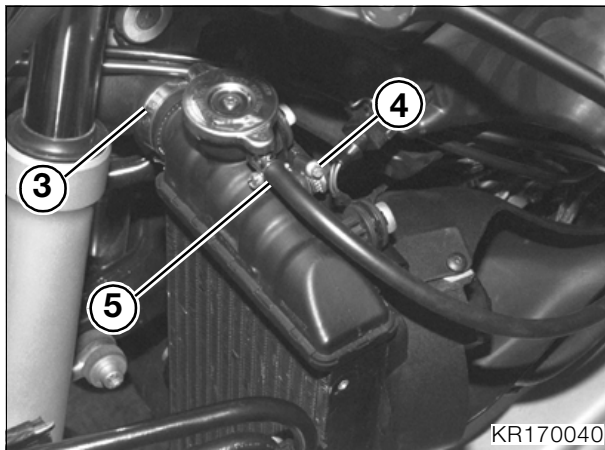
- Installation is the reverse of the removal procedure: pay particular attention to the following.



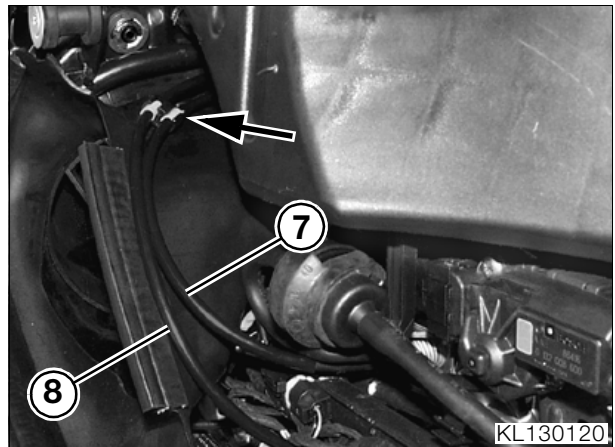
Note:

Route Bowden cable (arrow) for cruise control system past the air outlet duct.

Before installing the air outlet duct, pass the cable for the fan through the hole in the air outlet duct and connect the plug.



- Disconnect connecting hose (3) to right radiator, vapour outlet hose (5) and breather hose (4) at top of radiator.

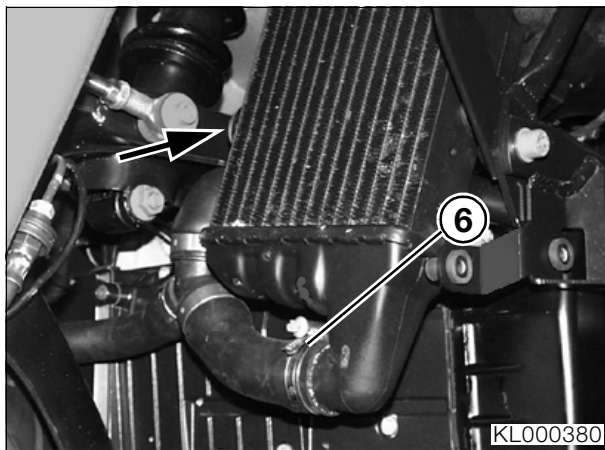


- Clip throttle-opener cable (8) and throttle-closer cable (7) into the holder (arrow) on the air outlet duct on the left.

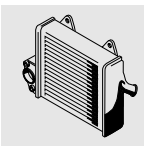


Tightening torque:

Hose clips hand-tight



- Disconnect coolant hose (6) at bottom of radiator.
- Pull radiator with fan out of the bottom holder (arrow).



Removing and installing right radiator

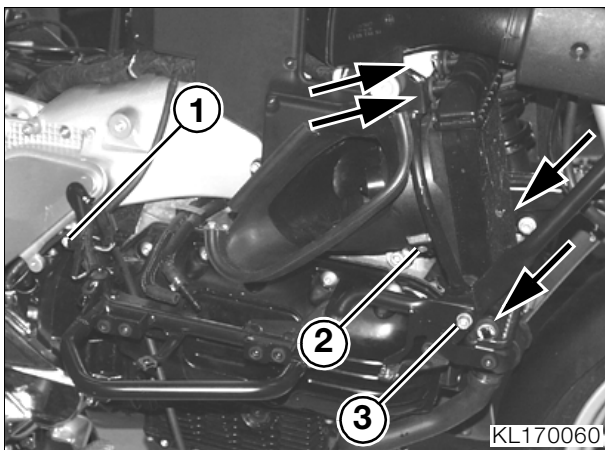
- Remove left and right fairing side sections.
 ➡See Group 46
- Remove centre and right sections of engine spoiler.
- Drain coolant.
 ➡See Group 00



Warning:

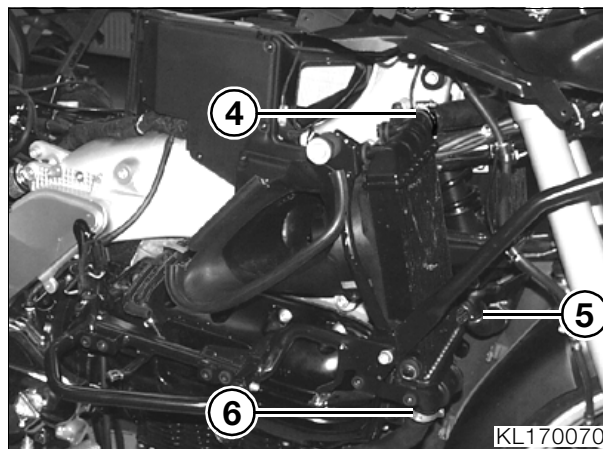
Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
 ➡See Group 16
- Remove the intake air pipe.



- Remove screw securing skirt bracket at front (3).
- Slacken screw securing skirt bracket at rear (1).
- Remove retaining clips (arrows) with washers.
- Swing skirt bracket down.

- Remove 2 screws (2) and remove air outlet duct.
- Disconnect fan plug.



- Disconnect coolant hose (5) from bottom of radiator, connecting hose (4) to left radiator and hose to water pump (6).
- Pull radiator with fan out of holders and remove.
- Installation is the reverse of the removal procedure.

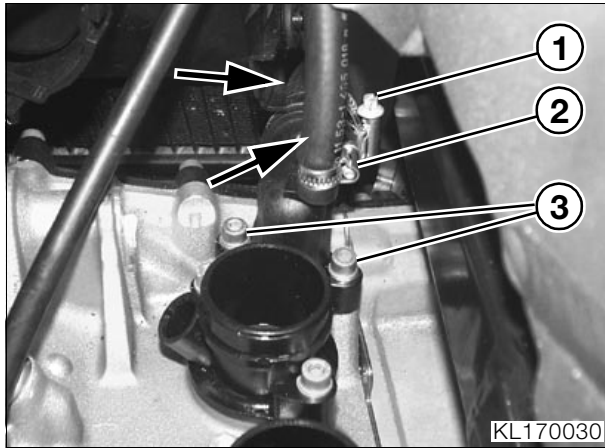


Tightening torque:

Hose clipshand-tight

Removing and installing coolant stub pipe on engine

- Drain coolant.
- ➡See Group 00
- Remove left engine cross-member.
- ➡See Group 46



- Slacken hose clamps (1, 2) and disconnect hoses (arrows).
- Remove screws (3) and remove coolant stub pipe complete with sealing ring.
- Installation is the reverse of the removal procedure.

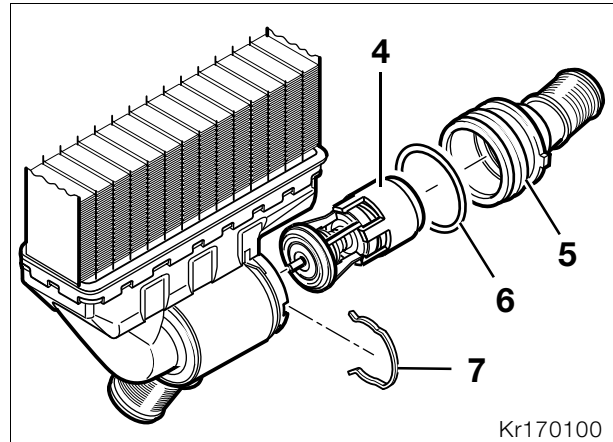


Tightening torques:

Coolant stub pipe to cylinder head..... 9 Nm

Removing and installing thermostat

- Drain coolant.
- ➡See Group 00
- Disconnect coolant hose from thermostat.

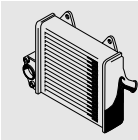


- Remove retaining clip (7).
- Pry out cover (5) at projection.
- Remove thermocouple (4).
- Check O-ring (6) for damage.
- Installation is the reverse of the removal procedure: pay particular attention to the following.

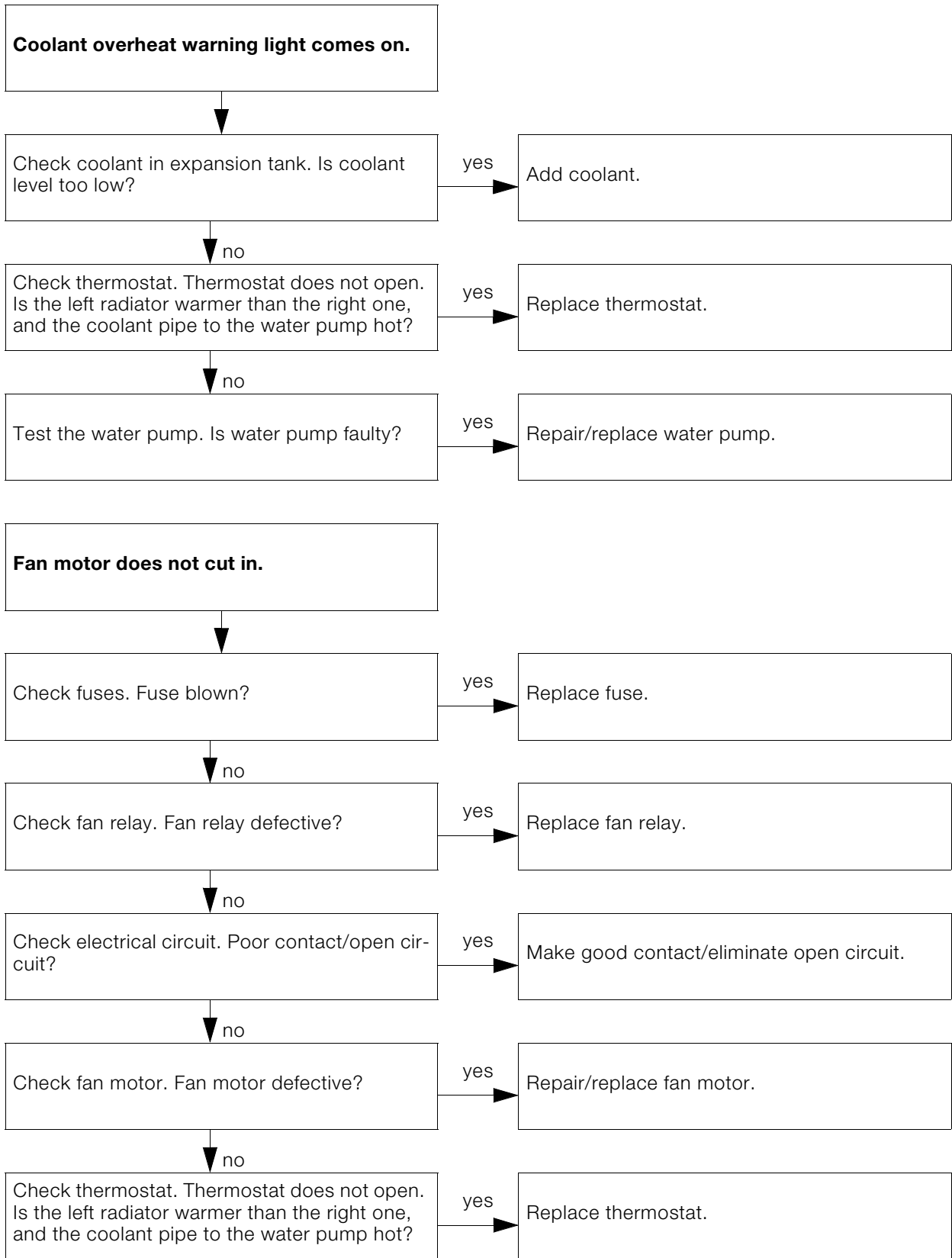


Note:

Chill cover (5) prior to installation in refrigerator/freezer, or similar.



Troubleshooting



Excessive loss of coolant.



Check coolant circuit.
Coolant circuit is interrupted or leaking?

yes

Reconnect or repair leak, as applicable.

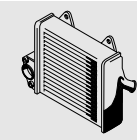
Engine remains cold or warms up very slowly.

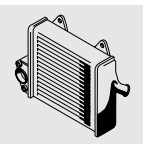


Check thermostat. Thermostat does not close.
Are both radiators equally warm and the coolant hose to the water pump cold?

yes

Replace thermostat.



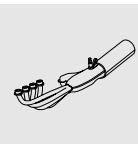


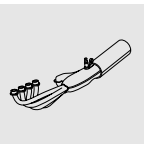
18 Exhaust system

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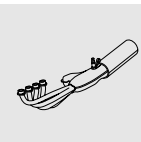
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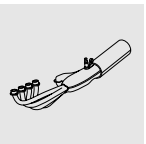
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Removing and installing exhaust system	5
Removing oxygen sensor	6





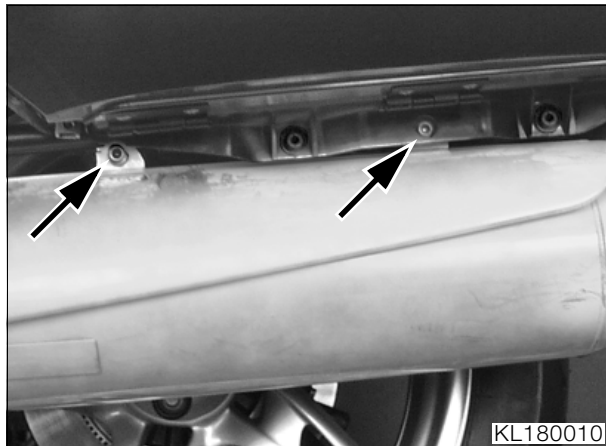
Technical Data	K 1200 LT
Exhaust system	
Emission control	3-way catalytic converter
Silencer (muffler)	Reflection/absorption silencer, non-rusting stainless steel





Removing and installing exhaust heat shield

- Slacken screws securing front left footrest plate.

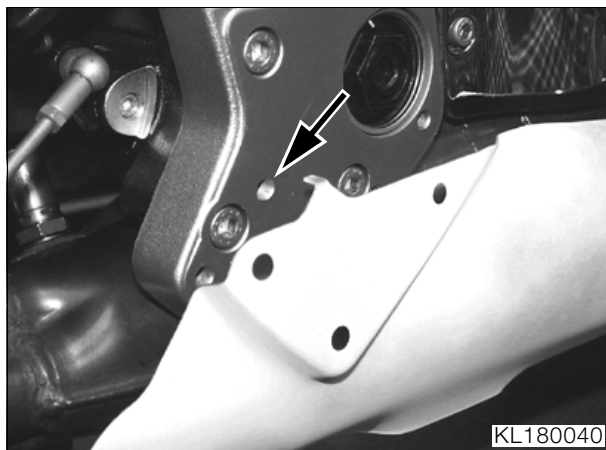


- Remove the 2 retaining screws (arrows).


Caution:

Do not damage the side case when removing the heat shield: use masking tape to protect the case if necessary.

- Pull heat shield toward rear to remove.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



- Engage tab at front in bore (arrow) in main frame.

 **Tightening torque:**
Footrest plate to frame 21 Nm

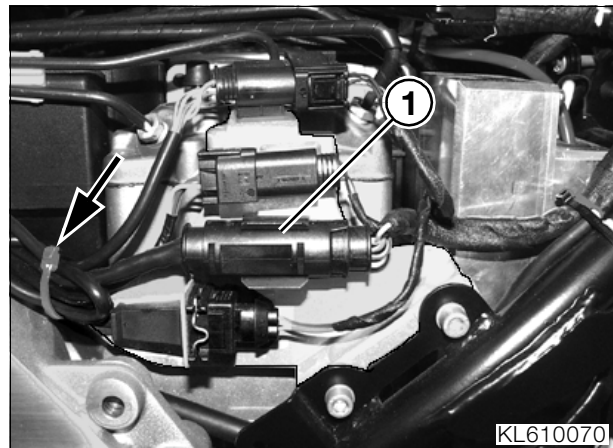
Removing and installing exhaust system

- Remove left-hand section of engine spoiler.
➡ See Group 46

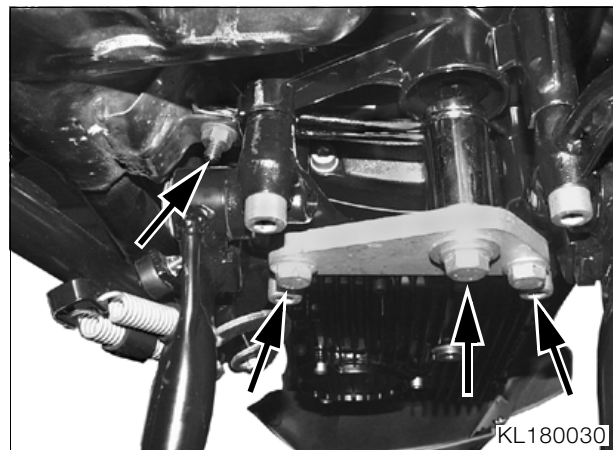
Note:

The bottom fastener of the rear footrest plate is secured to the battery bracket. When removing the battery cover, slacken but do not remove the screw.

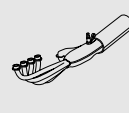
- Slacken screws securing rear left footrest plate.
- Remove left trim panel and battery cover.
- Remove front footrest plate.

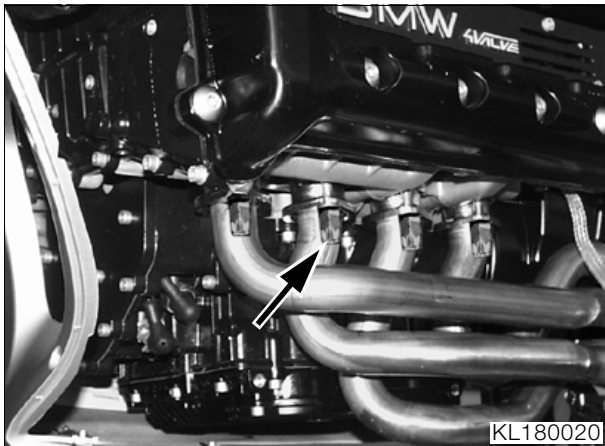


- Release the cable tie for the oxygen sensor (arrow).
- Disconnect plug for oxygen sensor (1) and pull cable down to remove.
- Remove exhaust heat shield.



- Remove screws (arrows) of exhaust bracket and remove exhaust bracket.





- Remove eight screws (arrow) securing exhaust system to cylinder head.
- Extend side stand.

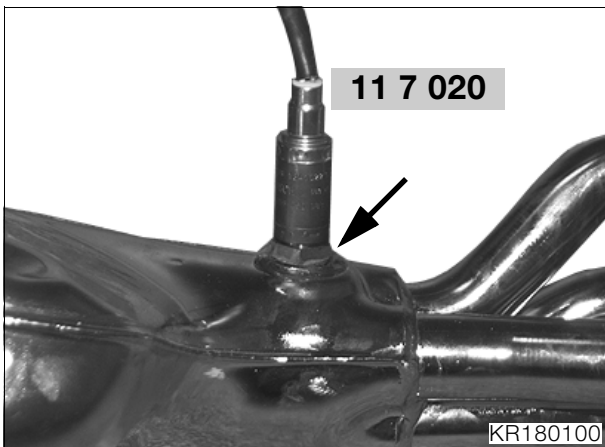


Note:

Make sure the oxygen sensor clears the gearshift lever.

- Pull exhaust down to clear the stud and forward out of its holder.
- Lower the exhaust system to remove.

Removing oxygen sensor



- Unscrew the oxygen sensor at the hexagon (arrow).

- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Lightly coat thread of oxygen sensor with **Never Seez compound**.
- Tighten the oxygen sensor at the hexagon with socket wrench insert, **BMW No. 11 7 020**.
- Replace the O-rings at the cylinder head.
- Clean threads in stirrup of exhaust bracket, coat screw threads with **Loctite 243** and tighten.
- When installing, make sure cable of oxygen sensor is correctly routed and secured.
- Warm the engine up to its normal operating temperature and let it cool down again.
- Check security of all screws securing exhaust system to cylinder head.



Tightening torque:

Oxygen sensor	45 Nm
Exhaust system to cylinder head	22 Nm
Stirrup to silencer	21 Nm
Stirrup to retaining plate	30 Nm
(clean thread + Loctite 243)	
Retaining plate to bearing mount	41 Nm

21 Clutch

Contents

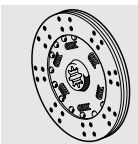
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Removing and installing clutch pressure line	12
Removing and installing clutch slave cylinder	13
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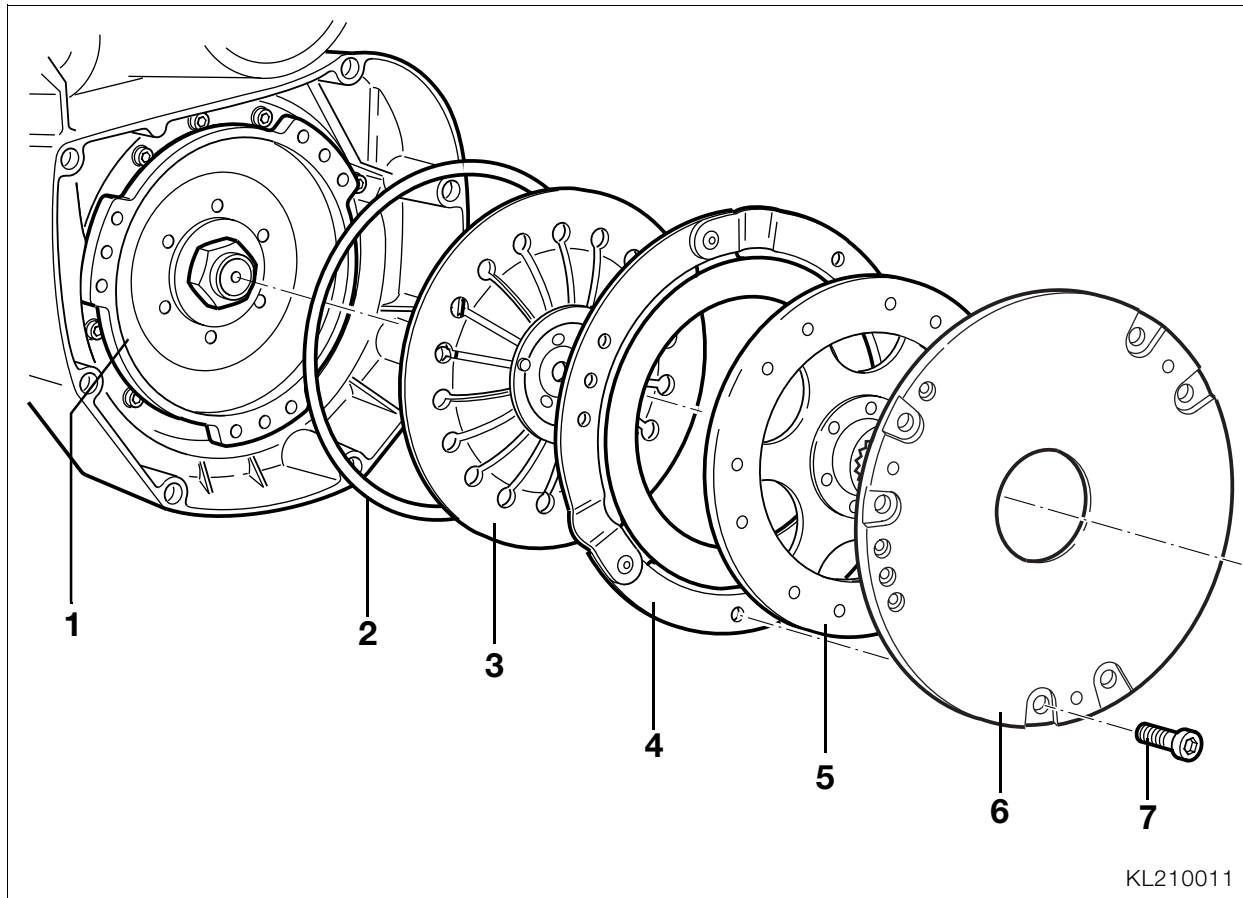




Technical Data		K 1200 LT
Clutch		
Type		Single dry plate clutch (asbestos-free)
Operation		Hydraulic
Clutch fluid		DOT 4 brake fluid
Clutch plate dia.	mm (in)	180 (7.02)
Wear limit: Minimum clutch plate thickness	mm (in)	4.6 (0.18) (measured with tips of calipers pressed by hand against rivets of clutch plate)







KL210011

Removing and installing clutch

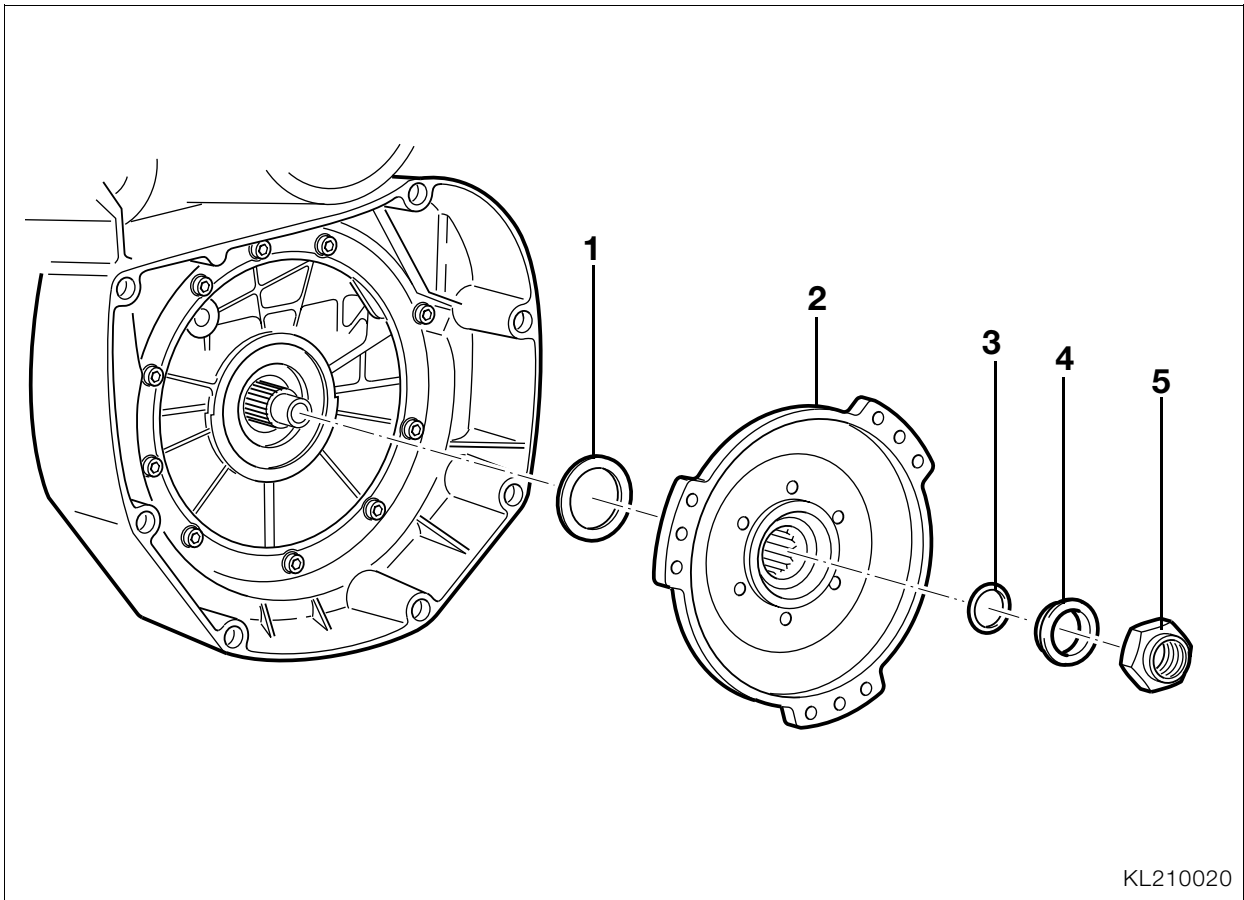
Preparatory work

- Remove fairing and engine spoiler.
- Remove the battery.
- Slacken exhaust system.
- Remove the inductive sensor on the rear wheel.
- Remove the rear wheel brake caliper, fasten to the rear frame with the inductive sensor using a cable tie.
- Remove rear wheel.
- Remove rear wheel drive unit.
- Remove the swinging arm.
- Remove cross tube.
- Remove clutch slave cylinder.
- Withdraw clutch pushrod.
- Remove reverser switch.
- Disconnect leads to starter and gearbox.
- Remove the gearbox.

Removing clutch

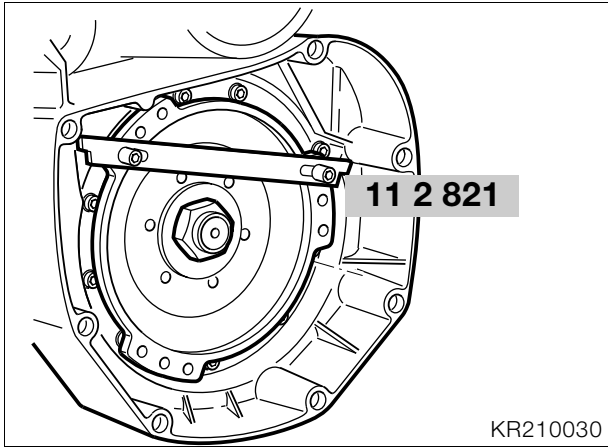
- Remove the six retaining screws (7).
- Remove clutch housing cover (6), clutch plate (5), thrust plate (4), diaphragm spring (3) and wire ring (2) from the clutch housing (1).





KL210020

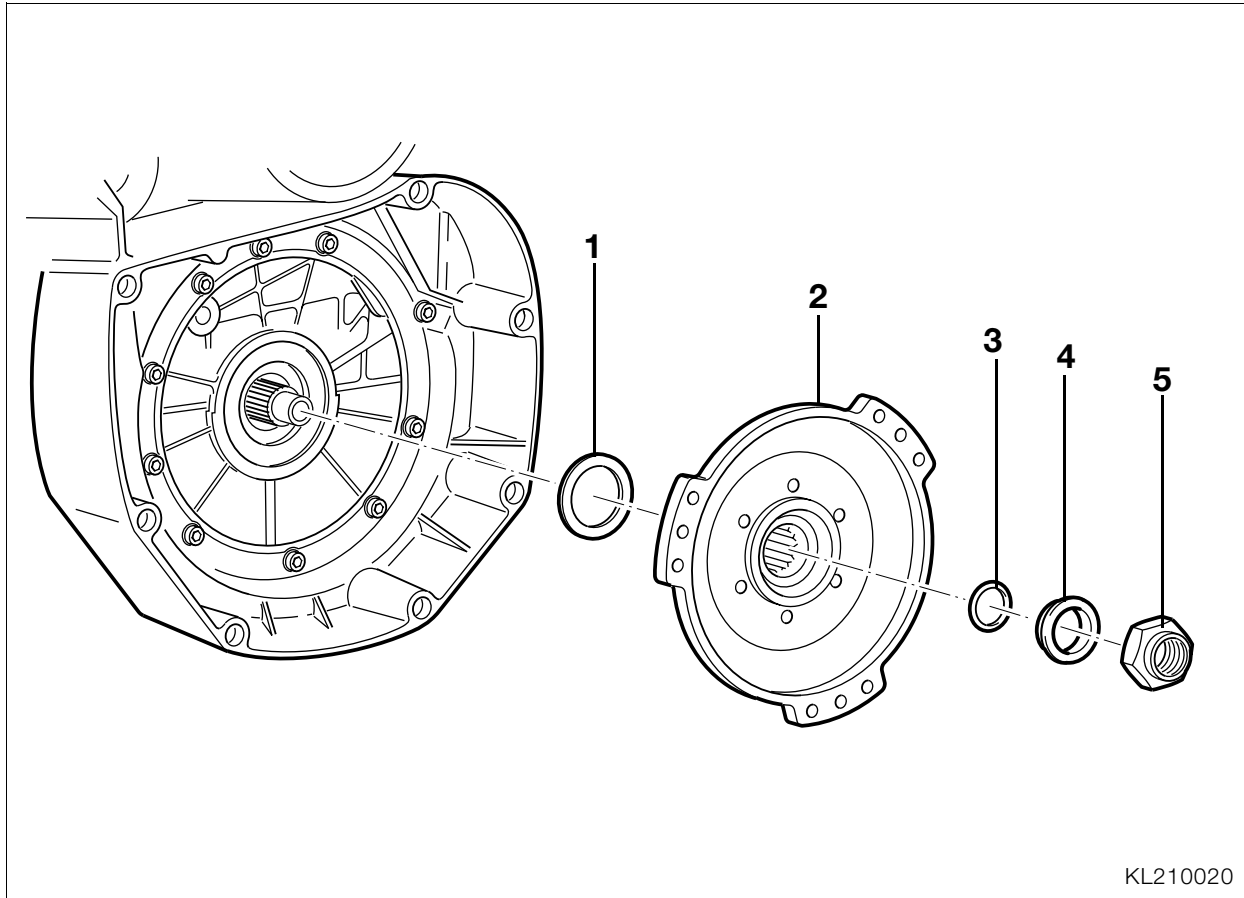
Removing clutch housing



KR210030

- Secure the holder, **BMW No. 11 2 821**, as illustrated.

- Unscrew hex nut (5).
- Remove thrust ring (4).
- Move clutch housing (2) backwards and forwards until the O-ring (3) is visible.
- Remove the O-ring (3).
- Pull off the clutch housing (2).
- Remove thrust washer (1).



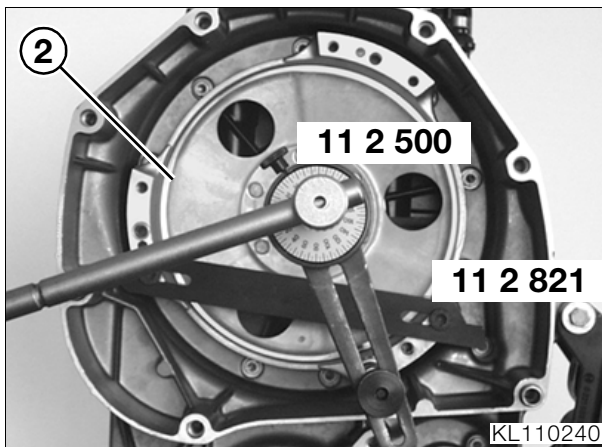
KL210020

Installing clutch housing

- Lightly oil the internal spline (2).
- Install thrust washer (1) between output shaft and intermediate flange; apply a blob of grease to hold the thrust washer in place, if necessary.
- Fit the clutch housing (2).

- Fit the mounting fixture, **BMW No. 11 2 821**, on the clutch housing at the position illustrated.

! Caution:
Fit new nuts (5).



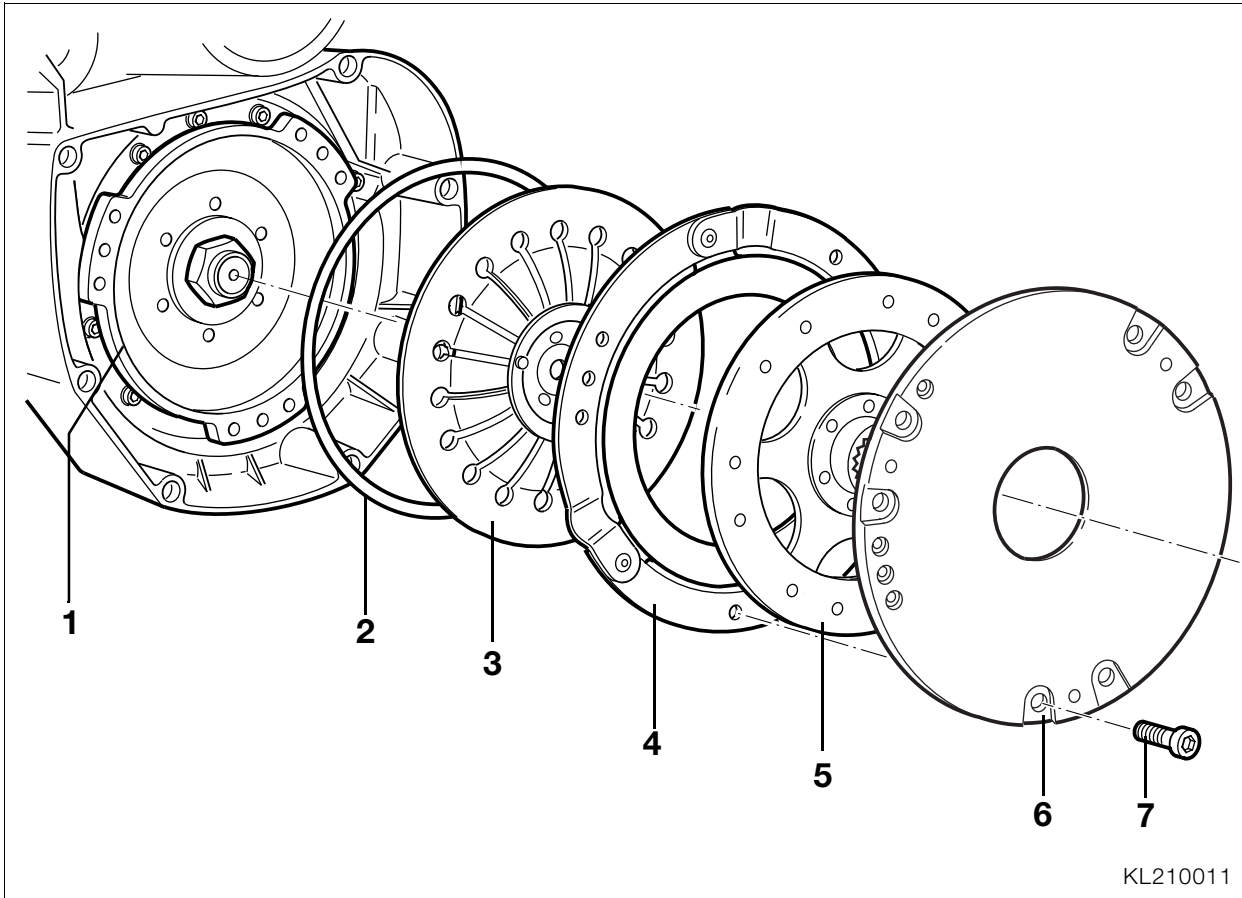
KL110240

- Fit a new O-ring (3) and thrust ring (4).
- Tighten nut (5) with the collar facing outwards (140 Nm).
- Loosen nut and retighten (50 Nm).
- Tighten nut with angle of rotation indicator, **BMW No. 11 2 500**.
- Remove the retaining fixture, **BMW No. 11 2 821**.

! Tightening torque:

- | | |
|----------------------------|--------|
| 1. Clutch housing nut..... | 140 Nm |
| 2. Slacken..... | |
| 3. Retighten to | 50 Nm |
| 4. Wrench angle..... | 60° |





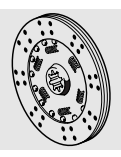
KL210011

Installing clutch

⚠ Caution:
Always use new screws.

- Grease all lubrication points with **Optimoly MP 3**.

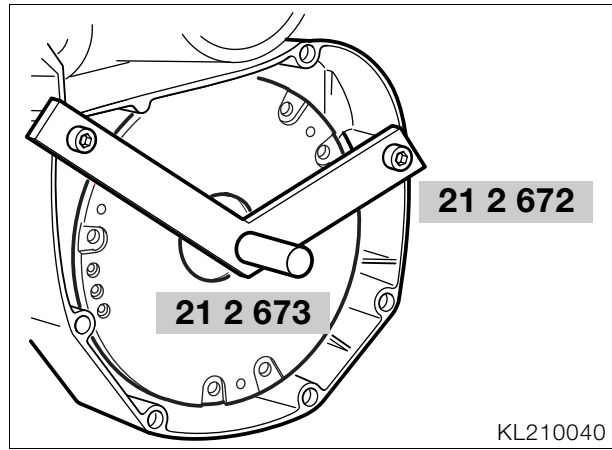
Lubrication points:
Splines on clutch plate and input shaft.
Diaphragm spring contact surface on clutch housing.
Diaphragm spring contact surface on pressure plate.



⚠ Caution:
Offset colour markings for residual imbalance by 120°: yellow on clutch housing (1), white on thrust plate (4) and clutch housing cover (6).

- Insert wire ring (2) into clutch housing (1).
- Insert diaphragm spring (3) with curvature towards the thrust plate (4) into the clutch housing (1).
- Insert thrust plate (4), clutch plate (5) and clutch housing cover (6) into the clutch housing (1).

- Tighten screws (7) to hold clutch in position.



KL210040

- Centre clutch plate (5) with centring mandrel, **BMW No. 21 2 673**, and centring bar, **BMW No. 21 2 672**.
- Tighten screws (7) in succession, in diagonally opposite sequence.

⚠ Tightening torque:
Housing cover to clutch housing..... 18 Nm

Changing the clutch fluid/bleeding the clutch system



Note:

This description applies for the brake filling and bleeding unit with extraction of the brake fluid by a partial vacuum at the brake caliper. If other devices are used, comply with their manufacturers' instructions.

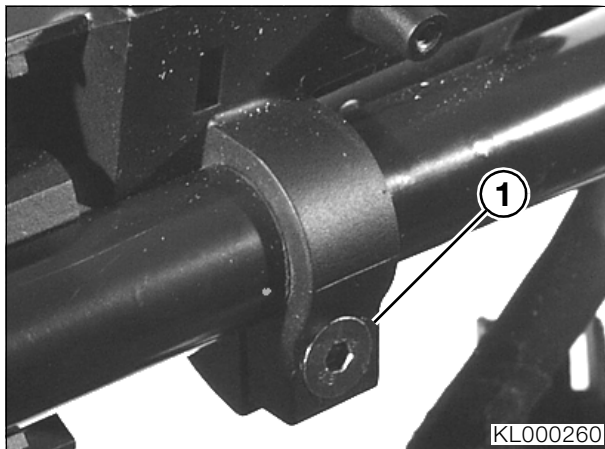
- Place the motorcycle on its centre stand so that it is level.
- Remove right fairing section skirt.



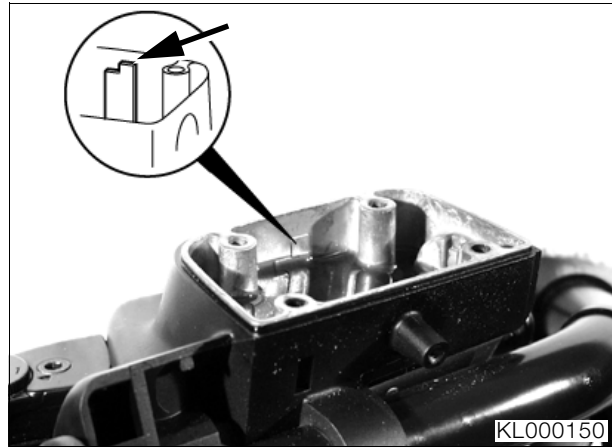
Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid attacks paint.

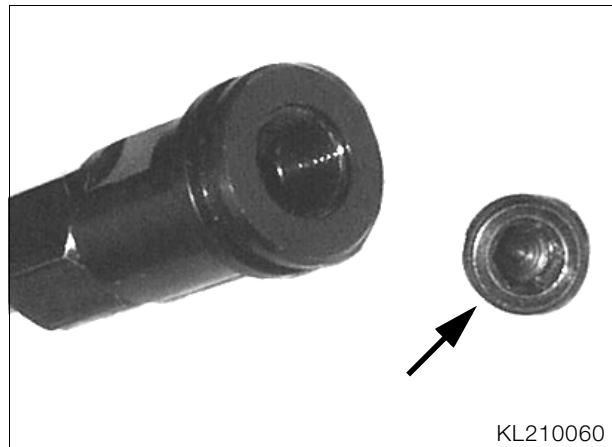
- Remove the top and bottom left-hand handlebar covers.
- Remove the combination switch and radio remote control.
- Place the handlebars in full right-hand lock.



- Loosen the clamping screw (1).
- Turn the brake fluid reservoir so that the sealing surface of the reservoir cap is horizontal when viewed from the side.
- Tighten the clamping screw.
- Remove the reservoir cap together with the diaphragm.



- Add brake fluid up to the MAX mark (arrow).
- Release the breather hose for the clutch fluid at the right-hand skirt bracket.
- Remove the protective hose from the filling adapter.



- Remove socket-head grub screw (arrow) from the filling adapter.
- Install bleed screw in filling adapter.
- Connect the brake bleeding device to the bleed screw.
- Open the bleed screw a half turn.



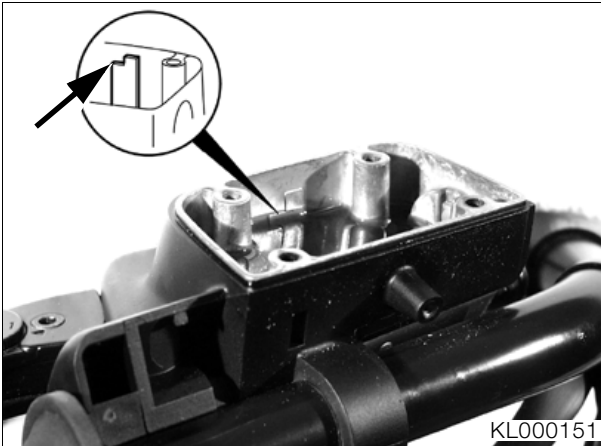
Caution:

Do not permit brake fluid level to drop below the MIN mark during the bleeding process, otherwise air will be drawn into the clutch system. Bleed the system again if this happens.

- Draw off brake fluid until it emerges clear and free from air bubbles.

Caution:

Dispose of old brake fluid in an environmentally friendly manner.



- Siphon brake fluid out to the MIN mark (arrow) in the reservoir.
- Assembly is the reverse of the disassembly procedure: pay particular attention to the following.

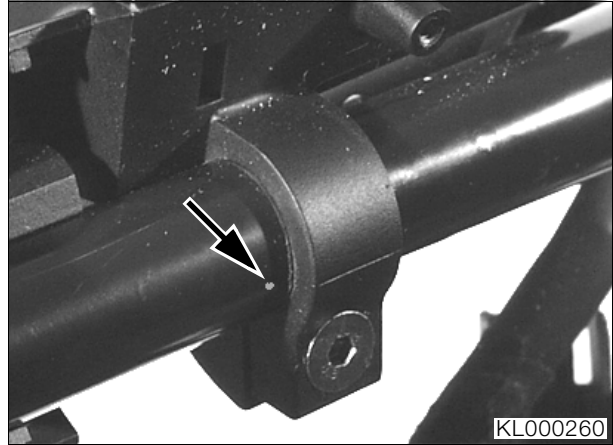
Warning:

The motorcycle must not be ridden without the grub screw screwed into the filling adapter.

- Remove bleed screw. Immediately wipe off all traces of brake fluid.
- Install socket-head grub screw into the filling adapter and tighten.



- Pull the protective hose over the filling adapter.
- Secure the breather hose to the right skirt with a cable tie.



- Return the clutch-lever fitting to the marked position (arrow).

Note:

Take care with the routing of the lines and cables when fitting the handlebar trim.

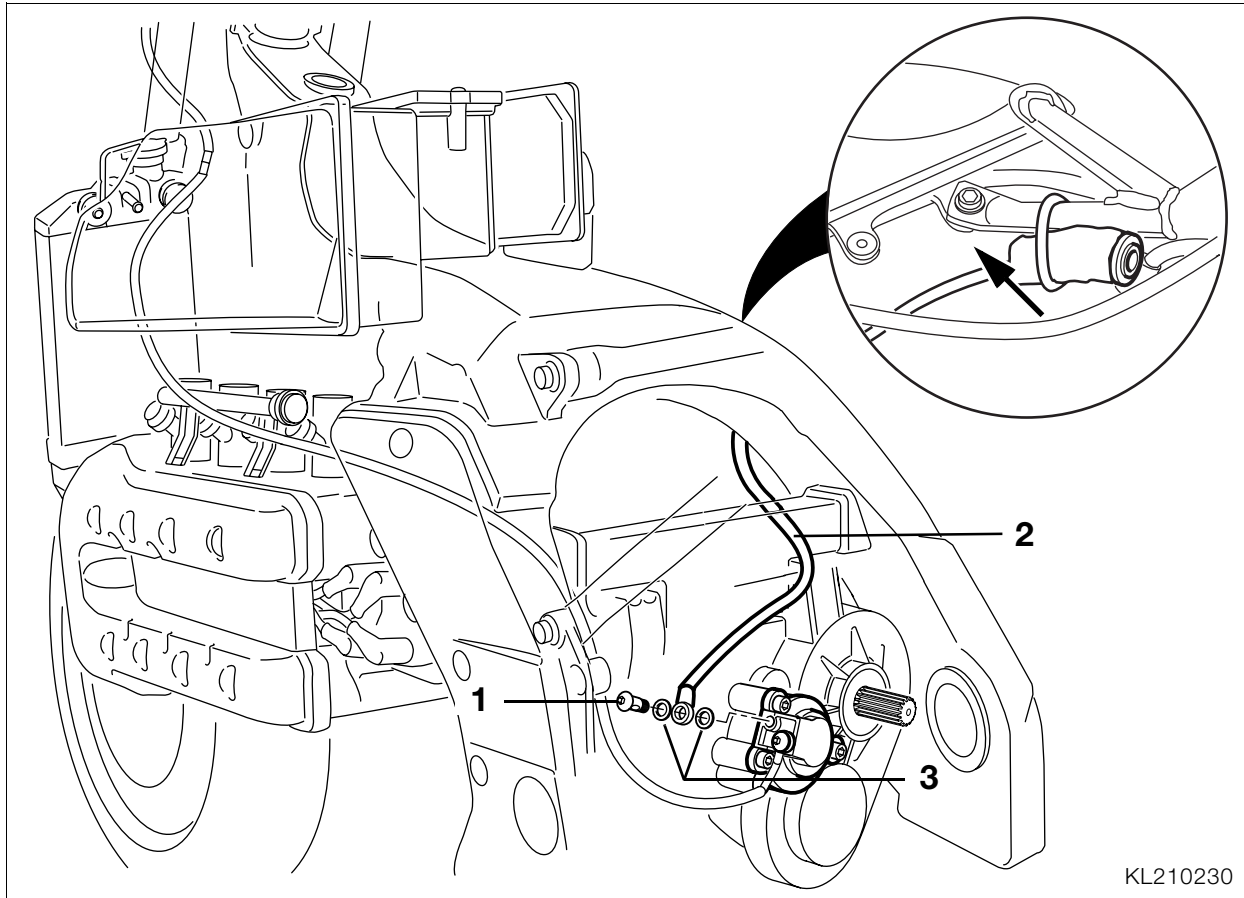
Brake fluid gradeDOT 4

Tightening torque:

Grub screw 10 Nm
 Clamping screw 5 Nm

Removing and installing clutch lines

- Place motorcycle on its centre stand.
- Remove right side section of fairing.
- Remove left-hand section of engine spoiler.
- Slacken exhaust system.
- Remove rear wheel.
- Remove rear wheel drive unit.
- Remove the swinging arm.
- Drain the clutch operating system.



KL210230

Removing and installing vent line

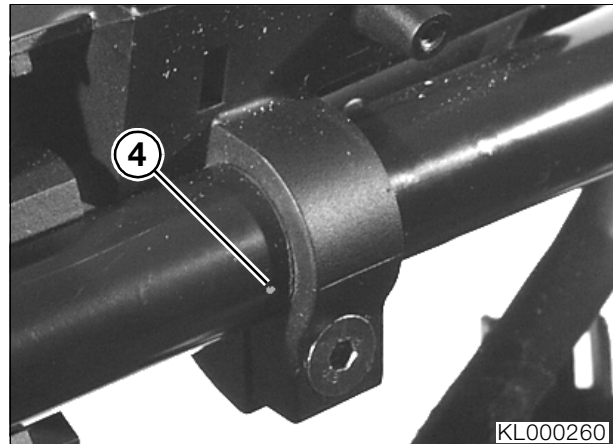
- Unscrew the banjo bolt (1) on the clutch slave cylinder.
- Remove sealing rings (3) and vent line (2).
- Assembly is the reverse of the disassembly procedure: pay particular attention to the following.



Caution:

Route the vent line without kinks such that contact with the spring strut is not possible in any situation. Always use new sealing rings (3).

- Fill clutch system with brake fluid.
- Bleed the clutch.
- Secure the vent line to the right skirt bracket (arrow) with a cable tie.



- Return the clutch-lever fitting to the marked position (4).

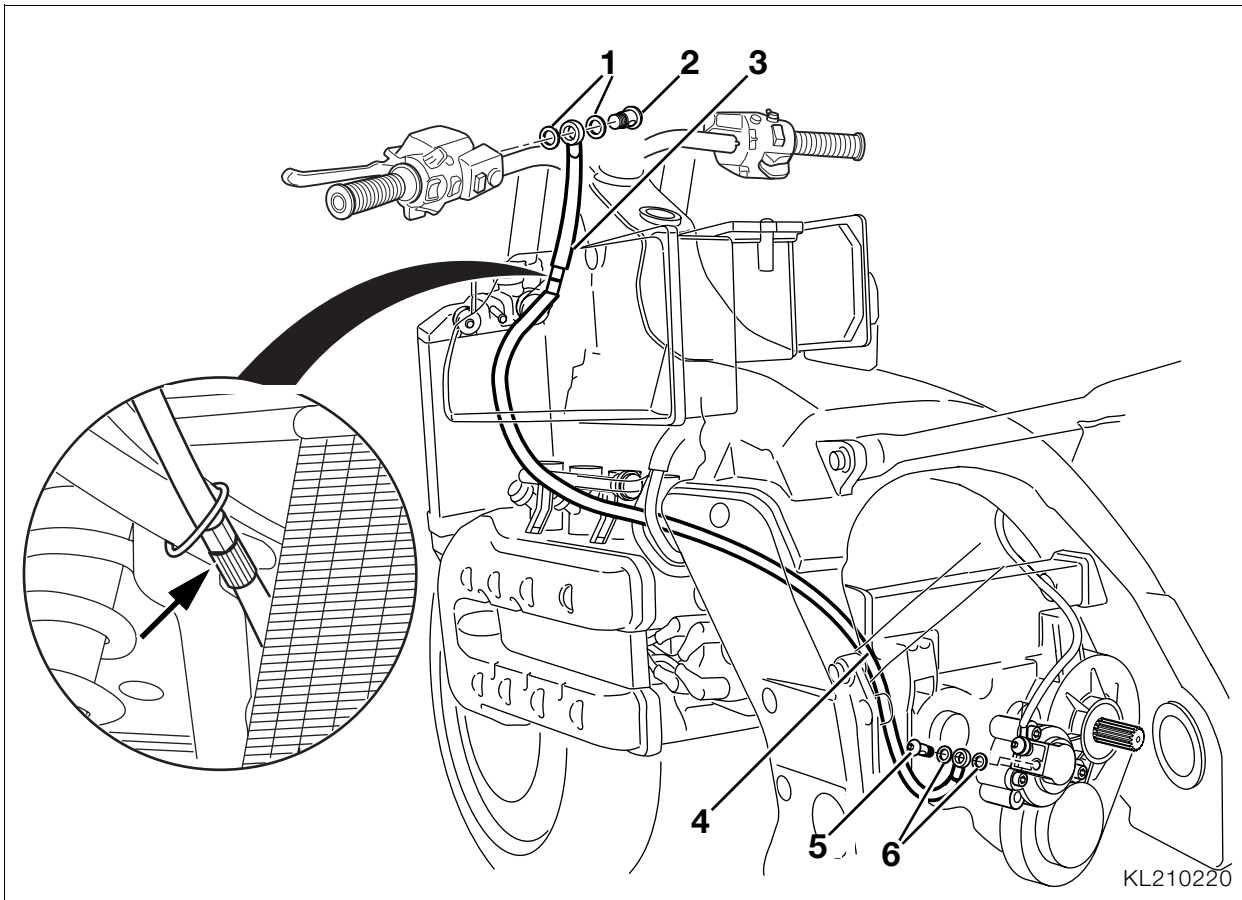
Brake fluid grade DOT 4



Tightening torque:

Grub screw 10 Nm
Banjo bolt 7 Nm





Removing and installing clutch pressure line

- Remove left side section of fairing.
- Remove fuel tank.
- Cut the cable ties on the injection rail and frame.
- Undo the junction in the clutch pipe (arrow).
- Unscrew the banjo bolt (5) on the clutch slave cylinder.
- Remove sealing rings (6). Remove pressure line (4), withdraw to the rear.
- Turn the clutch-lever fitting so that the securing screw (2) of the clutch line is accessible.
- Disconnect clutch line from clutch-lever fitting, remove sealing rings (1).
- Pull the front section (3) of the pressure line through and downwards.
- Assembly is the reverse of the disassembly procedure: pay particular attention to the following.
- Always use new sealing rings (1, 6).

Caution:

Make sure that the pressure line is not kinked or pinched.

- Route the clutch pressure line as illustrated.
- Connect the pressure line at the junction (arrow) and tighten, secure to the injection rail and frame using cable ties.
- Fill clutch system with brake fluid.
- Bleed the clutch.
- Remove bleed screw; immediately wipe off all traces of brake fluid which escape when adapter is removed.
- Use cable tie to secure vent line to right-hand skirt bracket (arrow).
- Return the clutch-lever fitting to the original position.

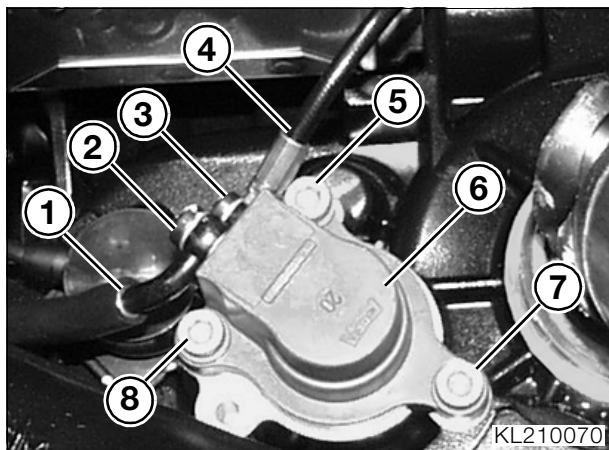
Brake fluid gradeDOT 4

Tightening torque:

Grub screw	10 Nm
Banjo bolt on clutch slave cylinder.....	7 Nm
Banjo bolt on clutch-lever fitting.....	18 Nm
Junction of pressure line	10 Nm

Removing and installing clutch slave cylinder

- Remove left fairing section, battery cover and engine spoiler.
- ➡See Group 46
- Remove the right and left front and rear footrest plates.
- Remove the exhaust system
- ➡See Group 18
- Remove the inductive sensor on the rear wheel.
- Remove the rear wheel brake caliper, fasten to the rear frame with the inductive sensor using a cable tie.
- Remove rear wheel.
- Remove rear wheel drive unit.
- ➡See Group 33
- Remove the swinging arm.
- Siphon off the clutch fluid.



Caution:

To prevent the clutch slave cylinder (6) from tilting, slacken securing screws (5, 7, 8) alternately and uniformly.

- Remove screws (5, 7, 8).
- Pull clutch slave cylinder (6) away from gearbox.
- Remove paper gasket.

Note:

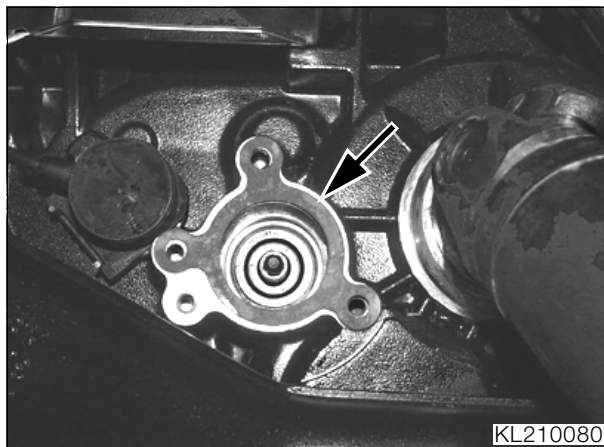
Take care with sealing rings.

- Undo banjo bolts (2, 3), remove pressure line (1) and vent line (4).

- Assembly is the reverse of the disassembly procedure: pay particular attention to the following.

Caution:

To prevent the clutch slave cylinder (6) from tilting, tighten securing screws (5, 7, 8) alternately and uniformly.



- Clean mating surfaces on the gearbox housing and clutch slave cylinder, use new paper gasket (arrow).
- Fit banjo bolts (2, 3) with new sealing rings.
- Fill clutch system with brake fluid.
- Bleed the clutch.

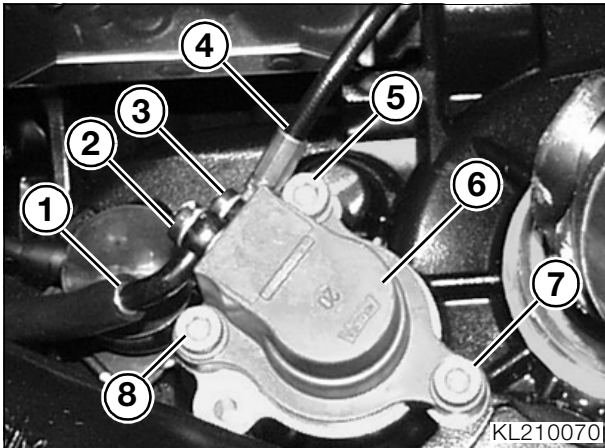
Tightening torques:

Slave cylinder to gearbox 9 Nm
Banjo bolts in slave cylinder 7 Nm



Removing and installing clutch release rod

- Remove left fairing section, battery cover and engine spoiler.
- ➔See Group 46
- Remove the right and left front and rear footrest plates.
- Remove the exhaust system
- ➔See Group 18
- Remove the inductive sensor on the rear wheel.
- Remove the rear wheel brake caliper, fasten to the rear frame with the inductive sensor using a cable tie.
- Remove rear wheel.
- Remove rear wheel drive unit.
- ➔See Group 33
- Remove the swinging arm.



⚠ Caution:

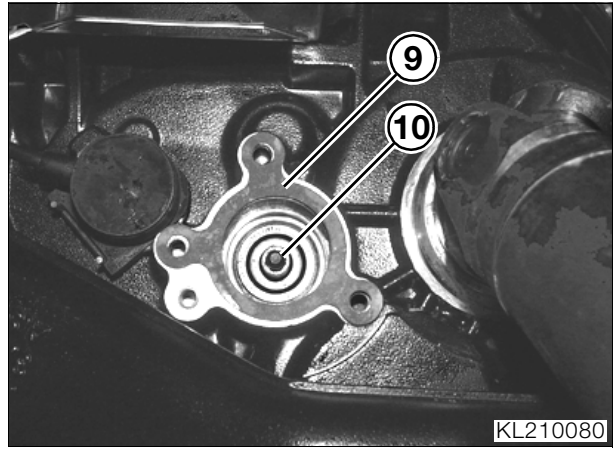
To prevent the clutch slave cylinder (6) from tilting, slacken securing screws (5, 7, 8) alternately and uniformly.

- Remove screws (5, 7, 8).

📄 Note:

Lines (1, 4) remain on clutch slave cylinder (6).

- Pull clutch slave cylinder (6) away from gearbox.



- Remove paper gasket (9)
- Pull clutch release rod (10) out to the rear.
- Assembly is the reverse of the disassembly procedure: pay particular attention to the following.
- Clean mating surfaces on the gearbox housing and clutch slave cylinder, use new paper gasket.

⚠ Caution:

To prevent the clutch slave cylinder (6) from tilting, tighten securing screws (5, 7, 8) alternately and uniformly.

🔧 Tightening torque:

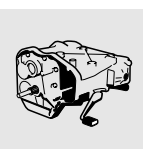
Slave cylinder to gearbox 9 Nm

23 Gearbox

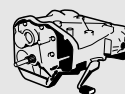
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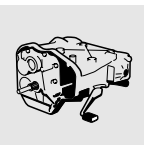


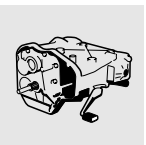
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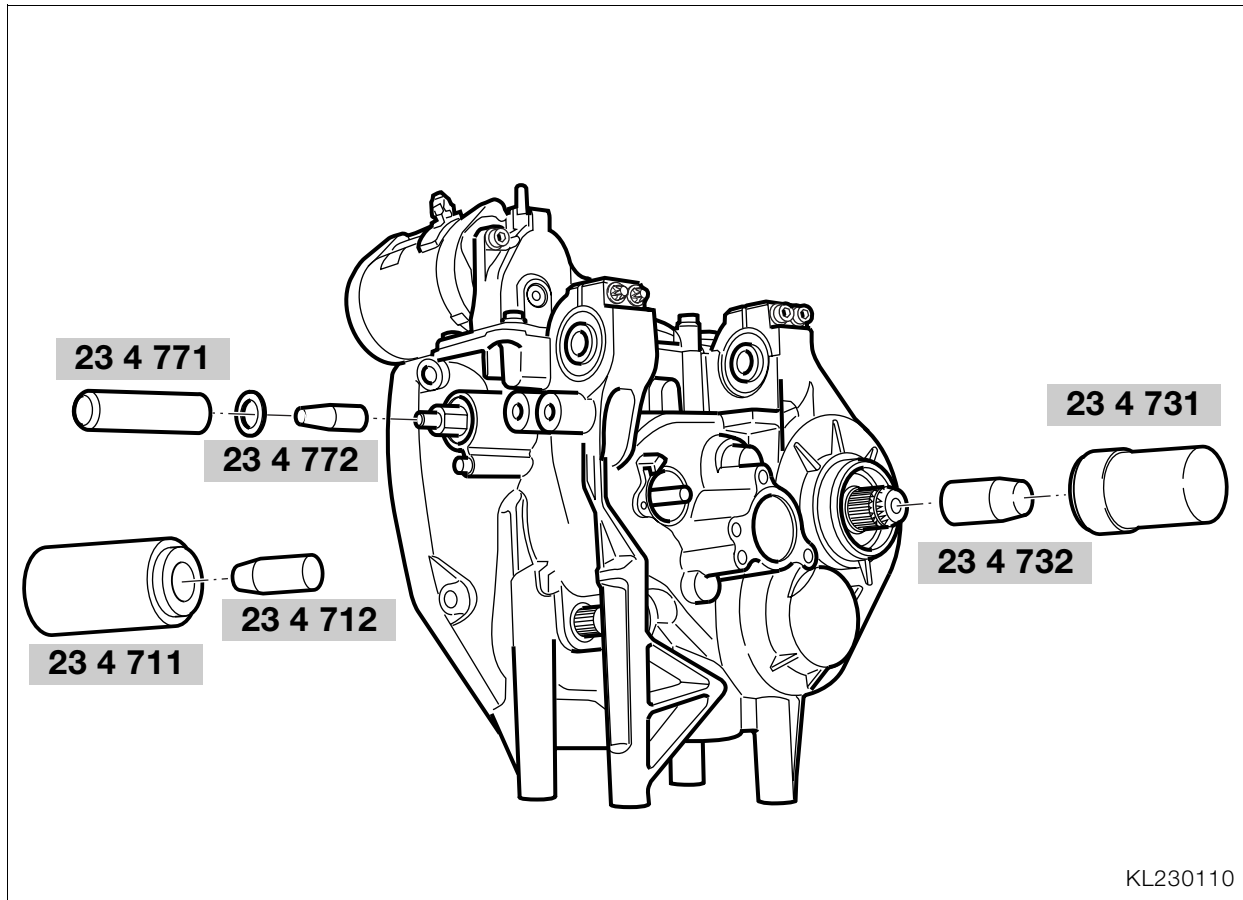


Technical Data		K 1200 LT
Type of gearbox		5-speed gearbox (4 + overdrive) with integral reverser, claw-action shift and reaction damper. Reverser actuation with lock-out mechanism for forward gears and electric safety elements, plus Hall-effect transmitter for reverser speed control by reverser control unit.
Gear shift type		By shift pedal and selector drum with overrun protection
Reverser actuation		By central selector shaft with actuation angle of approx. 42°.
Gear ratios	1st gear 2nd gear 3rd gear 4th gear 5th gear Reverse	3.864 3.022 2.393 1.819 1.316 115.7
Total spread of gear ratios Gear spread		2.936
Oil grade (all the year round)		Brand-name SAE 90 hypoid gear oil, API class GL 5
Capacity To lower edge of filler neck	cc (fl. oz.)	600 ... 750 (20.3 ... 25.4)
Length of intermediate shaft, fully assembled	mm (in)	198.95 ... 199.00 (7.833 ... 7.835)
Length of output shaft, fully assembled	mm (in)	192.95 ... 193.00 (7.596 ... 7.598)
Length of input shaft, fully assembled	mm (in)	138.60 ... 138.55 (5.457 ... 5.455)
Length of selector drum, fully assembled	mm (in)	111.80 ... 111.90 (4.402 ... 4.406)
Selector shaft endplay	mm (in)	0.1 ... 0.3 (0.004 ... 0.012)
Output shaft endplay values		
Free gearwheel, 1st gear	mm (in)	0.1 ... 0.33 (0.004 ... 0.013)
Free gearwheel, 2nd gear	mm (in)	0.1 ... 0.33 (0.004 ... 0.013)
Free gearwheel, 3rd gear	mm (in)	0.1 ... 0.57 (0.004 ... 0.022)
Intermediate shaft endplay		
Free gearwheel, 4th gear	mm (in)	0.1 ... 0.46 (0.004 ... 0.018)
Free gearwheel, 5th gear	mm (in)	0.1 ... 0.46 (0.004 ... 0.018)
Travel of spring segment on input shaft	mm (in)	0.4 ... 0.6 (0.016 ... 0.024)









KL230110

Replacing the shaft sealing rings in the gearbox housing and gearbox cover



Note:

All shaft sealing rings can be replaced with the gearbox installed, apart from the input-side shaft sealing ring on the input shaft. Replace all shaft sealing rings if the gearbox is fully disassembled. Lightly oil the sealing lips before installing the shaft sealing rings.

Replacing input shaft sealing ring at input side

- Lever out the shaft sealing ring with a screwdriver.
- Drive in the new sealing ring with the sealing lips facing inwards, using slip-over sleeve, **BMW No. 23 4 712**, and drift, **BMW No. 23 4 711**.

Replacing output shaft sealing ring



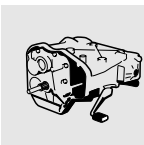
Caution:

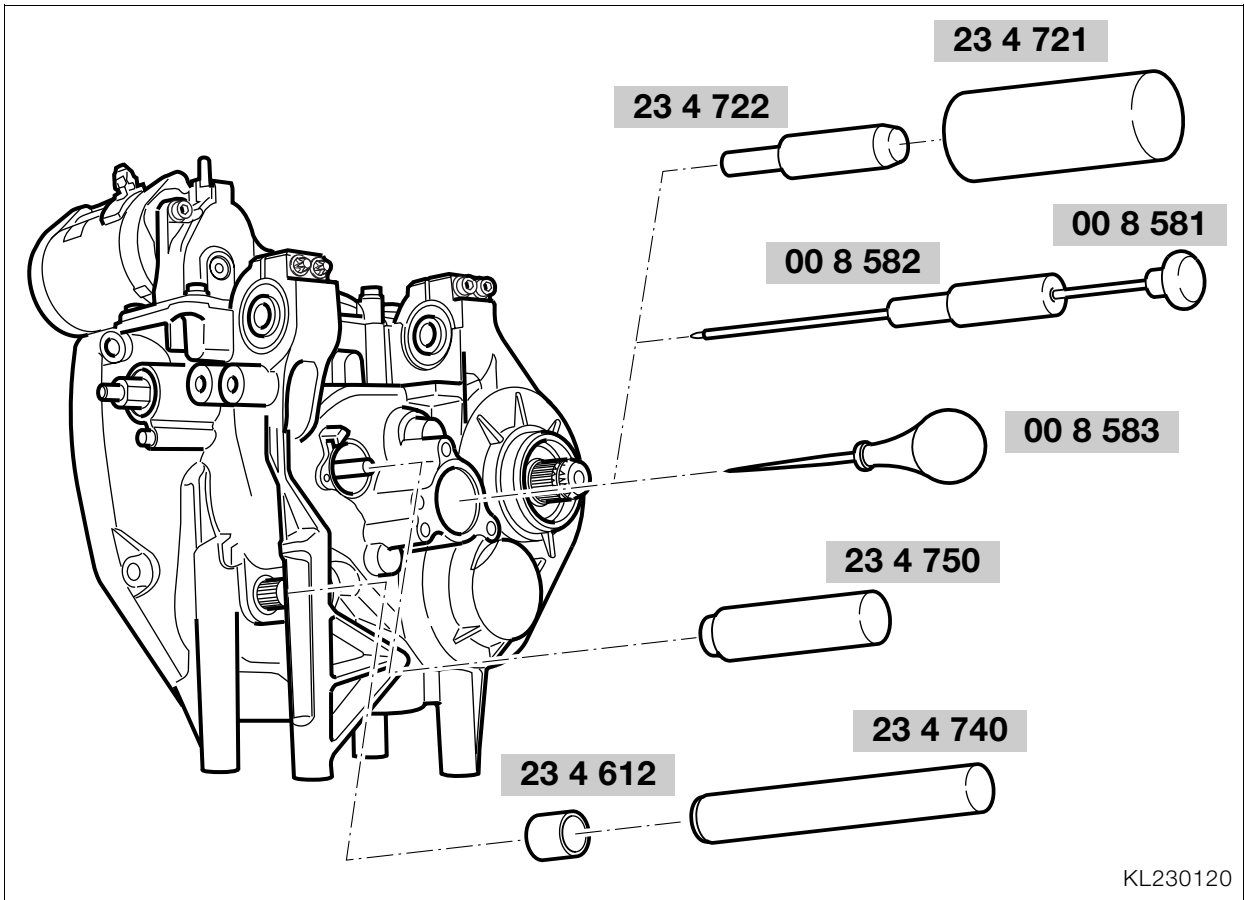
The sealing washer for the grooved ball bearing is immediately behind the shaft sealing ring: take care not to damage the sealing washer when removing the sealing ring.

- Carefully lever out the shaft sealing ring with a screwdriver.
- Install the sealing ring with the sealing lip facing inwards, using assembly sleeve, **BMW No. 23 4 732**, and drift, **BMW No. 23 4 731**.

Replacing shaft sealing ring for selector shaft of reverser

- Remove the gear-shift lever.
- Lever out the shaft sealing ring with a screwdriver.
- Drive in the new sealing ring with the sealing lips facing inwards, using slip-over sleeve, **BMW No. 23 4 772**, and drift, **BMW No. 23 4 771**.
- Reinstall the gear-shift lever





KL230120

Replacing input shaft sealing ring at output side

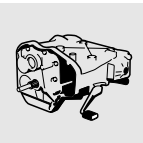
- Pierce the shaft sealing ring with awl, **BMW No. 00 8 583**.
- Screw the pull rod, **BMW No. 00 8 581**, into the hold and use impact weight, **BMW No. 00 8 582**, to remove the shaft sealing ring.
- Install the new sealing ring with the sealing lips facing inwards, using guide, **BMW No. 23 4 722**, and drift, **BMW No. 23 4 721**.

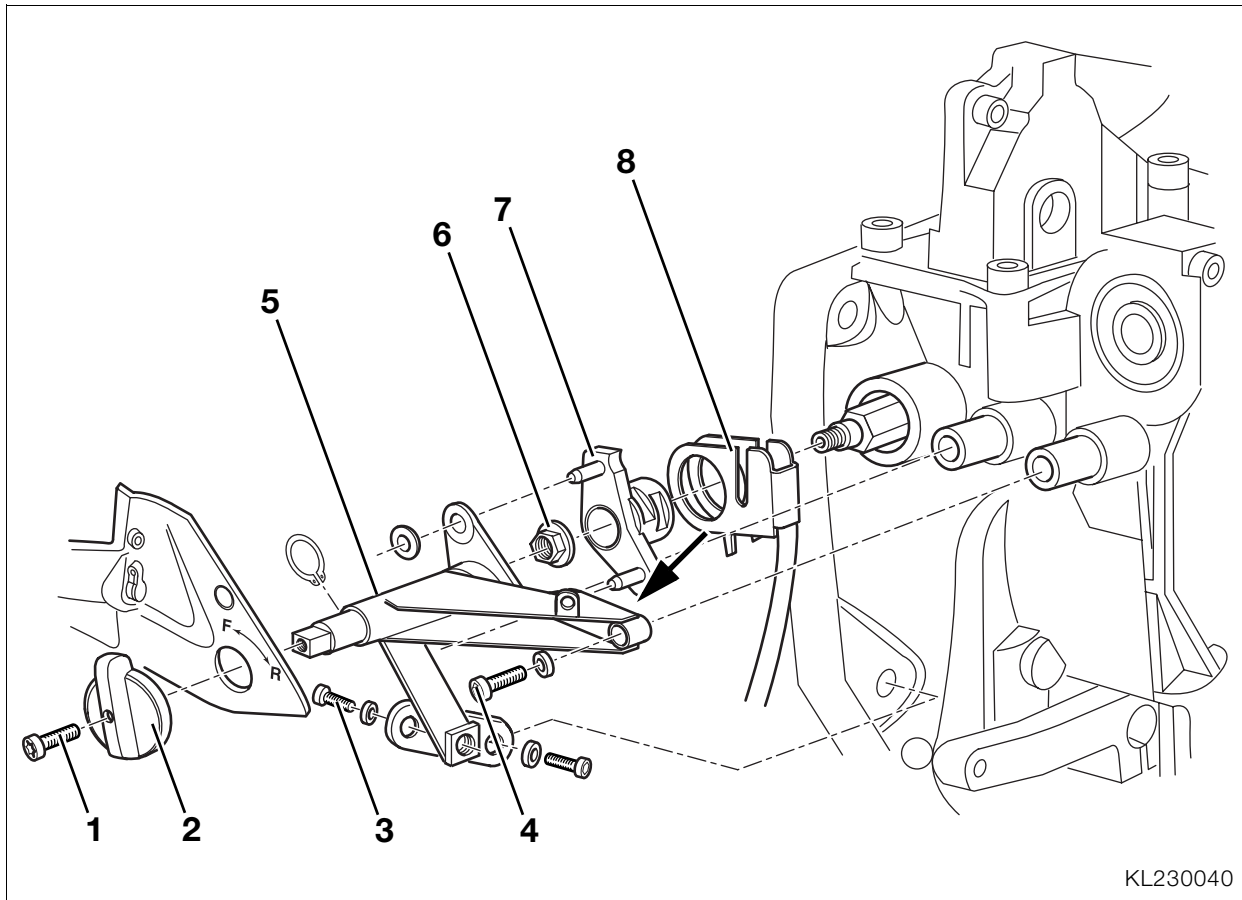
Replacing shaft sealing ring for selector drum

- Lever the shaft sealing ring out with a screwdriver.
- Install the new sealing ring with the sealing lip facing inwards, using drift, **BMW No. 23 4 750**.

Replacing shaft sealing ring for selector shaft

- Lever the shaft sealing ring out with a screwdriver.
- Install the sealing ring with the sealing lip facing inwards, using assembly sleeve, **BMW No. 23 4 612**, and drift, **BMW No. 23 4 740**.





Removing and installing actuating unit for reverser

Removing and installing actuating control for reverser

- Remove screw (1).
- Remove actuating control (2) for reverser.
- Clean threads of screw (1), coat with **Loctite 243** and install.

Removing and installing actuating unit for reverser

- Remove skirt.
- Remove left-hand section of engine spoiler.
- Remove screws (3, 4).
- Remove actuating unit for reverser (5).
- Remove nut (6).
- Remove selector lever for reverser (7) with switch unit (8).
- Remove switch, if necessary.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

Mount the switch unit for the reverser with the recess engaging the lug on the gearbox.



Note:

Install the actuating control (2) with the grip projection at the top. Make sure that all cables are correctly routed and are not pinched or kinked.

- Route cables for side-stand switch, switch for reverser and gearbox switch behind the actuating unit for the reverser (arrow).
- Clean threads of screws (3), coat with **Loctite 243** and install.
- Clip the cable for the oxygen sensor into the retaining clip on the actuating unit for the reverser.

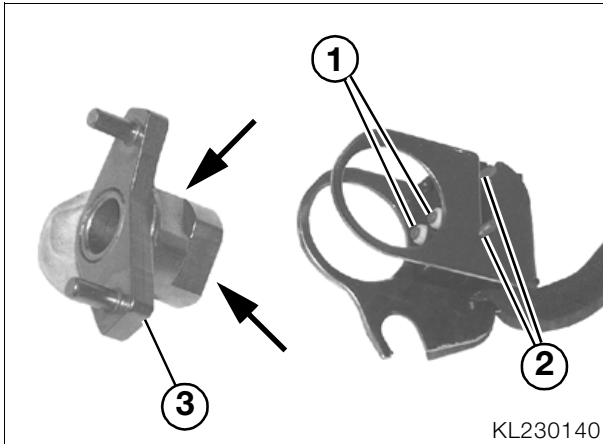


Tightening torques:

Switch unit for reverser to gearbox.....	9 Nm
Actuating control for reverser (clean thread and Loctite 243).....	6 Nm
Reverser actuator to link M8 (clean thread and Loctite 243).....	24 Nm
Link of reverser actuator to intermediate flange M8 (clean thread and Loctite 243).....	24 Nm



Disassembling/assembling double switch for reverse gear



- Turn actuating lever (3) clockwise until the flats (arrows) are toward contacts (1).
- Remove the actuating lever.

Caution:

Do not damage retainers (2) of the double switch.

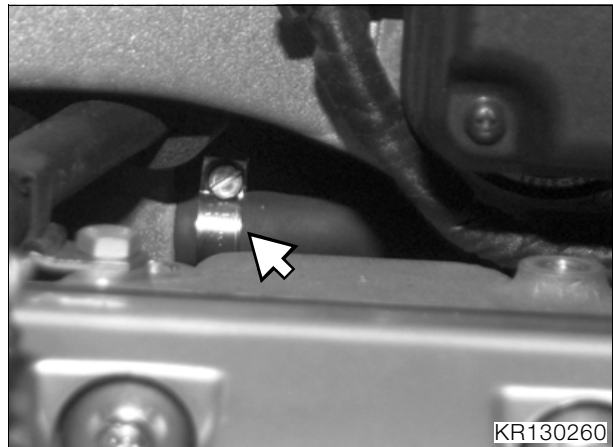
- If necessary, remove the double switch for reverse-gear indication from the actuating lever.
- Assembly is the reverse of the disassembly procedure.

Removing gearbox

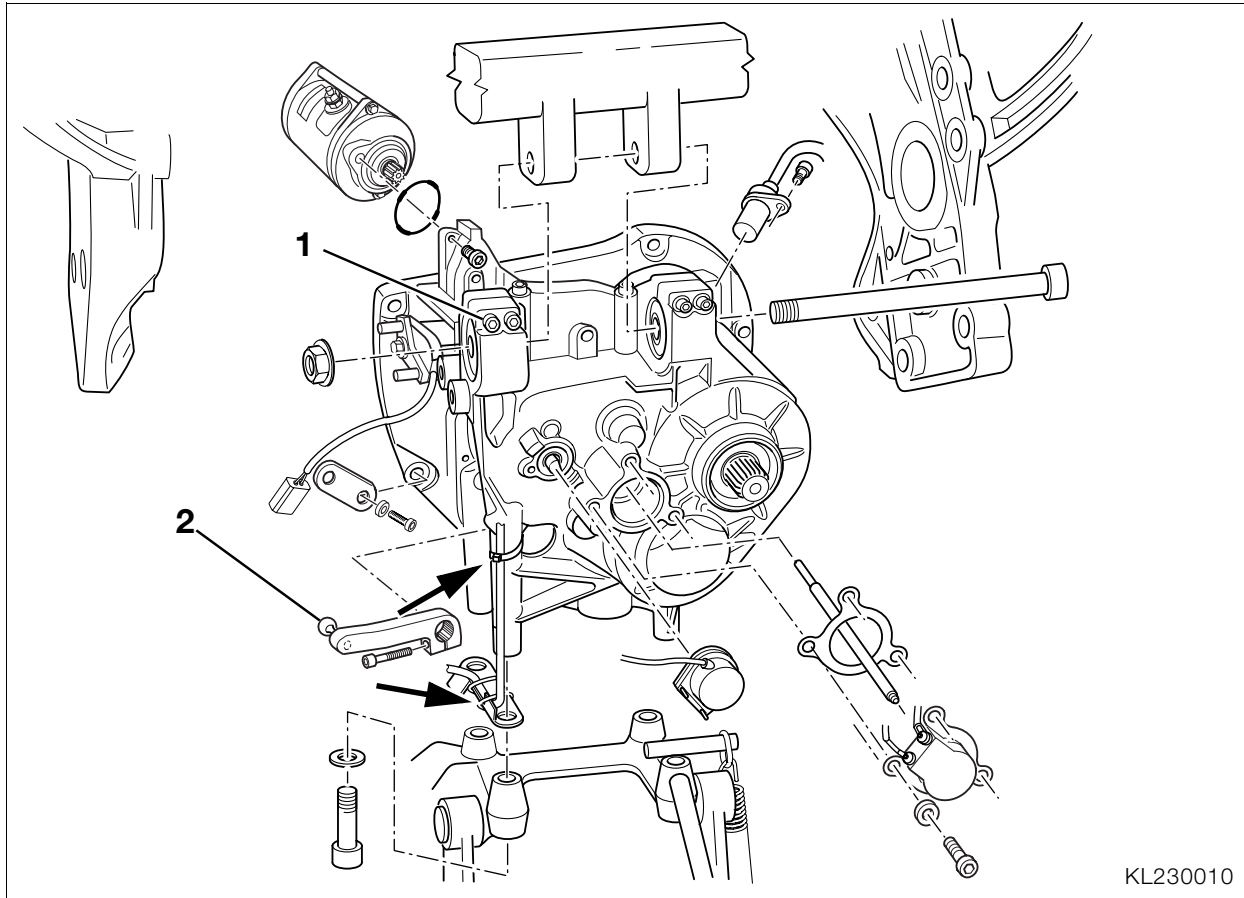
Caution:

Disconnect the negative cable from the battery first, followed by the positive cable.

- Disconnect the battery.
- Remove the left and right fairing side sections.
- Remove actuating control for reverser.
- Remove engine spoiler.
- Remove left and right skirt brackets.
- Remove tank cover with the control unit for the radio.
- Remove fuel tank.
- Remove the intake air pipe.
- Remove the left and right air outlet ducts from the radiators.
- Press left and right radiators with fans out of their holders.
- Remove fuel injection rail.
- Remove throttle-valve rail with air filter box.
- Disconnect fuel lines from engine.



- Disconnect hose (arrow) for crankcase breather.
- Remove front left footrest plate.
- Remove front right footrest plate.
- Remove left and right rear footrest plates.
- Remove left and right battery covers.
- Disconnect plugs for oxygen sensor, side-stand switch, coolant-temperature sensor and gear indicator behind left-hand battery cover.
- Disconnect primary lead from ignition coil.



- Remove exhaust system.
- Fit lifting gear, **BMW No. 00 1 510**.
- Remove rear wheel.
- Remove inductive sensor from rear wheel drive.
- Remove the rear wheel brake caliper, fasten to the rear frame with the inductive sensor using a cable tie.



Warning:
Note high release torques.

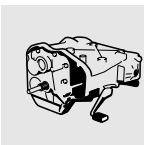
- Remove rear wheel drive unit.
- Remove swinging arm.
- Remove front drive shaft.
- Disengage gearshift linkage at ball joint (2).
- Remove transverse tube.

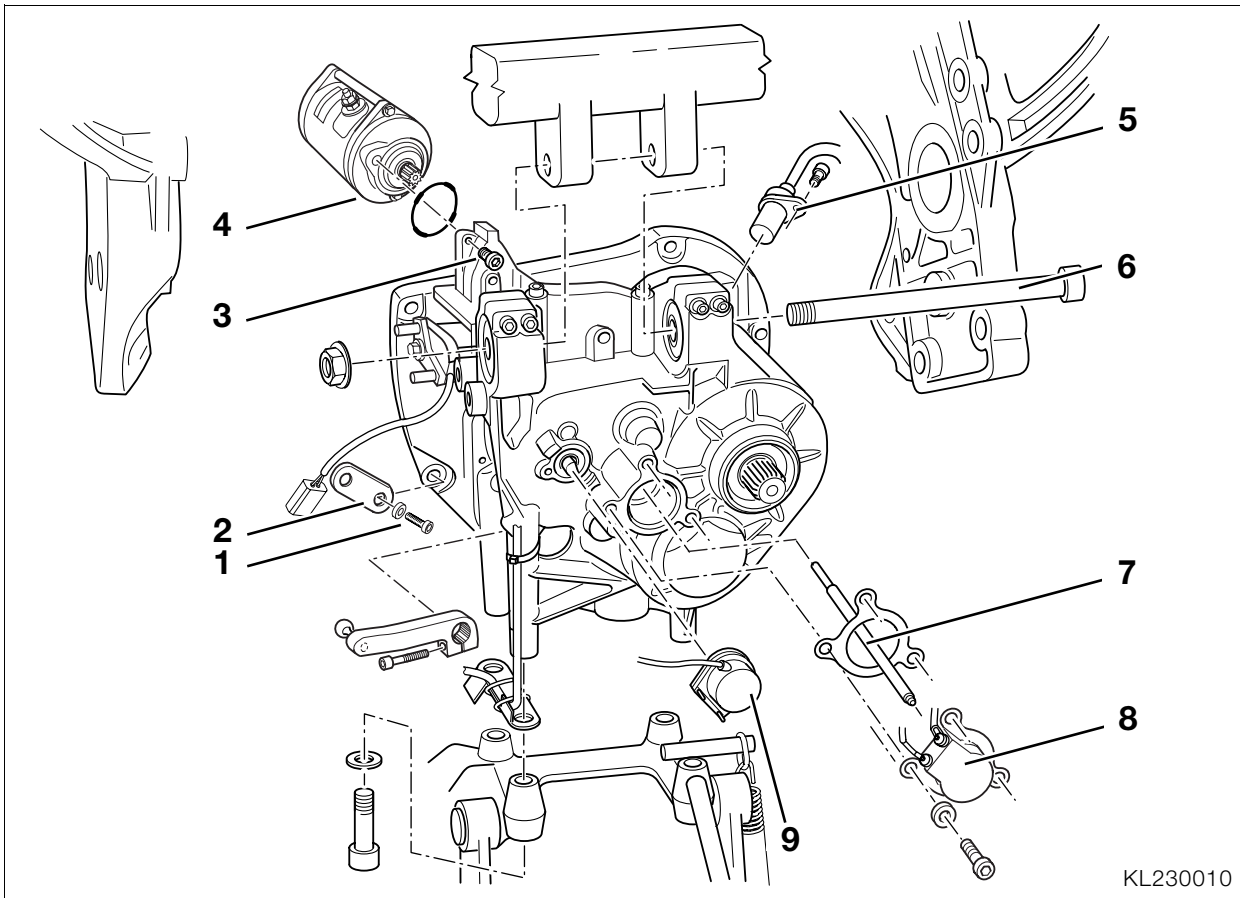
- Remove actuating unit for reverser, complete with switch unit.
- If the gearbox is to be fully disassembled, remove the main (centre) stand. Cut through the cable strap (arrow) and remove the cable for the side-stand switch.



Caution:

The two Torx screws securing the left rubber mount (1) are each marked by a spot of paint: do not slacken these screws.





KL230010

- Disconnect plug for speed sensor (5) of reverser at right-hand skirt bracket.
- Remove nuts securing cross member to engine at left and right.
- Remove the clutch slave cylinder (8).
- Remove clutch release rod (7) from the gearbox.
- Secure front wheel in position.
- Use workshop crane, **BMW No. 46 5 640**, to raise rear of frame high enough to take weight off gearbox mounts.
- Remove gearbox mounting bolt (6).



Note:

Disconnect the power cable for the starter motor from the positive terminal on the rear frame.

- Disconnect cables for generator and starter motor (4).
- Compress spring and remove gear indicator switch (9).



Note:

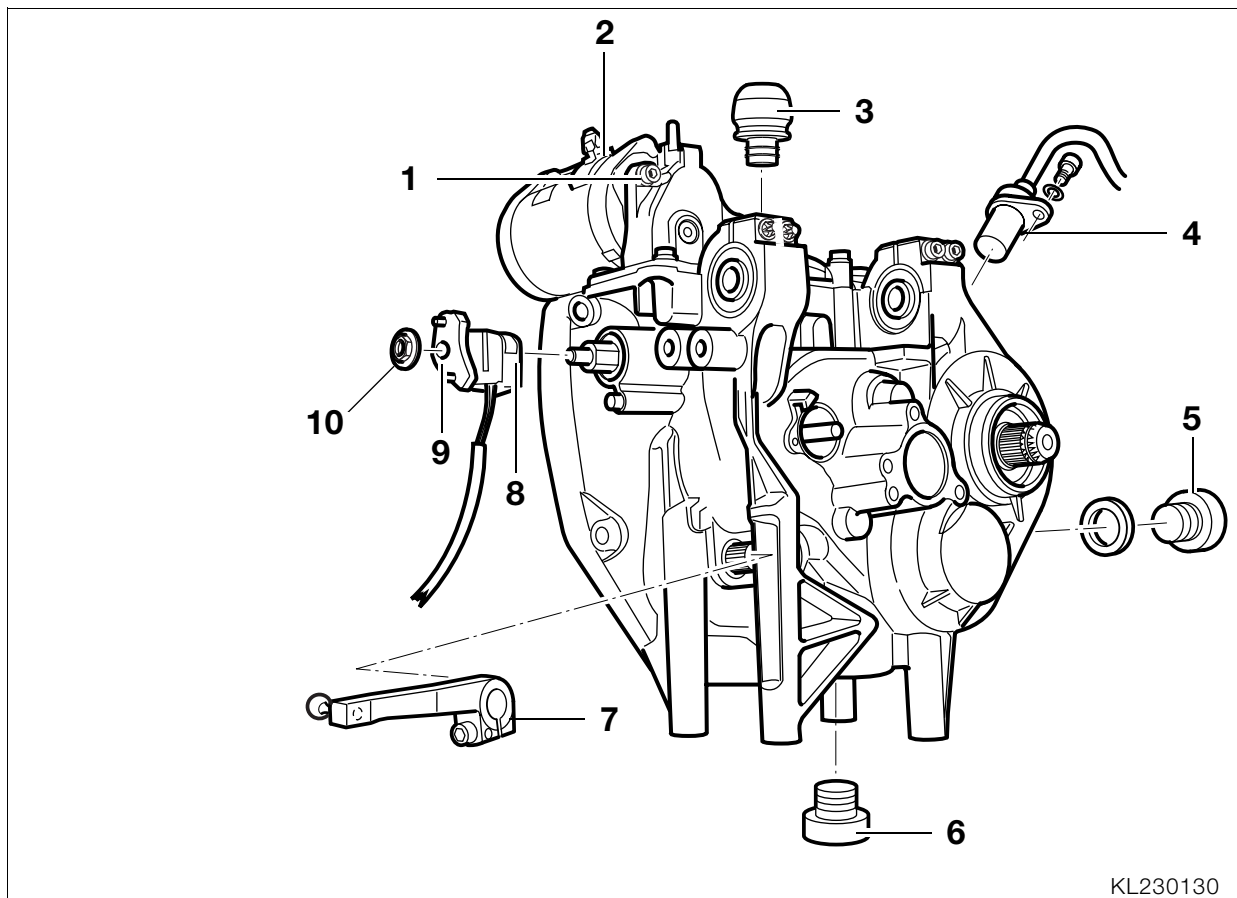
If not removed, the main (centre) stand must be retracted to permit removal of the gearbox. Screw (1) is secured with **Loctite 243**.

Caution:

When raising the frame, make sure that there is adequate clearance between the gearbox and the frame on the right and between the upper transverse tube and the generator: always take care not to scratch the surfaces.

- Use workshop crane, **BMW No. 46 5 640**, to raise frame until gearbox and starter motor are accessible.

- Remove seven screws (1) securing gearbox to intermediate flange.
- Remove link for reverser (2).
- Pull gearbox out of intermediate flange until stub of input shaft is clear and remove gearbox complete with starter motor.
- If gearbox is to be fully disassembled, remove screw (3) securing starter motor and remove starter motor.

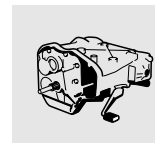


KL230130

Disassembling gearbox

Preparatory work

- Remove screw (1) securing starter motor (2) and remove starter motor from gearbox housing.
- Remove oil filler/level check screw (5).
- Remove oil drain plug (6) and drain the oil from the gearbox into a suitable tray.
- Remove breather (3).
- Remove speed sensor for reverser (4).
- Remove selector lever (7).
- Remove nut (10) and remove actuating lever (9) with double switch (8) for reverse-gear indicator.



Assembling reverse gear train

Eight screws (1)

Mark positions of each of the screws on the cover of the reverser.

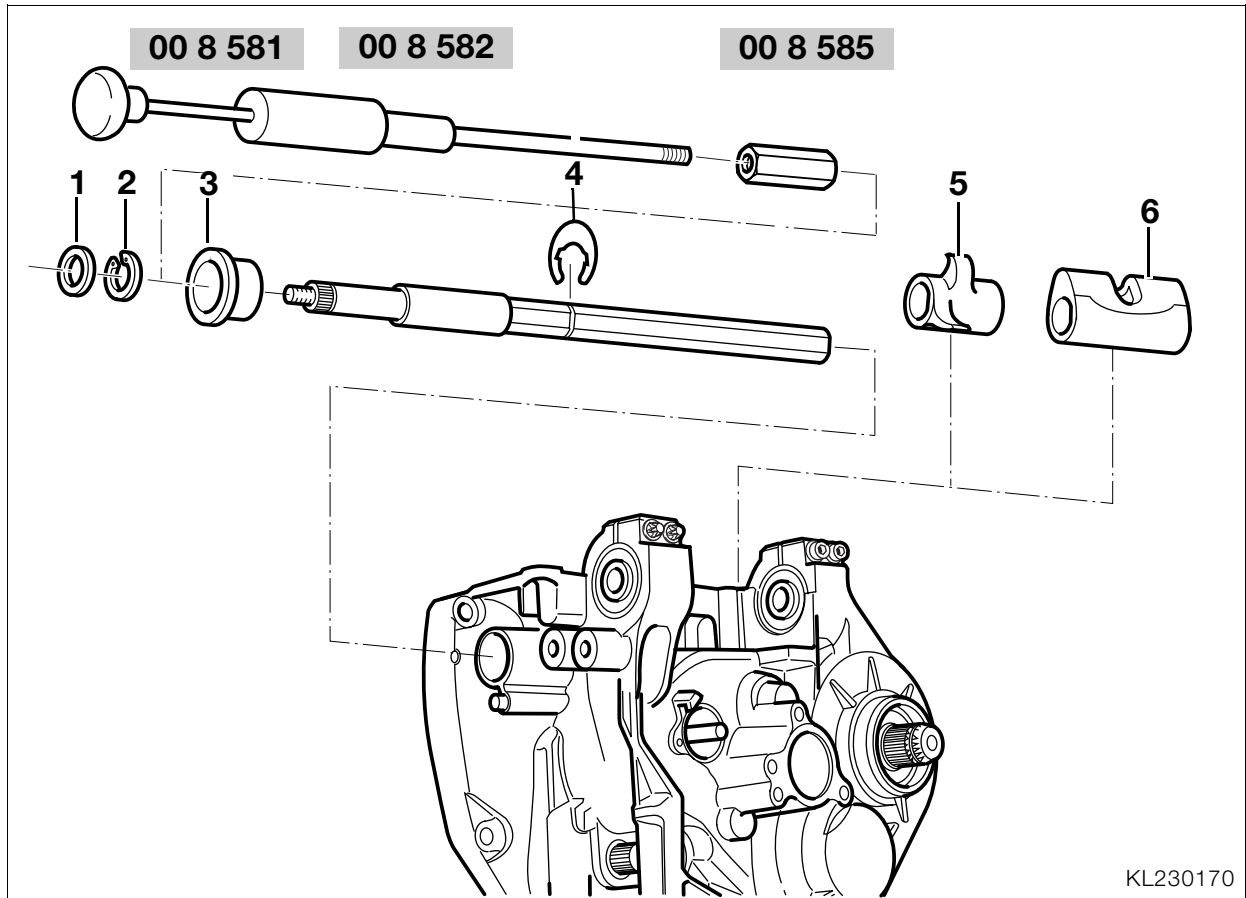
Remove the cover and gearbox

Using adapter, BMW No. 00 8 584, and puller, remove the cover (2) of reverser and remove cover.

Remove retaining pin (3) using adapter, BMW No. 00 8 584, pull rod, and impact weight, remove bearing pin (10) for 3rd stage spur gear.

Using adapter, BMW No. 00 8 584, pull rod, and impact weight, remove bearing pin (7) for 3rd stage spur gear. Remove 3rd stage spur gear.

Remove 4th stage spur gear using adapter, BMW No. 00 8 584, pull rod, and impact weight. Remove 4th stage spur gear.



KL230170

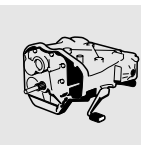
- Use a screwdriver to pry out sealing ring (1) of actuating shaft.
- Remove circlip (2) from gearbox housing.

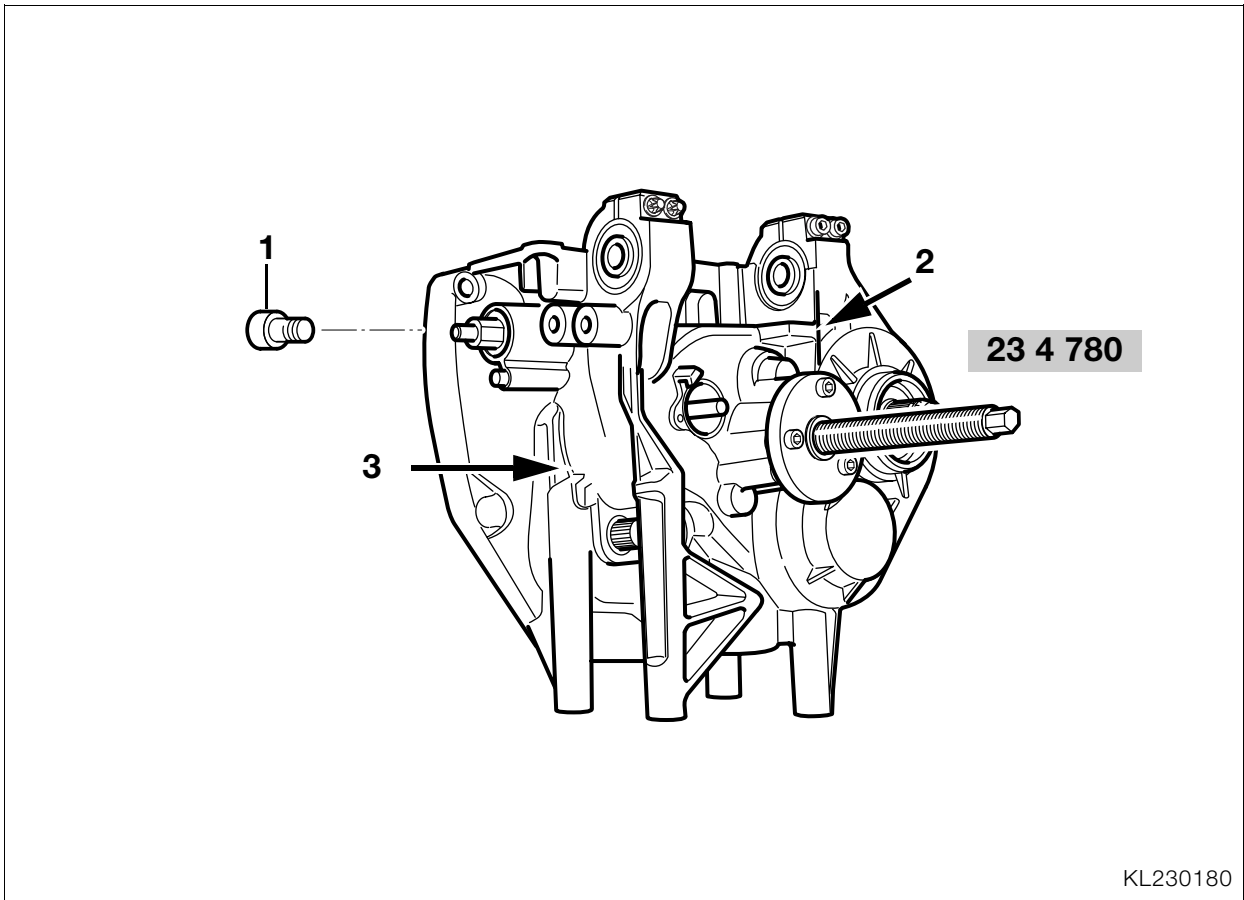


Caution:

When removing, make sure that retaining ring (4) for pawl (5) and driver (6) does not drop into the gearbox housing.

- Remove circlip (4) from actuating shaft.
- Turn actuating shaft so that pawl does not engage selector drum.
- Using an M6 adapter, **BMW No. 00 8 585**, and puller, **BMW No. 00 8 580**, pull the actuating shaft out of the gearbox housing until spacer (3) is clear.
- Remove spacer (3).
- Pull actuating shaft out of gearbox housing, removing driver (6) and pawl (5) from the actuating shaft.





KL230180

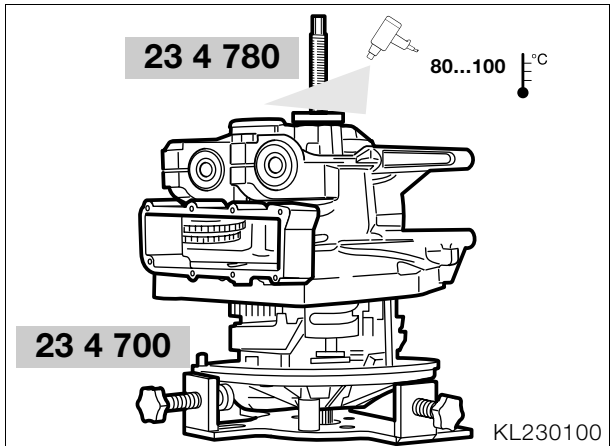
Removing gearbox housing



Note:

Do not drive back centring pins (2, 3).

- Remove the nine screws (1) securing the cover to the housing.



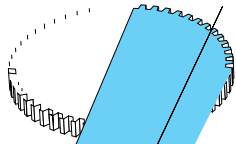
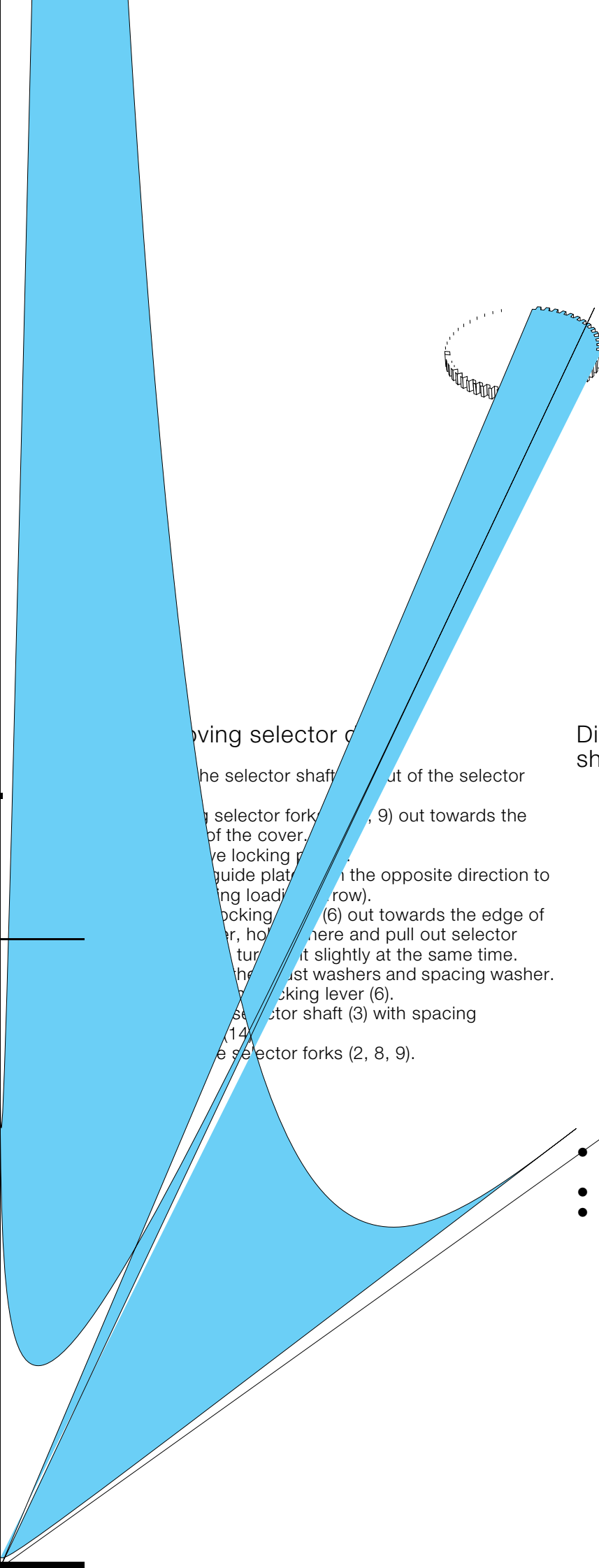
KL230100

- Insert gearbox into mount, **BMW No. 23 4 700**.
- Secure press-off tool, **BMW No. 23 4 780**, to mount of clutch slave cylinder.



Avoid damage to the housing cover and painted surfaces.

- Heat the bearing points in the housing to 80 °C... 100 °C (176 °F...212 °F).
- Use press-off tool, **BMW No. 23 4 780**, to separate the housing from the housing cover.

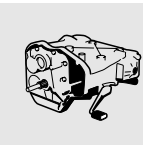


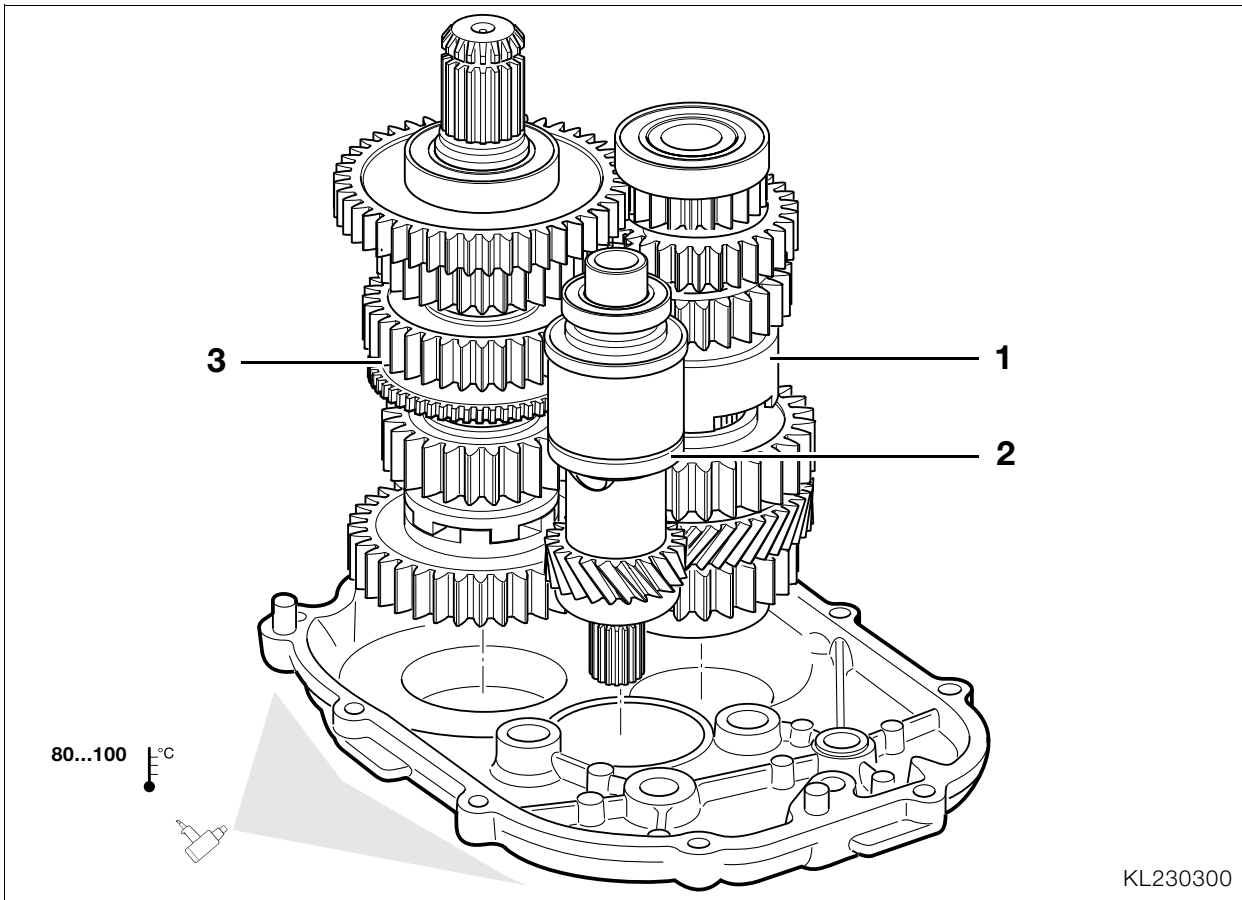
Moving selector...

the selector shaft... out of the selector
 selector forks (2, 8, 9) out towards the
 of the cover.
 locking
 guide plate... in the opposite direction to
 loading...
 locking... (6) out towards the edge of
 er, hold... here and pull out selector
 turn... it slightly at the same time.
 the... washers and spacing washer.
 locking lever (6).
 selector shaft (3) with spacing
 (14)
 selector forks (2, 8, 9).

Disassembling/assembling selector shaft

- Remove torsion spring (13) with locking lever (12) from selector shaft (11).
- Remove torsion spring (10).
- Assembly is the reverse of the disassembly procedure.





Removing gearbox shafts

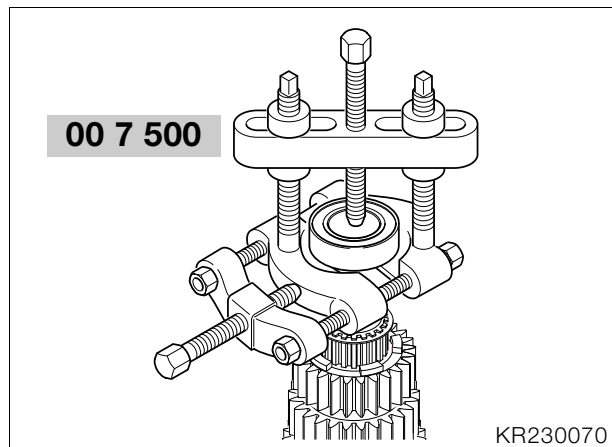
- Heat bearing points in gearbox cover to 80 °C ... 100 °C (176 °F ... 212 °F).
- Remove input shaft (2), output shaft (3) and intermediate shaft (1) from the cover together.

Replacing grooved ball bearing on intermediate shaft

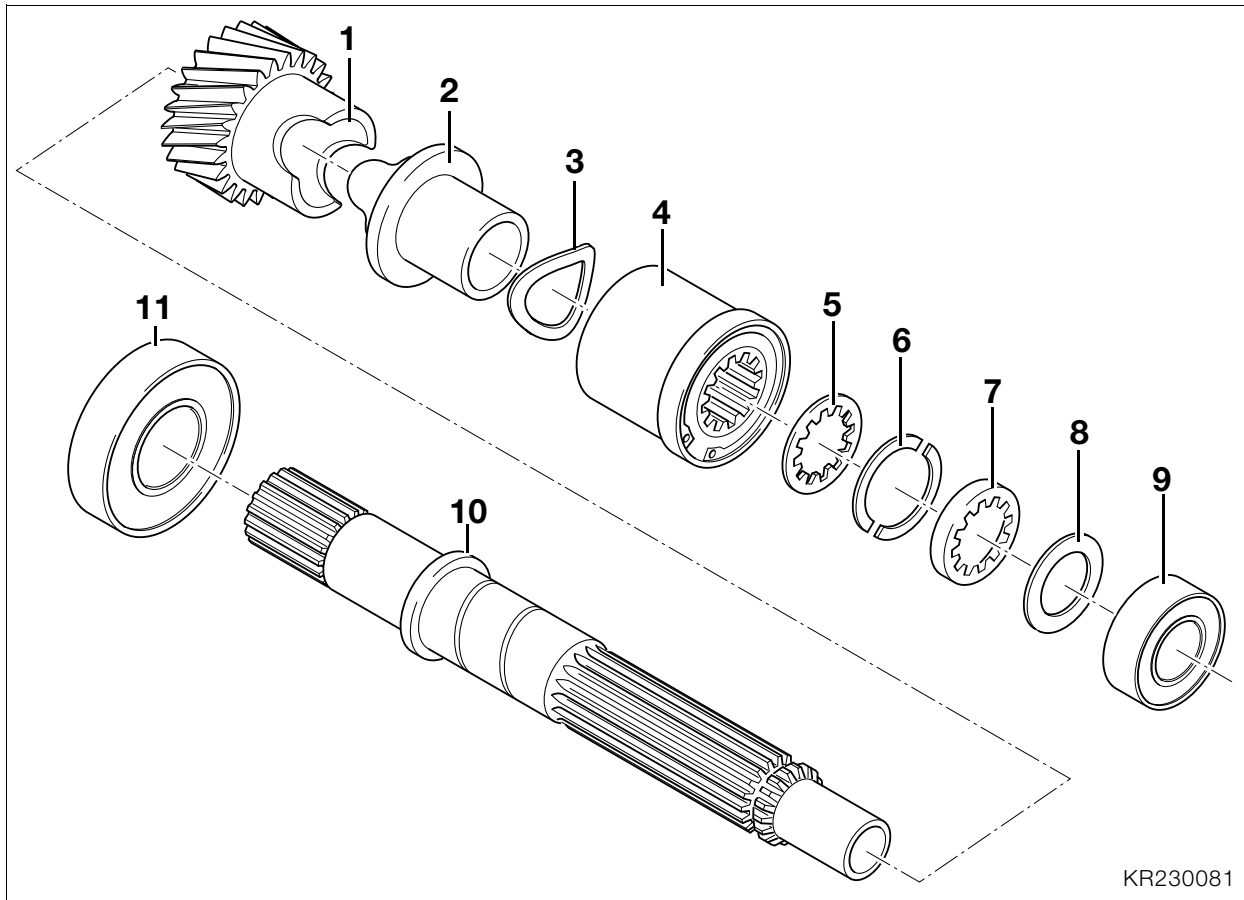
Caution:

Apart from the grooved ball bearings, the intermediate shaft must always be replaced as a complete unit.

If the grooved ball bearings are replaced, the fully assembled length must be re-adjusted.



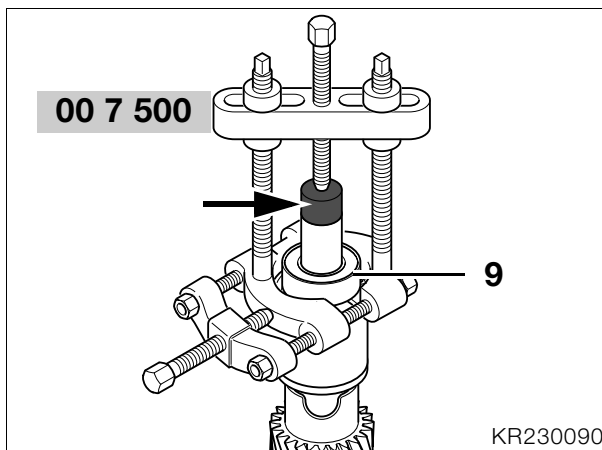
- Pull off the grooved ball bearings with a universal puller, **BMW No. 00 7 500**.
 - Press the output-side grooved ball bearing on to the intermediate shaft.
- Checking/adjusting fully assembled length of intermediate shaft
- ➡ See below
- Place spacing washer of calculated thickness in position and press on the input-side grooved ball bearing.



KR230081

Disassembling/assembling input shaft

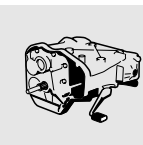
Disassembling input shaft

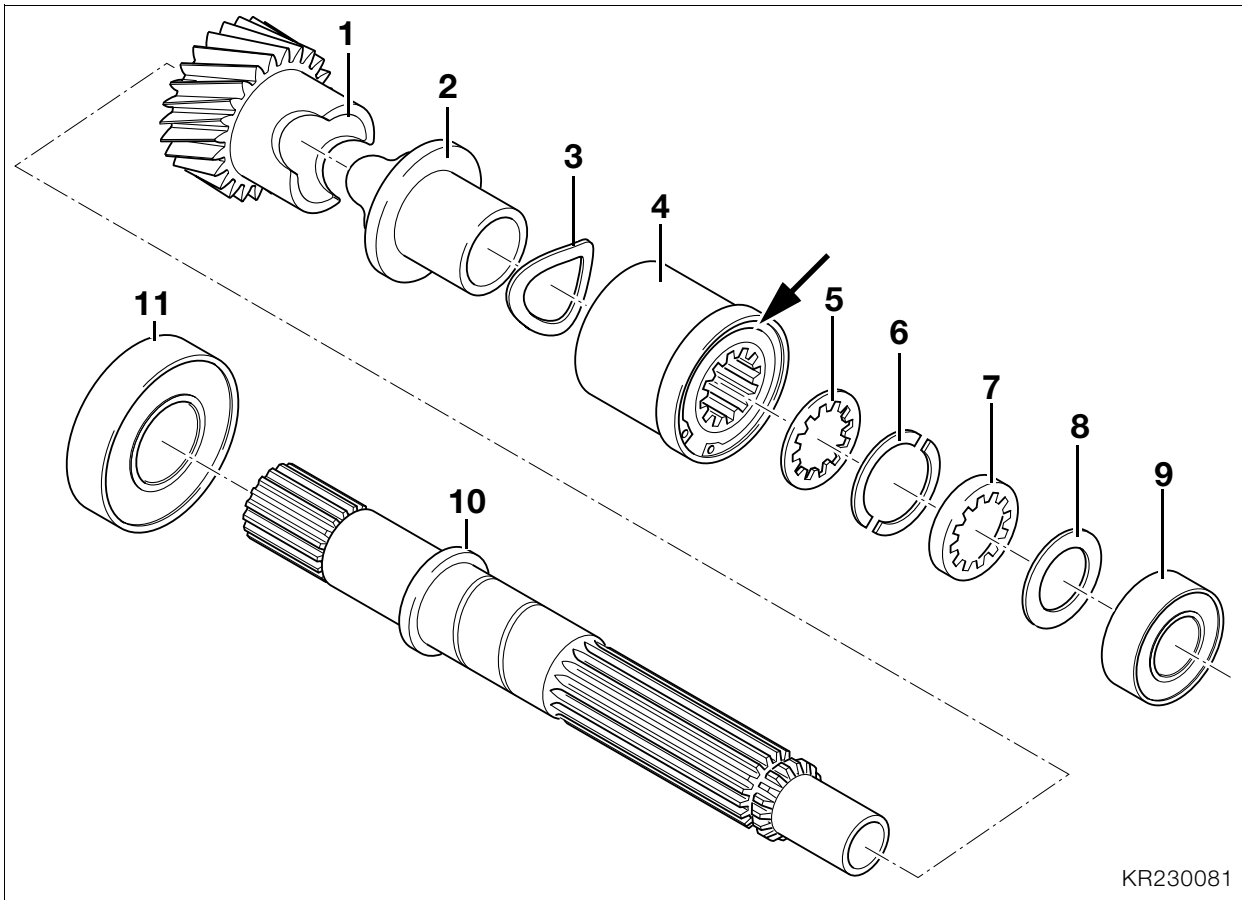


KR230090

- Remove guide ring (7).
- Compress spring cluster (4) and remove split segment washer (6).
- Remove backup washer (5), spring cluster (4), anti-rattle disc (3), thrust block (2) and constant-speed gear (1).
- Clamp input shaft (10) other way round in vise.
- Use universal puller, **BMW No. 00 7 500**, and pressure head (arrow) to pull off grooved ball bearing (11).

- Clamp the input shaft into a vise with soft jaws.
- Use universal puller, **BMW No. 00 7 500**, and pressure head (arrow) to pull off grooved ball bearing (9) with spacing washer (8).
- Note the thickness of the spacing washer.



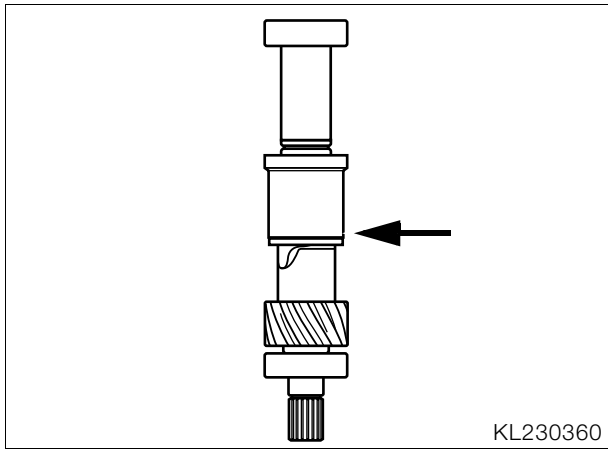


KR230081

Assembling input shaft

- Lightly oil the bearing surface for constant-speed gear (1) on input shaft (10), and install the constant-speed gear.
 - Lightly oil the splines in thrust block (2) and install it.
 - Place anti-rattle disc (3) on thrust block (2).
 - Mount spring cluster (4) with locating ring (arrow) facing upwards on anti-rattle disc (3).
 - Install backup washer (5) of the same thickness as the original washer.
 - Compress spring cluster (4) and insert the split segment washer (6) in the ring groove.
 - Install retaining sleeve (7) with the shoulder over split-segment washer (6).
 - Check the fully assembled length and adjust if necessary.
- ⇒ See below
- Install spacing washer (8) of calculated thickness, and press on grooved ball bearing (9).

Checking travel of spring segment on input shaft



KL230360

- Check endplay of spring cluster (4).

Caution:
 Replace backup washer (5) if endplay is out of tolerance.

Endplay:
 Spring cluster
 on shaft 0.4 ... 0.6 mm (0.016 ... 0.024 in)



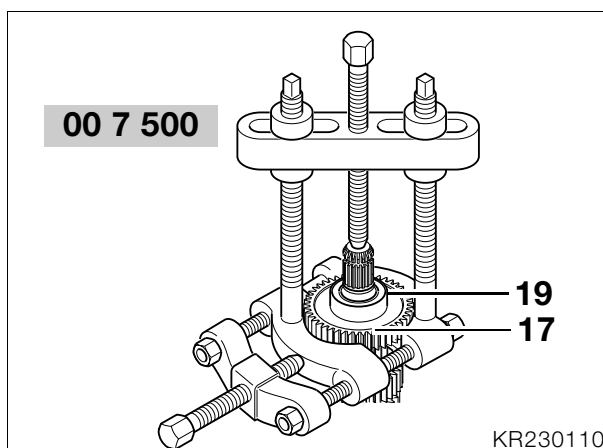
KL230210

Disassembling/assembling output shaft

Disassembling output shaft

Caution:

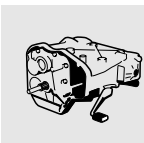
To avoid damaging the needle roller bearing on the splines, spread the rollers carefully at the end face when removing.

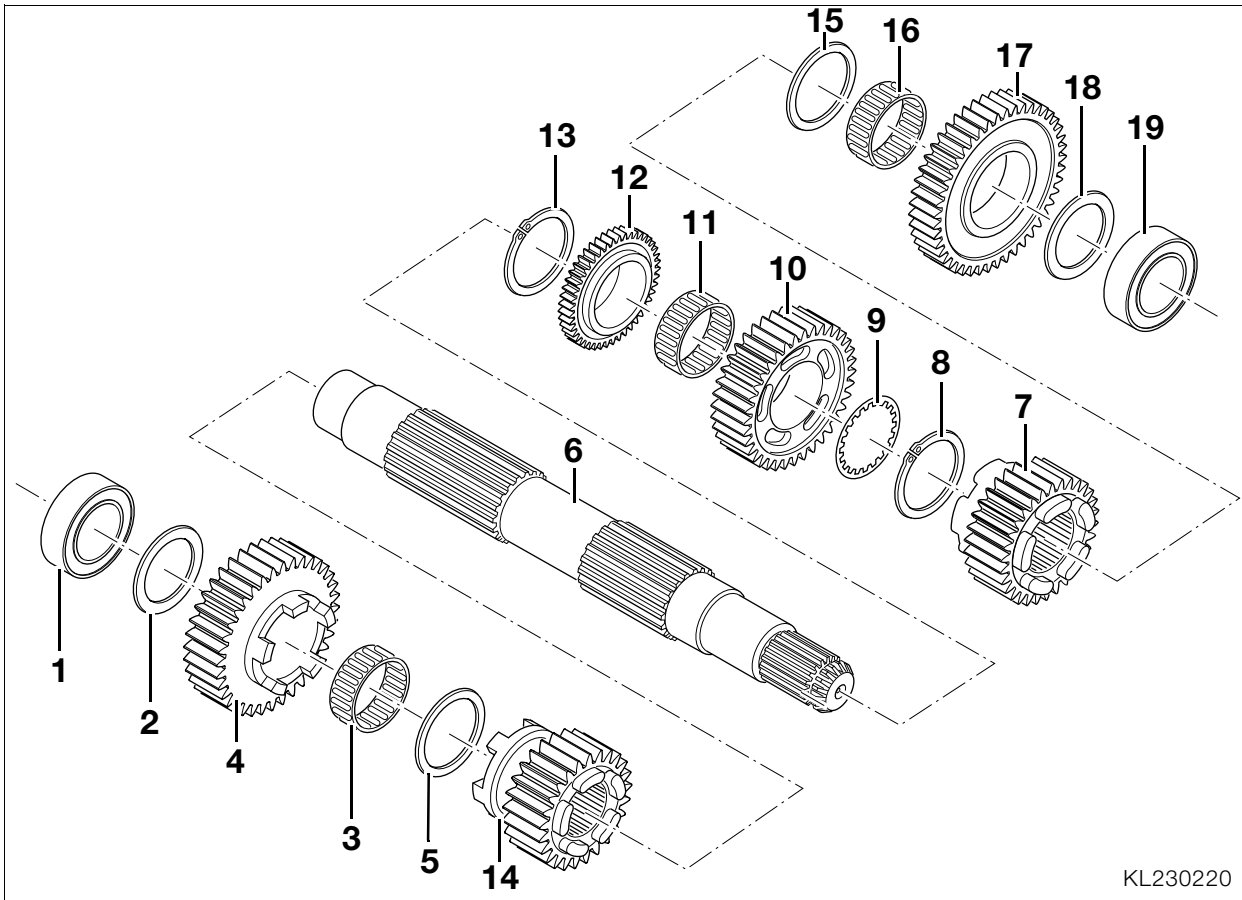


KR230110

- Use universal puller, **BMW No. 00 7 500**, to remove grooved ball bearing (19) together with shift gearwheel (17) and shim (18).

- Remove needle roller bearing (16).
- Remove the sliding gearwheel for 4th gear (7).
- Remove circlip (8), backup washer (9), shift gearwheel for 3rd gear (10) and needle roller bearing (11).
- Remove 5th stage spur gear (12) of reverser.
- Remove circlip (13) and sliding gearwheel for 5th gear (14).
- Turn output shaft (6) other way round and clamp into the vise with soft jaws.
- Use universal puller, **BMW No. 00 7 500**, to pull off grooved ball bearing (1).
- Remove shim washer (2), needle roller bearing (3), shift gearwheel for 2nd gear (4) and thrust washer (5).





KL230220

Assembling output shaft



Note:

Begin by installing 5th stage spur gear (12) of re-
 verser.
 Before assembly, oil all friction faces lightly with gear
 oil.



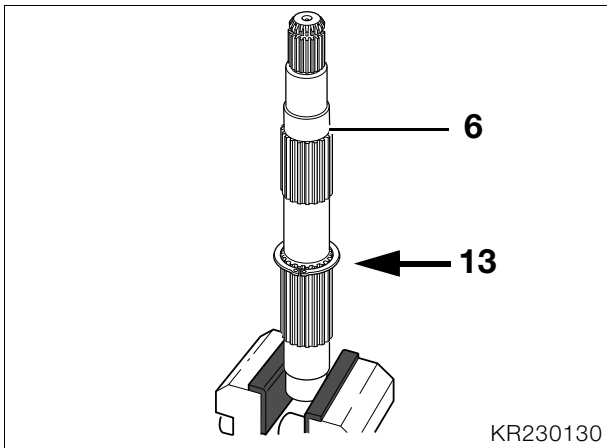
Caution:

To avoid damaging the needle roller bearing on the
 splines when installing, spread the rollers carefully
 at the end face.

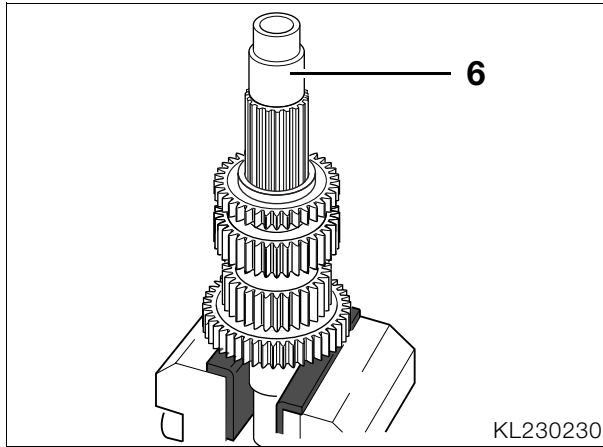
- Install 5th stage spur gear (12) with narrow collar
 toward circlip.
- Install needle roller bearing (11).
- Install shift gearwheel for 3rd gear (10) with pock-
 ets facing away from the 5th stage spur gear (12).
- Install backup washer (9) and circlip (8).
- After installing shift gearwheel for 3rd gear,
 measure endplay.
- Install shift wheel for 4th gear (7) with recess for
 shift fork facing towards the 3rd gear shift
 wheel (10).
- Install backup washer (15) and needle roller
 bearing (16).
- Install shift wheel for 1st gear (17) with the pock-
 ets facing towards the 4th gear shift wheel (7).
- Install spacing washer (18) and grooved ball
 bearing (19).

– After installing, check endplay at 1st gear shift
 wheel.

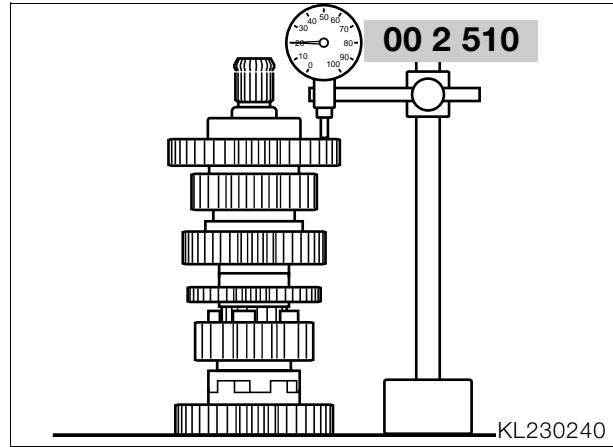
➡ See below



- Clamp the output shaft into the vise with soft
 jaws and with the splined end up.
- Install circlip (13/arrow).



KL230230



KL230240

- Reverse position of output shaft (6) in vise.
- Install sliding gearwheel for 5th gear (14) with the recess for the selector fork facing the 2nd gear shift wheel (4).
- Install backup washer (5) and needle roller bearing (3).
- Install the shift wheel for 2nd gear (4) with the dogs facing the 5th gear sliding gearwheel (14).
- Check/adjust fully-compressed length.
- ➡ See below
- Install spacing washer (2) of the determined thickness, and press on deep-groove ball bearing (1).
- Check 2nd gear endplay.

Checking endplay

- Secure dial gauge, **BMW No. 00 2 510**, to dial gauge stand.
- Position dial-gauge stylus on edge of the gear-wheel and check endplay.

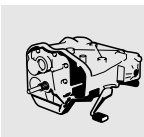


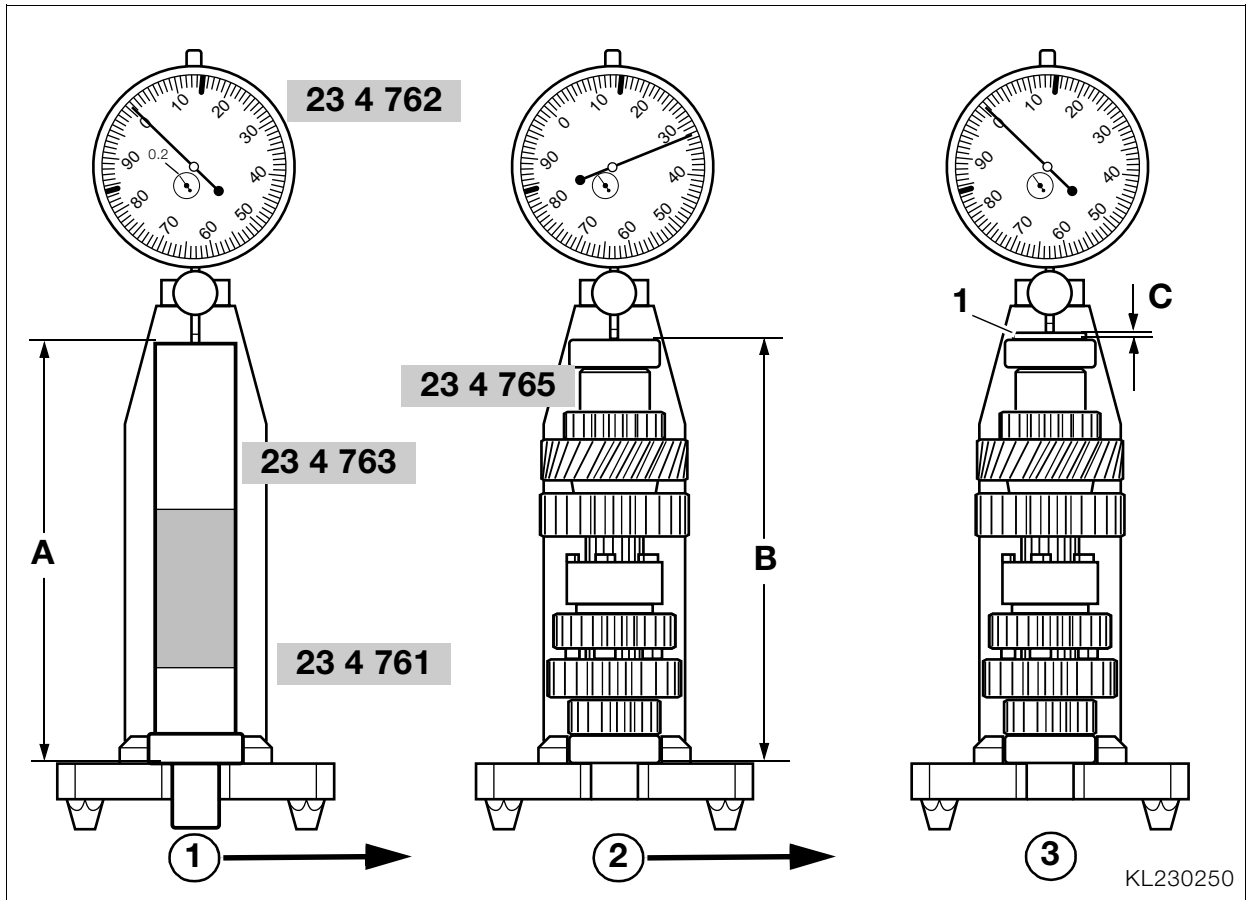
Caution:

Excessive endplay is due to incorrect assembly or worn needle roller bearings, backup washers or spacing washers, or the shift gear. Check and replace as necessary.

Endplay values:

Endplay,	
1st gear.....	0.1 ... 0.33 mm (0.004 ... 0.013 in)
Endplay,	
2nd gear	0.1 ... 0.33 mm (0.004 ... 0.013 in)
Endplay,	
3rd gear	0.1 ... 0.57 mm (0.004 ... 0.022 in)





Checking/adjusting fully assembled length of gearbox shafts

Checking/adjusting fully assembled length of intermediate shaft



Caution:

Check and adjust the fully assembled length as described below and install a spacing washer of the correct thickness.

Before measuring, always make sure that the grooved ball bearings are pressed fully home, even if the shaft has not been disassembled and reassembled.

- Pull off the input-side grooved ball bearing with universal puller, **BMW No. 00 7 500**.
- Remove the spacing washer.
- Locate dial gauge, **BMW No. 23 4 762**, in rear bore of measuring fixture, **BMW No. 23 4 761**, and set to 0.2 mm (0.008 in) preload.
- Using dial gauge, zero to distance "A" of the zero gauge, **BMW No. 23 4 763**.
- Place reference washer, **BMW No. 23 4 765**, on the intermediate shaft.
- Place the grooved ball bearing on the reference washer.
- Insert intermediate shaft in measuring stand.

- Using the dial gauge, measure the deviation from zero of distance "B" at the inner bearing race. Deviation from zero is equivalent to the thickness "C" of spacer (1).
- Place spacer (1) of correct thickness on inner bearing race and check deviation from zero.

$$A = B + C$$



Caution:

The maximum deviation from zero must not be exceeded.

- Remove the intermediate shaft from the measuring fixture.
- Take off spacer, grooved ball bearing and reference washer.
- Place a spacing washer (1) of the correct thickness on the intermediate shaft and press on the grooved ball bearing.

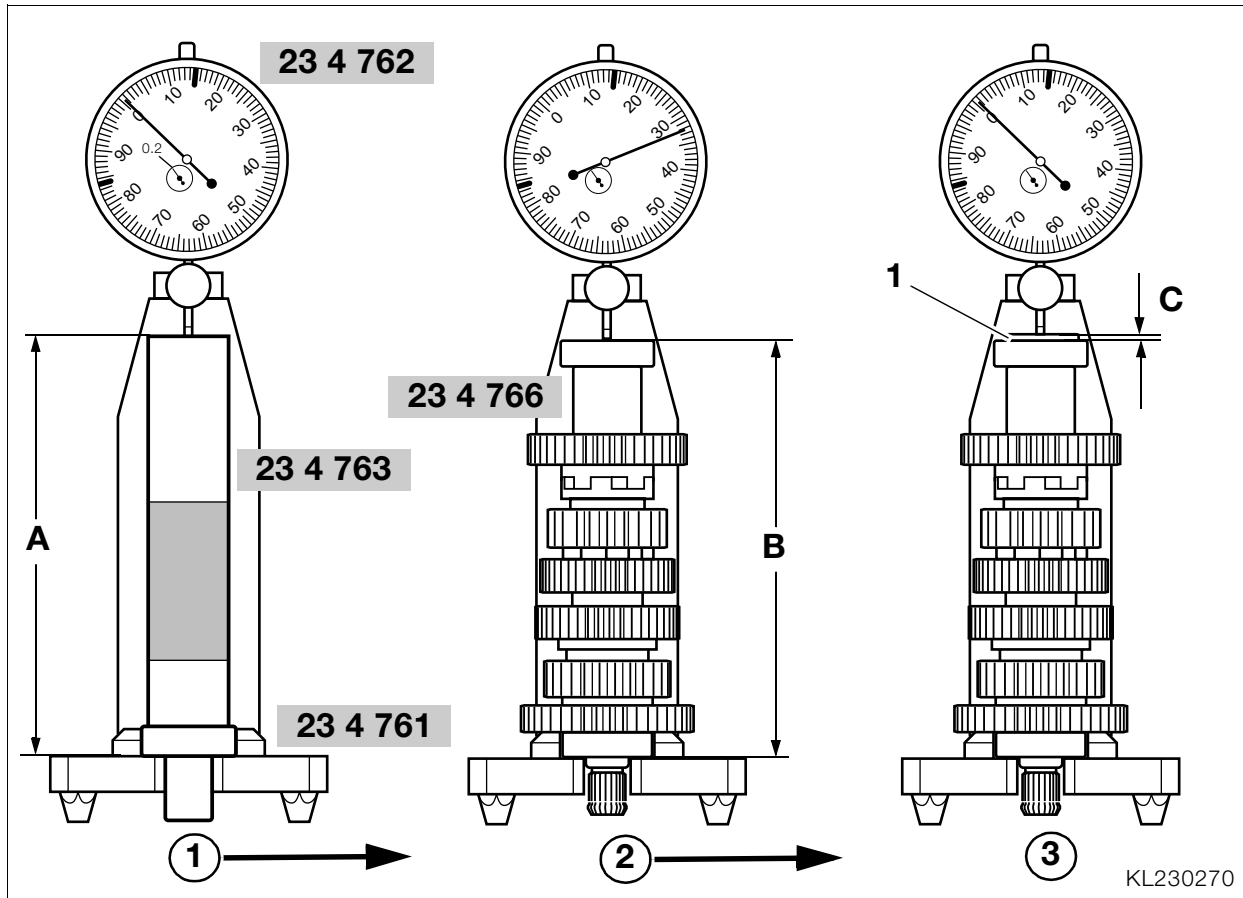
Reference dimension for intermediate shaft:

Maximum deviation

from zero -0.05 ... 0.00 mm (-0.002 ... 0.00 in)

Fully assembled

length..... 198.95 ... 199.00 mm (7.833 ... 7.835 in)



Checking/adjusting fully assembled length of output shaft

Caution:

Check and adjust the fully assembled length as described below and install a spacing washer of the correct thickness.

Before measuring, always make sure that the grooved ball bearings are pressed fully home, even if the shaft has not been disassembled and reassembled.

- Pull off output-side deep-groove ball bearing with universal puller, **BMW No. 00 7 500**.
- Remove the spacing washer.
- Locate dial gauge, **BMW No. 23 4 762**, in rear bore of measuring fixture, **BMW No. 23 4 761**, and set to 0.2 mm (0.008 in) preload.
- Using dial gauge, zero to distance “A” of the zero gauge, **BMW No. 23 4 763**.
- Place reference washer, **BMW No. 23 4 766**, on the output shaft.
- Place the grooved ball bearing on the reference washer.
- Insert the output shaft into the measuring stand.

- Using the dial gauge, measure the deviation from zero of distance “B” at the inner bearing race. Deviation from zero is equivalent to the thickness “C” of spacer (1).
- Place spacer (1) of correct thickness on inner bearing race and check deviation from zero.

$$A = B + C$$

Caution:

The maximum deviation from zero must not be exceeded.

- Take off spacer, grooved ball bearing and reference washer.
- Place a spacing washer (1) of the correct thickness on the output shaft and press on the grooved ball bearing.

Reference dimension for output shaft:

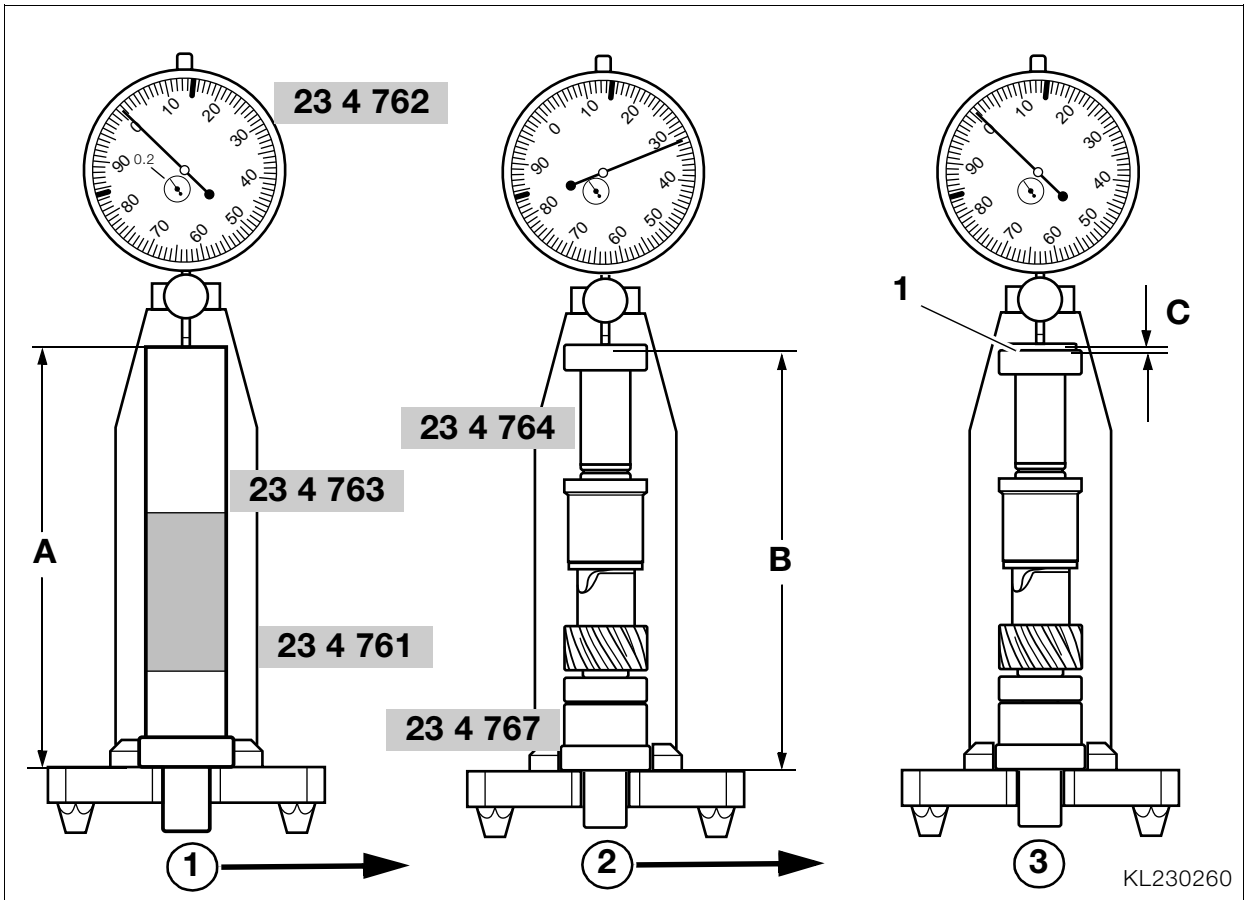
Maximum deviation

from zero -0.05 ... 0.00 mm (-0.002 ... 0.00 in)

Fully assembled

length..... 192.95 ... 193.00 mm (7.596 ... 7.598 in)





Checking/adjusting fully assembled length of input shaft

⚠ Caution:

Check and adjust the fully assembled length as described below and install a spacing washer of the correct thickness.

Before measuring, always make sure that the grooved ball bearings are pressed fully home, even if the shaft has not been disassembled and reassembled.

- Pull off output-side deep-groove ball bearing with universal puller, **BMW No. 00 7 500**.
- Remove the spacing washer.
- Locate dial gauge, **BMW No. 23 4 762**, in front bore of measuring fixture, **BMW No. 23 4 761**, and set to 0.2 mm (0.008 in) preload.
- Using dial gauge, zero to distance "A" of the zero gauge, **BMW No. 23 4 763**.
- Mount reference washer, **BMW No. 23 4 764**, on the input shaft.
- Place the grooved ball bearing on the reference washer.
- Insert input shaft with adapter disc, **BMW No. 23 4 767**, in measuring stand.

- Using the dial gauge, measure deviation from zero of distance "B" at the inner bearing race. Deviation from zero is equivalent to the thickness "C" of spacer (1).
- Place spacer (1) of correct thickness on inner bearing race and check deviation from zero.

$$A = B + C$$

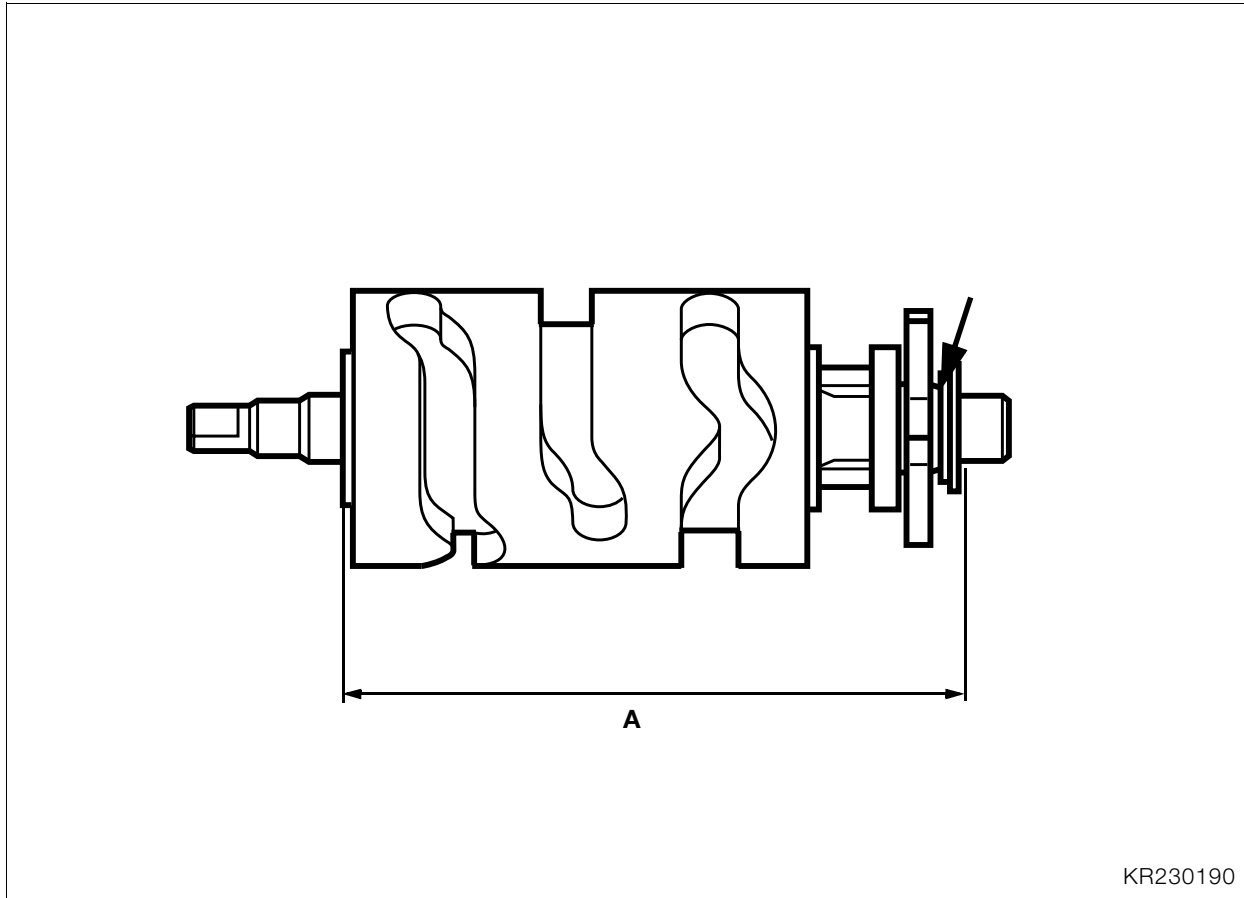
⚠ Caution:

The maximum deviation from zero must not be exceeded.

- Take the input shaft out of the measuring fixture.
- Remove the adapter disc, spacing washer, grooved ball bearing and reference washer.
- Place spacer (1) of the correct thickness in position and press the grooved ball bearing onto the input shaft.

Reference dimension for input shaft:

Maximum deviation from zero -0.05 ... 0.00 mm (-0.002 ... 0.00 in)
Fully assembled length..... 138.55 ... 138.60 mm (5.455 ... 5.457 in)



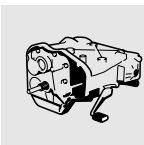
KR230190

Checking/adjusting fully assembled length of selector drum

- Place spacing washer and both thrust washers on the selector drum.
- Using slide gauge, determine fully assembled length "A".
- If necessary, adjust fully assembled length "A" with a shim (arrow).

Fully assembled length:

Selector drum 111.80 ... 111.90 mm (4.402 ... 4.406 in)

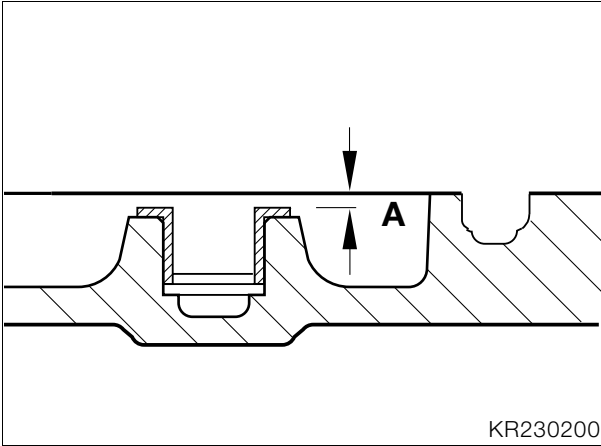


Shimming selector shaft

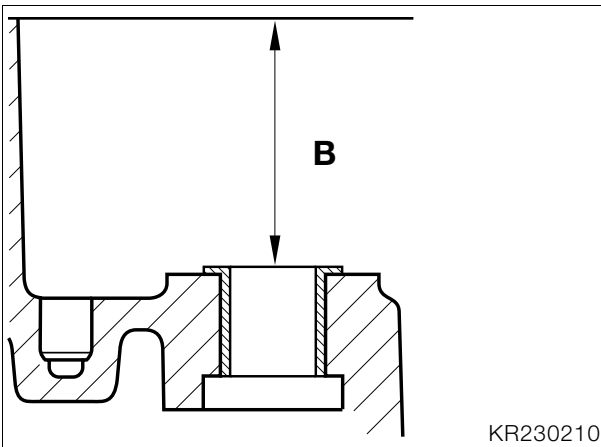


Caution:

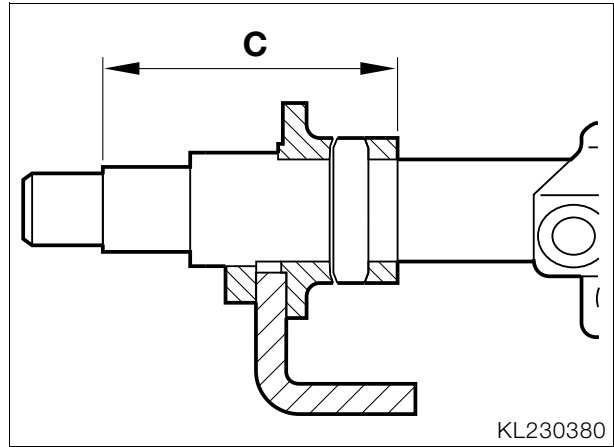
If the housing or the complete selector shaft is replaced, the selector shaft must be measured and shimmed.



- Measure distance "A" from shouldered bushing to cover mating face.



- Measure distance "B" from shouldered bushing to housing mating face.



- Measure distance "C" from the shoulder on the selector shaft to the back of the sleeve.
- Calculate endplay as follows:

Distances "A" + "B" = "D"

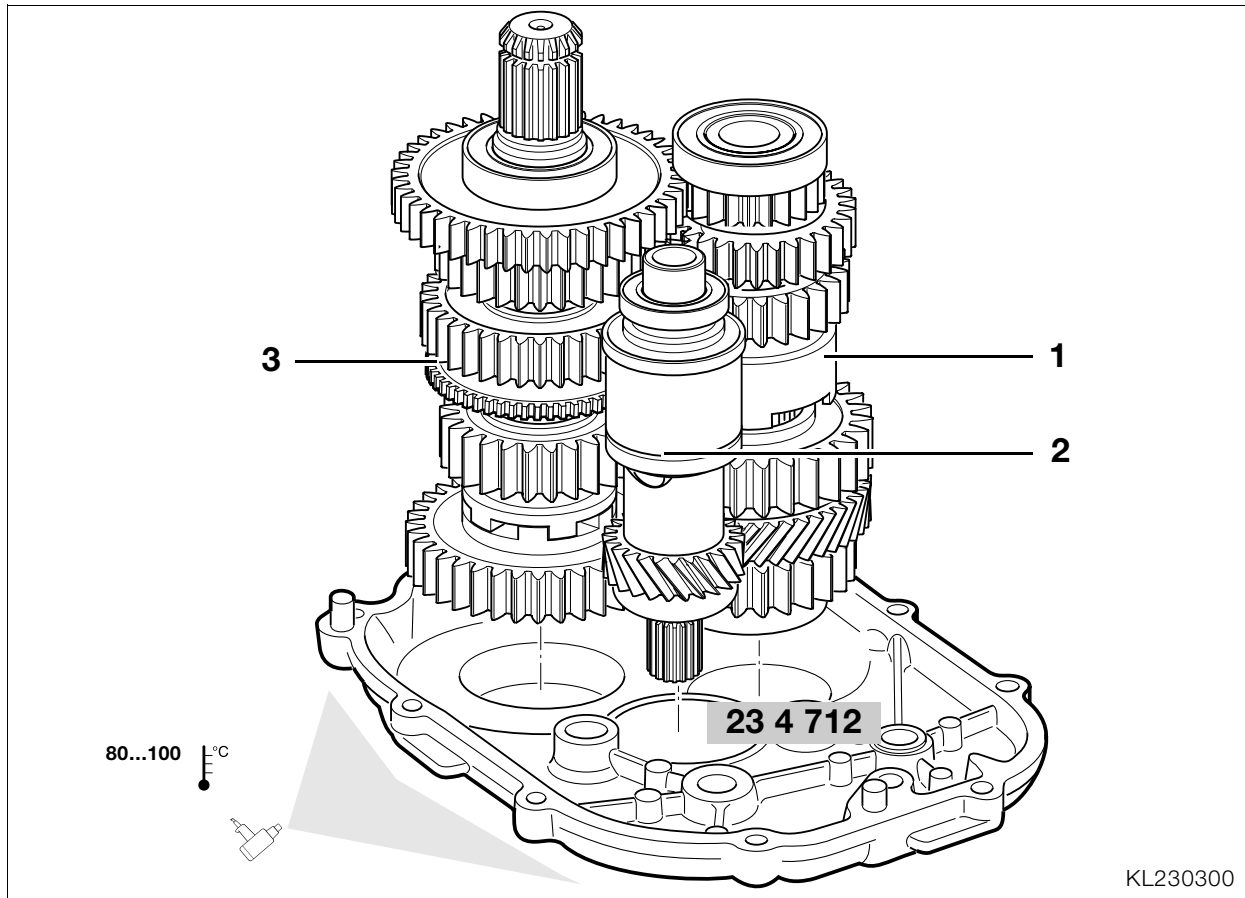
Distances "D" - "C" = "E"

Distance "E" - thickness of spacing washer = endplay.

Endplay:

Selector shaft 0.1 ... 0.3 mm (0.004 ... 0.012 in)





Assembling gearbox

Installing gearbox shafts

Installing input, output and intermediate shafts

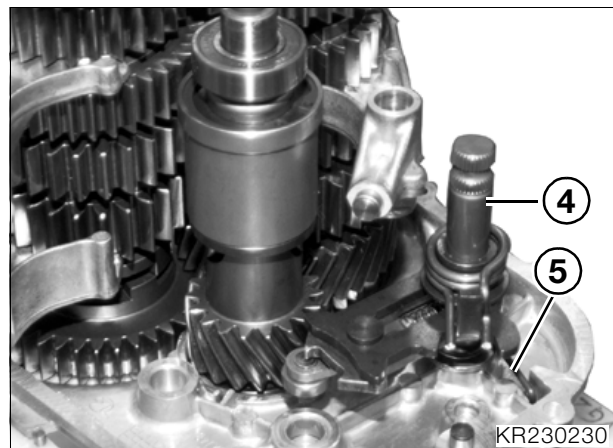


Caution:

Before installing, the gearbox shafts, housing and cover must be thoroughly cleaned and examined for damage. Replace all shaft sealing rings. Check that the gearbox shafts are correctly seated.

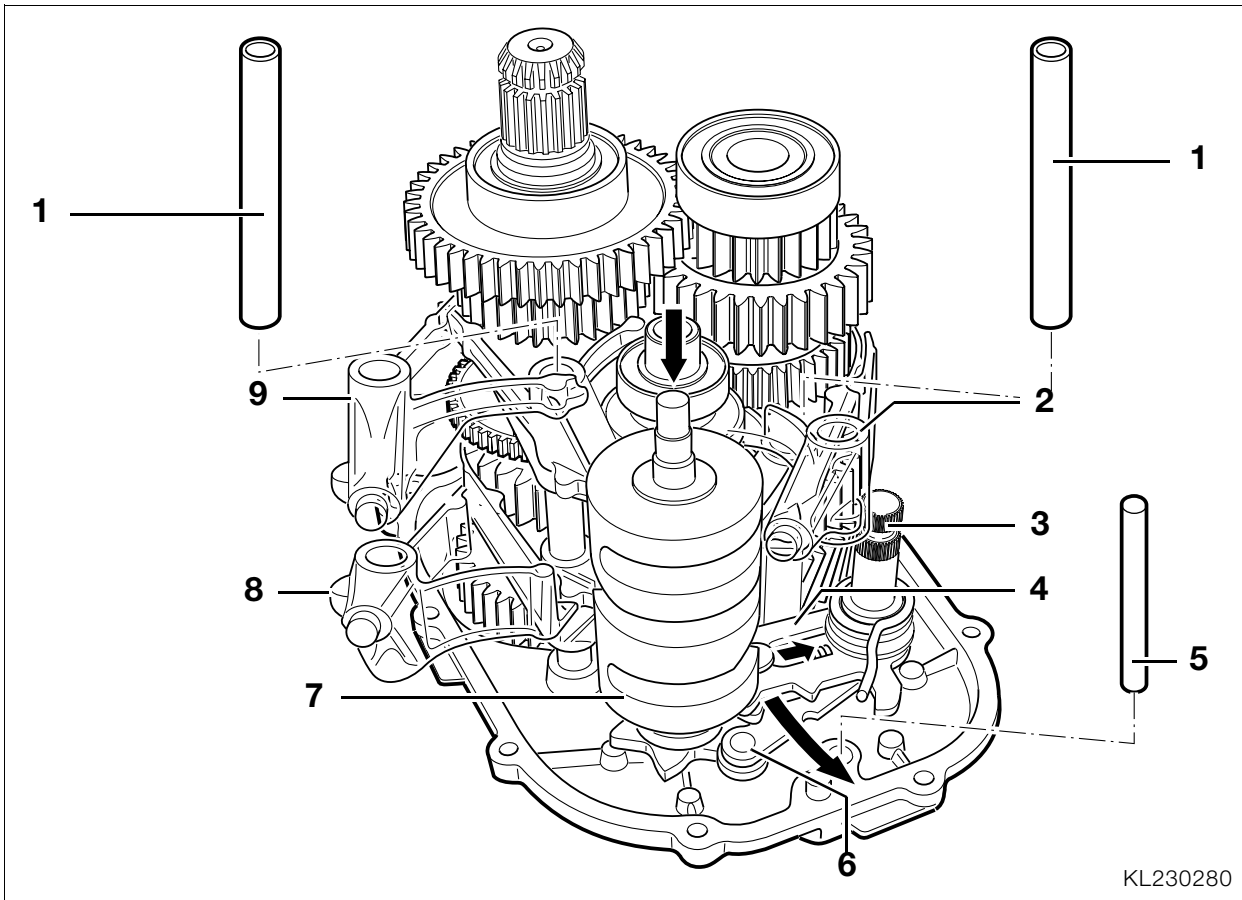
- Insert the cover into gearbox mount, **BMW No. 23 4 700**.
- Align the input, output and intermediate shafts so that their gearwheels mesh.
- Insert slip-over sleeve for input shaft, **BMW No. 23 4 712**, into cover.
- Heat bearing points in cover to 80...100 °C (176...212 °F).
- Insert input shaft (2), output shaft (3) and intermediate shaft (1) together, all at the same time.
- Install the selector forks.

Installing selector shaft



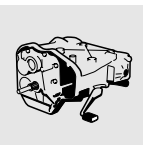
- Place a spacing washer of the correct thickness in position and install selector shaft (4).
- Engage torsion spring (5) in position.

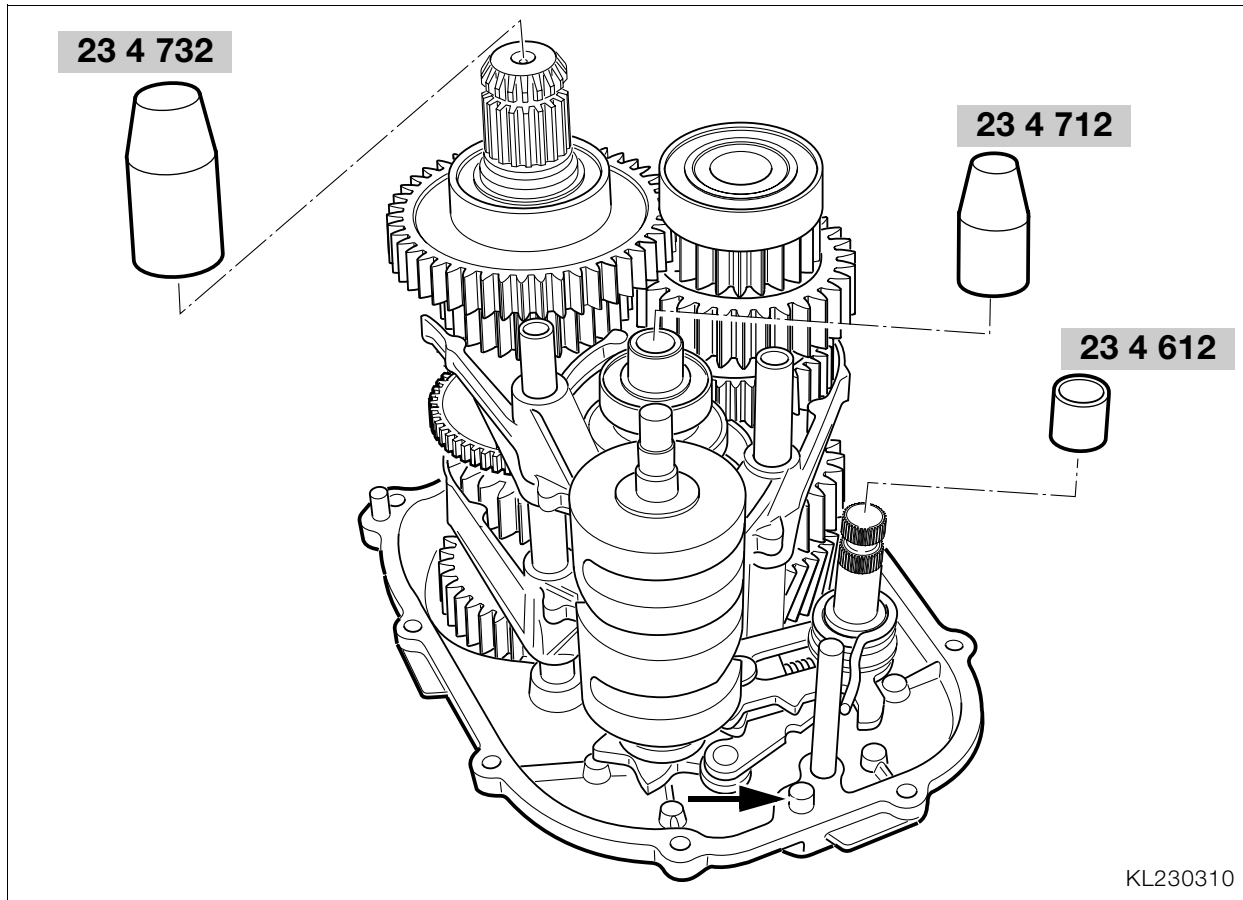




Installing selector drum

- Place a spacing washer of the correct thickness and the input-side thrust washer on selector drum (7) and secure with a small amount of grease.
- Swing locking lever (6) out towards the edge of the cover and install the selector drum.
- Swing locking lever (6) towards selector drum (7) and engage it in position together with guide plate (4).
- Place shift forks (2, 8, 9) in the guides.
- Install selector shafts (1).
- Install locking pin (5).
- Place thrust washer on selector drum.





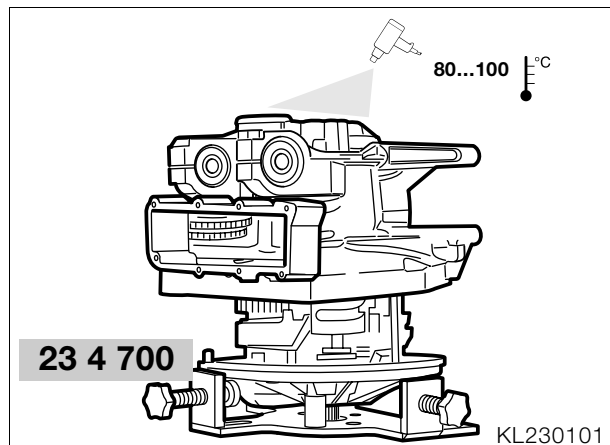
Installing gearbox housing

- Install pin (arrow) in cover.

Caution:

Clean and de-grease the sealing faces. The sealing compound sets within 30 minutes; with- in this time, place the housing in position and tighten the securing screws.

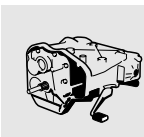
- Using the metering device, apply **Loctite 574** surface sealant to the mating face of the cover.
- Place assembly sleeve, **BMW No. 23 4 732**, on the output shaft.
- Place assembly sleeve, **BMW No. 23 4 712**, on the input shaft.
- Place assembly sleeve, **BMW No. 23 4 612**, on the selector shaft.

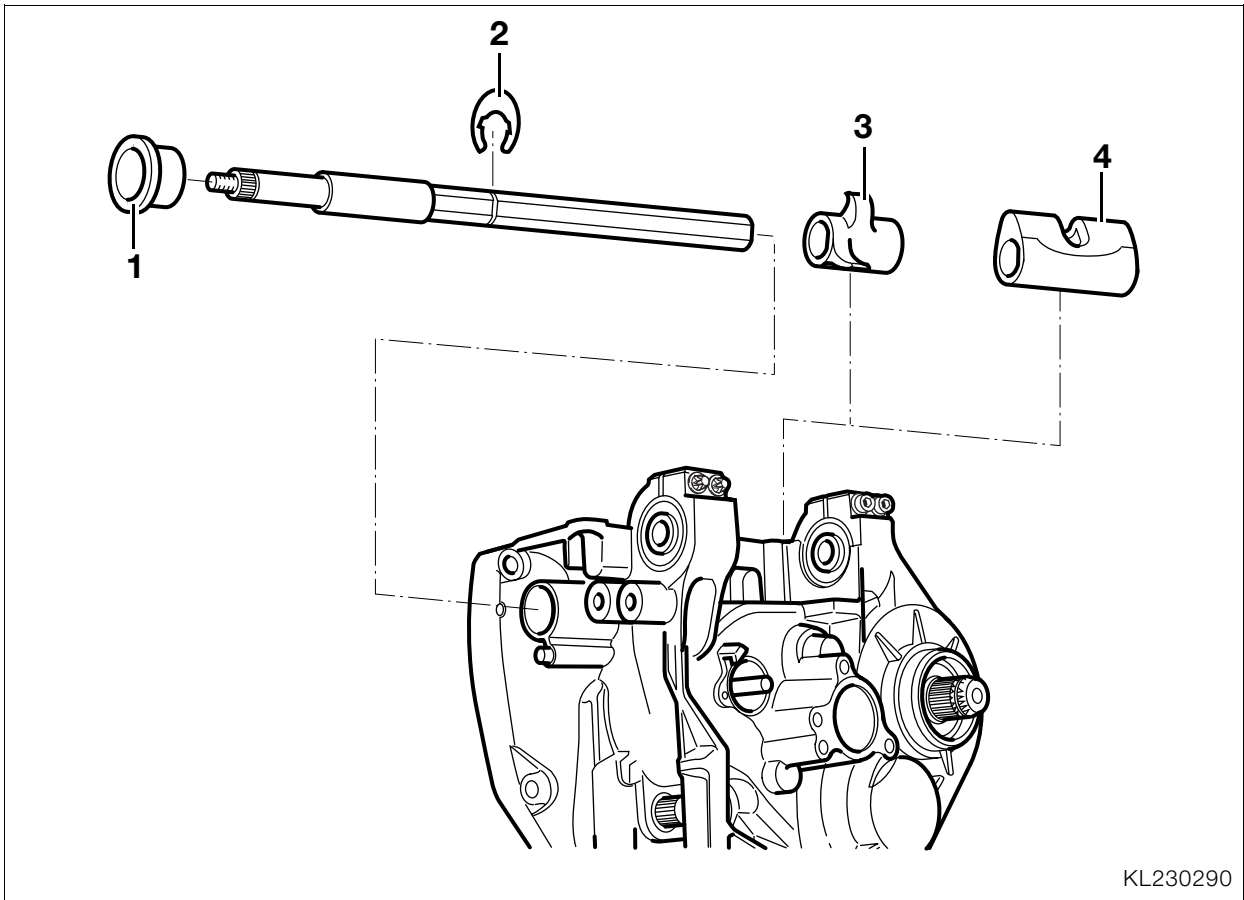


- Heat the bearing seats in the housing to 80 ... 100 °C (176 ... 212 °F) and place the hous- ing on the cover.
- Install securing screws in gearbox housing and tighten in diagonally opposite sequence.

Tightening torque:

Housing cover to housing 9 Nm

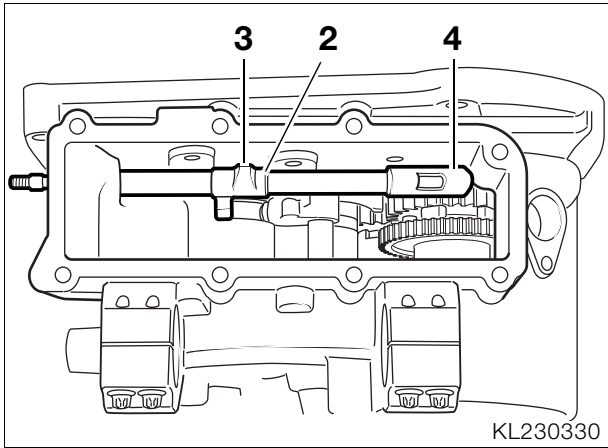




KL230290

Installing reverser

- Select neutral.



KL230330



Note:

Always use a new circlip (2).

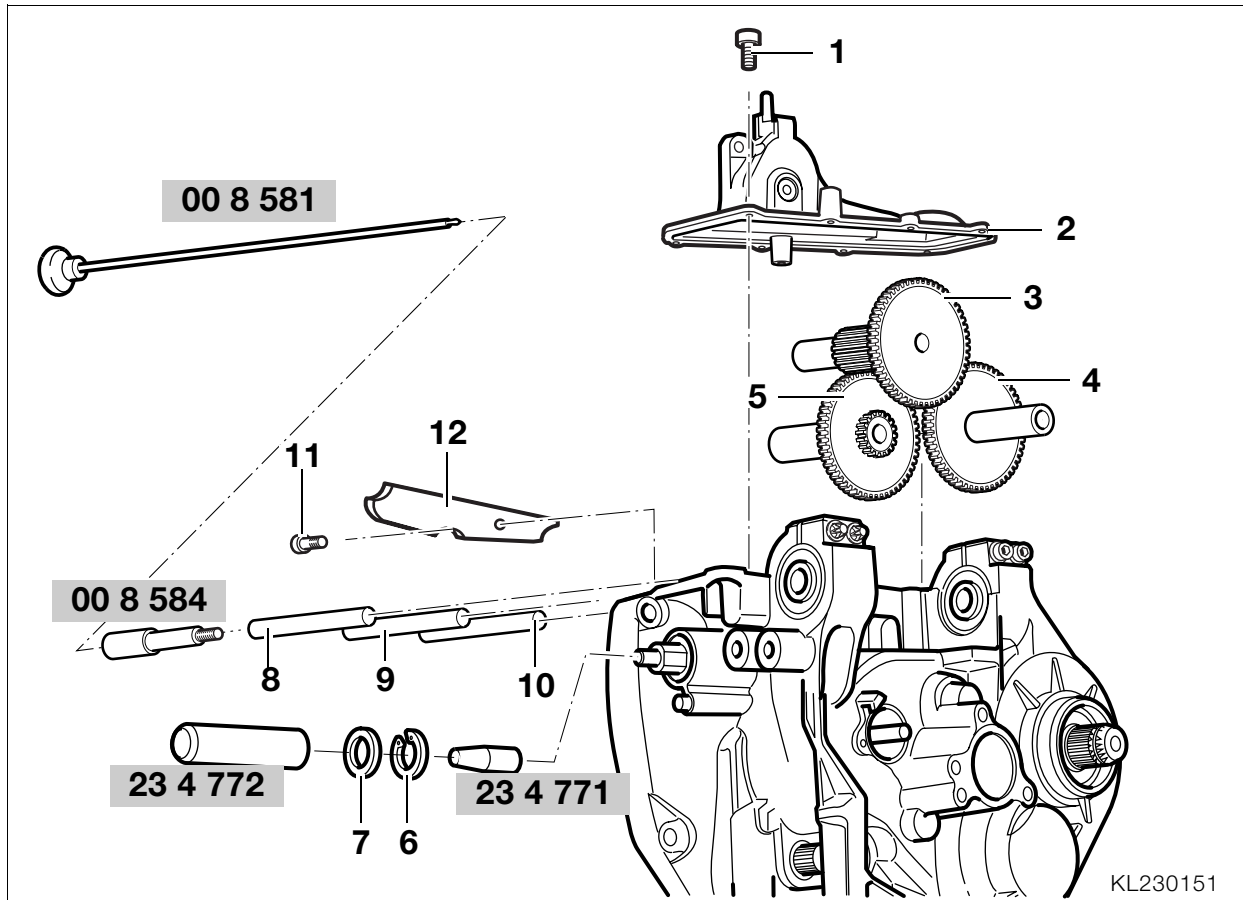
- Introduce actuating shaft into gearbox housing and slip pawl (3) with long lug toward collar and driver (4) with flat toward 5th stage spur gear onto actuating shaft.
- The pawl must be able to engage the selector drum.



Caution:

When reassembling, take care not to drop the circlip into the gearbox and make sure that the circlip is correctly seated in its groove.

- Install the circlip (2).
- Press spacer (1) home on shaft.



- Fit a new retaining ring (6) in groove in housing bore.

Caution:

Endplay of actuating shaft must be perceptible before sealing ring (7) is installed.

- Use slip-over sleeve, **BMW No. 23 4 772**, and drift, **BMW No. 23 4 771**, to install new sealing ring (7).

Caution:

Check that O-rings on bearing pins (8, 9, 10) are free of damage before installing and apply a light coating of oil to facilitate installation.

- Working from above, insert 4th stage spur gear (4) to engage driver.
- Install bearing pin (10).
- Using adapter, **BMW No. 00 8 584**, and pull rod, **BMW No. 00 8 581**, drive in bearing pin until seated.

- Working from above, insert 3rd stage spur gear (3).
- Install bearing pin (9).
- Using adapter, **BMW No. 00 8 584**, and pull rod, **BMW No. 00 8 581**, drive in bearing pin until seated.
- Working from above, insert 2nd stage spur gear (5).
- Install bearing pin (8).
- Using adapter, **BMW No. 00 8 584**, and pull rod, **BMW No. 00 8 581**, drive in bearing pin until seated.

Note:

Apply **Loctite 243** to threads of screw (11) for plate (12).

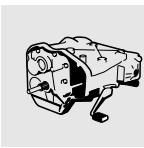
- Place plate (12) in position at side of 2nd stage spur gear, press down and install screw (11) to secure.

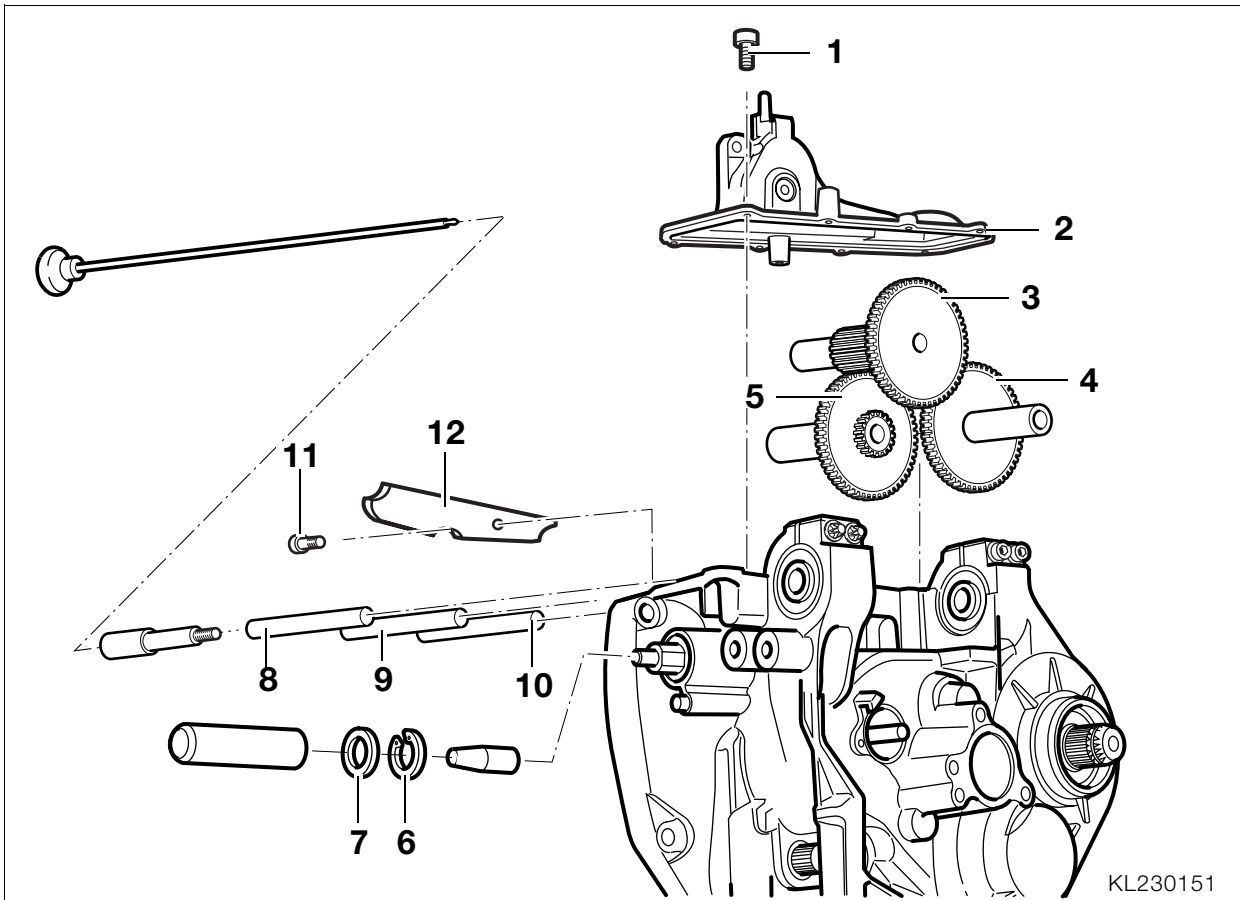
Caution:

When installed, the gear train must rotate easily and evince perceptible endplay and radial play.

Tightening torque:

Plate, reverser to gearbox (clean thread + Loctite 243)..... 10 Nm





KL230151

Performing a functional check

- Mount shift lever on selector shaft and engage neutral.
- Mount actuating control on actuating shaft of reverser.
- It must be possible to engage the reverser with the gearbox in neutral. If necessary, turn the output shaft to move the gears slightly. If it does not engage, remove reverser and reinstall.
- Remove actuating control for reverser.



Note:

Gear (14) and spring element (13) in cover (2) of reverser must move freely. Check teeth of gear for damage. Replace entire cover (2) if teeth are damaged.

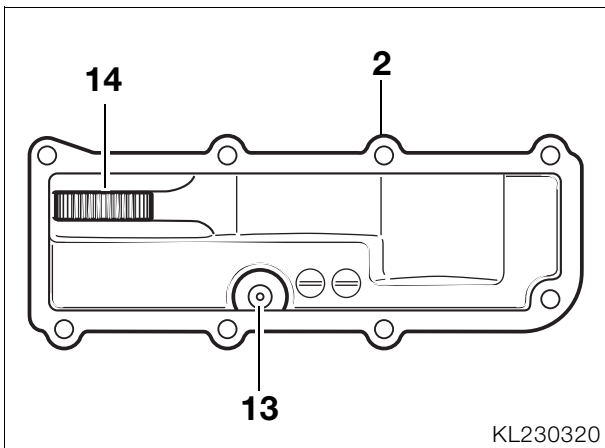


Caution:

When installing cover (2), make particularly sure that:

- reverser is **not** engaged
- 6 BMW cheesehead screws are installed (clearance from generator).

Installing cover of reverser



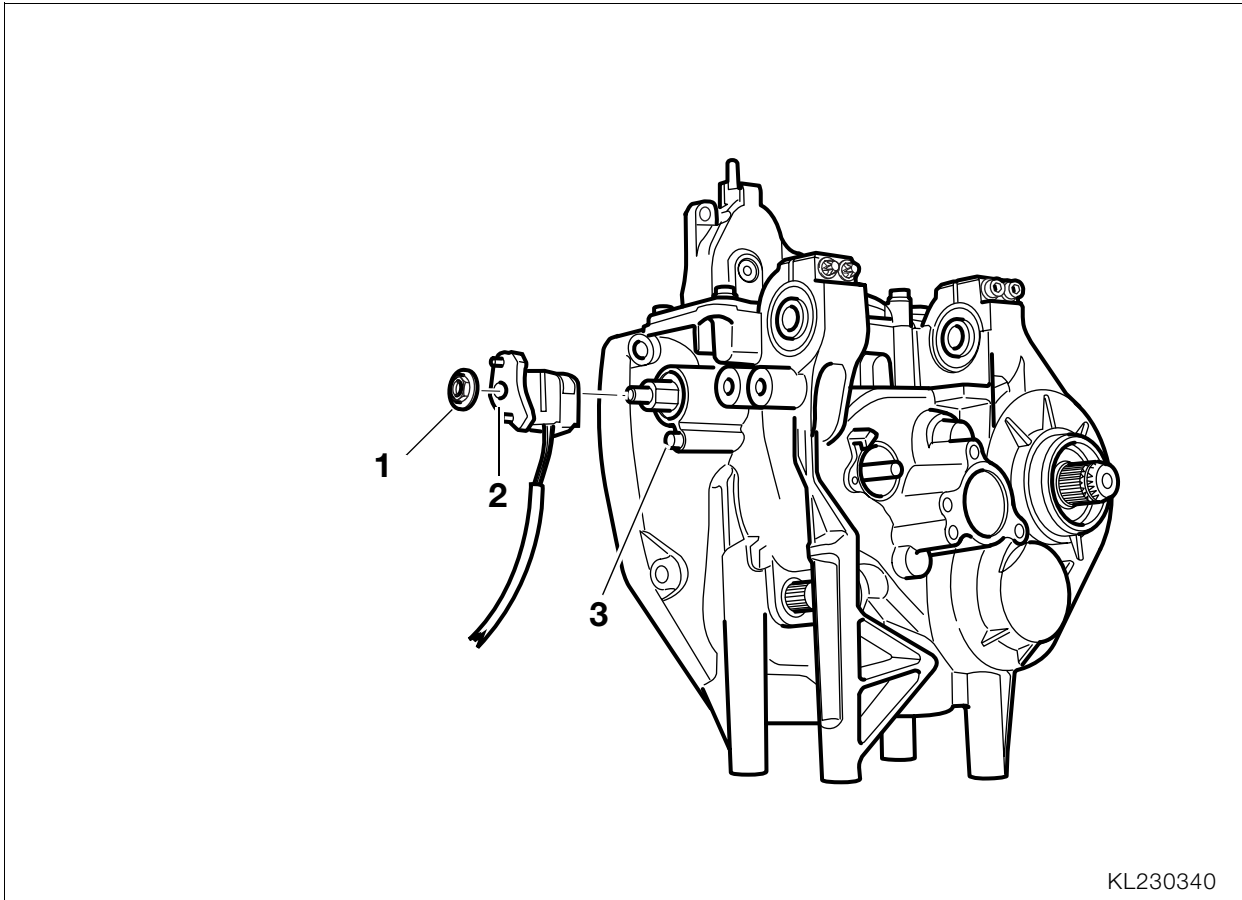
KL230320

- Reinstall securing screws for reverser cover in their original positions (as marked).
- Coat mating face of cover (2) of reverser with **Loctite 574** and install 8 securing screws (1).
- Uniformly tighten securing screws in diagonally opposite sequence.

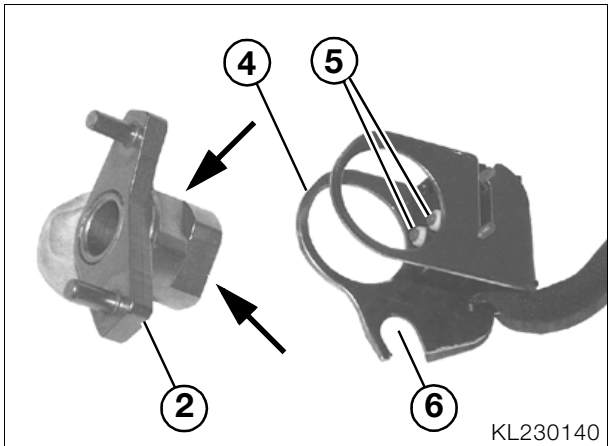


Tightening torque:

Cover of reverser to gearbox..... 10 Nm



KL230340



KL230140

! Caution:

When installing the reverse gear switch, make sure that the rear retaining plate does not slip between gearbox housing and actuating lever. Actuating lever (2) must be seated against shaft collar.

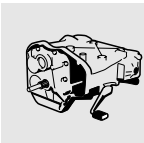
- Install new stop nut (1) and tighten.

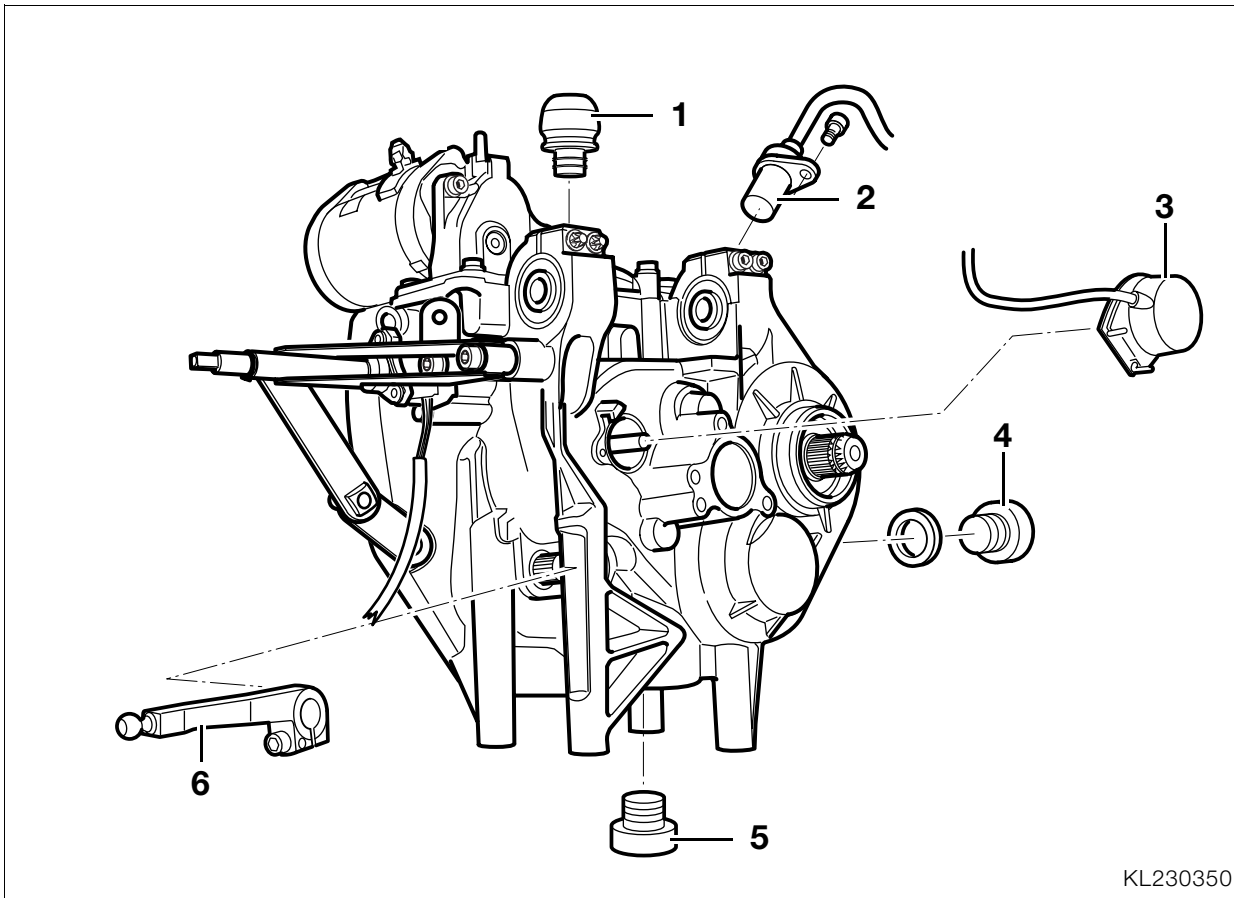
! Tightening torque:

Reverse gear switch on actuating shaft..... 9 Nm

Install actuator unit for reverser

- Install actuating lever (2) in holder (4) with the flats (arrows) toward contacts (5). Turn actuating lever until reverse gear switch moves smoothly in its guides.
- Recess (6) must be toward the gearbox housing.
- Mount fully assembled reverse gear switch on actuating shaft, making sure that recess (6) of retaining plate engages locking pin (3).





KL230350

Completing assembly of gearbox



Caution:

Make sure that breather (1) is correctly seated in groove in bore.

- Press breather (1) home in bore.



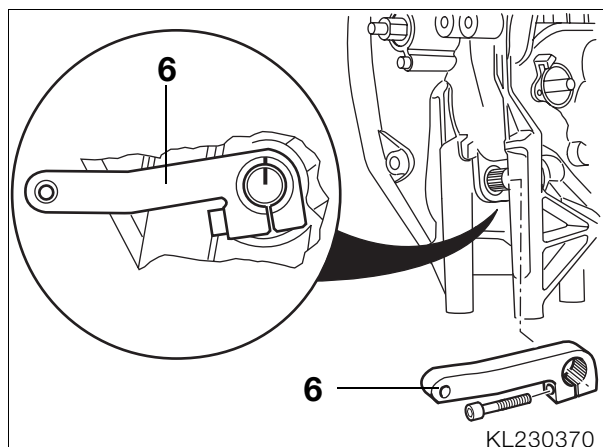
Caution:

Clean metal particles off the magnet in drain plug (5).

- Install oil drain plug (5).
- Insert oil inspection plug (4) with a new sealing ring.
- Check O-ring of speed sensor (2) for damage, replace if necessary.
- Install speed sensor (2).
- Install gear indicator switch (3).

Tightening torques:

Oil drain plug in gearbox housing	55 Nm
Oil filler plug in gearbox housing	30 Nm
Speed sensor for reverser to gearbox	6 Nm



KL230370

- Install selector lever (6).

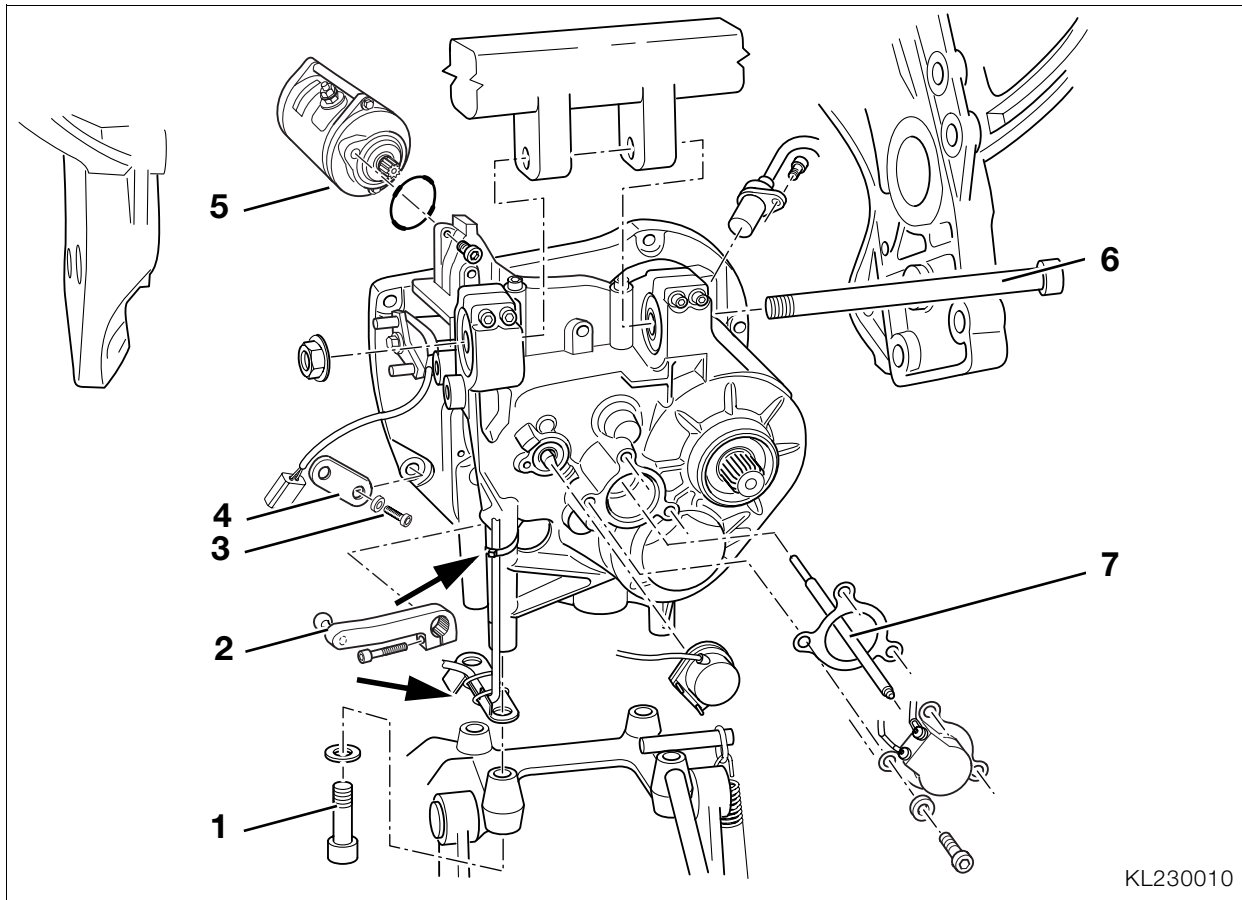


Note:

Make sure that marks on selector lever and selector shaft are aligned.
Perform another functional check before installing the gearbox.

Tightening torque:

Pinch bolt of selector lever	9 Nm
------------------------------------	------



KL230010

Installing gearbox



Note:

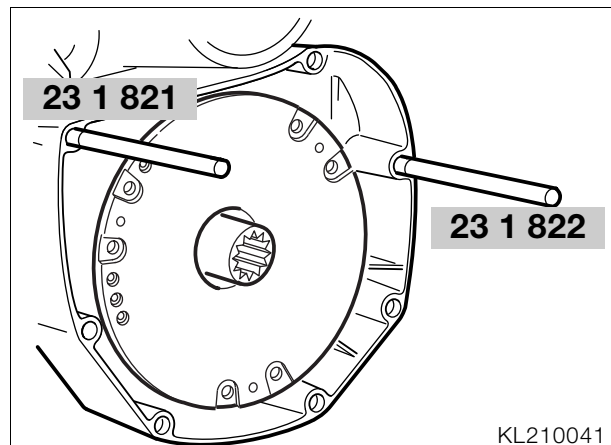
Always install new engine-side and gearbox-side sealing rings for starter motor. Use one hand to press the starter motor profiled sealing ring on the gearbox side into its groove.

- Install sealing rings.
- Introduce starter motor (5) into bore in crankcase.



Note:

If not removed, the main (centre) stand must be retracted to permit installation of the gearbox.



KL210041

- Secure guide pins, **BMW No. 23 1 820**, to intermediate flange.
- Apply a coat of **Optimoly MP 3** to the splines of the gearbox input shaft.
- Slide gearbox over guide pins, **BMW No. 23 1 820**, and into position on sleeves of intermediate flange.

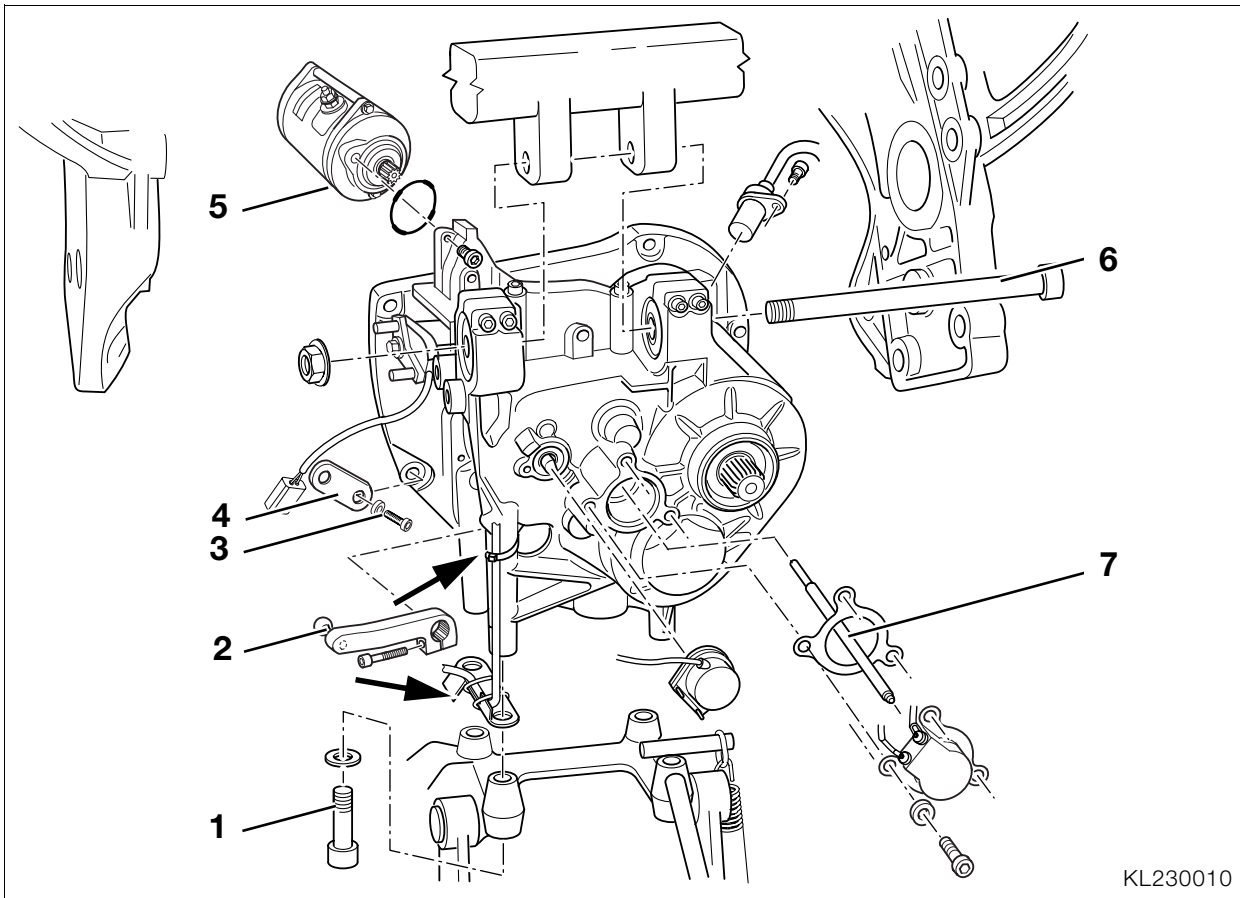


Caution:

Make sure that pinion of starter motor is correctly meshed with reverser.

- Remove guides, **BMW No. 23 1 820**.





KL230010



Note:

Apply **Loctite 243** to threads of screw (3).

- Position link (4) for reverser against gearbox housing.
- Install screw (3) with threads coated with **Loctite 243**.
- Tighten all seven screws securing gearbox to intermediate flange.



Caution:

To prevent the clutch slave cylinder from tilting, tighten three securing screws alternately and uniformly.

- Install clutch release rod.
- Clean mating surfaces on the gearbox housing and clutch slave cylinder, use new paper gasket.
- Install the clutch slave cylinder.
- Lower frame until cables can be connected to starter motor and generator and reconnect cables.
- Connect power cable for starter motor to terminal on rear frame, use cable ties to secure cables.
- Fully lower the frame.

- Insert gearbox mounting bolt (6) and tighten.
- Insert clutch release rod (7) into gearbox, noting correct installed position.
- Connect selector lever (2) to gearshift linkage.
- If necessary, install screws (1) securing bearing mount to main stand.
- Secure cable for side stand switch to gearbox with cable tie (arrow).



Caution:

The alignment of the left-hand rubber mounts relative to the frame is preset at the factory; do not slacken the securing screws. The rubber mounts do not have to be re-aligned unless the left-hand rubber mount has been replaced.



Note:

When lowering the frame, make sure that clearance is adequate on the right between frame and gearbox: do not scratch the surfaces.

- Secure the left/right engine mountings to the cross-member.

- Fully lower the frame.
- Remove workshop crane, **BMW No. 46 5 640**.
- Install skirt brackets.
- Connect plugs for oxygen sensor, side-stand switch, and coolant-temperature sensor.
- Install actuating unit for reverser, complete with switch unit.
- Install radiators with fans left and right in holders.
- Reconnect plugs and cables for engine and gearbox.
- Install transverse tube.
- Install front drive shaft.
- Install swinging arm.
- Install rear wheel drive.
- Install brake caliper.
- Install inductive sensor for rear wheel drive.
- Install rear wheel.
- Install exhaust system.
- Install left and right battery covers.
- Install left and right rear footrest plates.
- Fill gearbox with oil to correct level.
- Install left and right front footrest plates.
- Install throttle-valve rail with air filter box.
- Install fuel injection rail.
- Install the intake air pipe.
- Install the fuel tank.
- Install tank cover with the control unit for the radio.
- Remove lifting gear, **BMW No. 00 1 510**.

- Install engine spoiler.
- Install actuating control for reverser.
- Install left and right fairing side sections.



Caution:

Connect the positive battery terminal first, then the negative terminal.

- Install the battery.

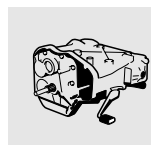
Quantities:

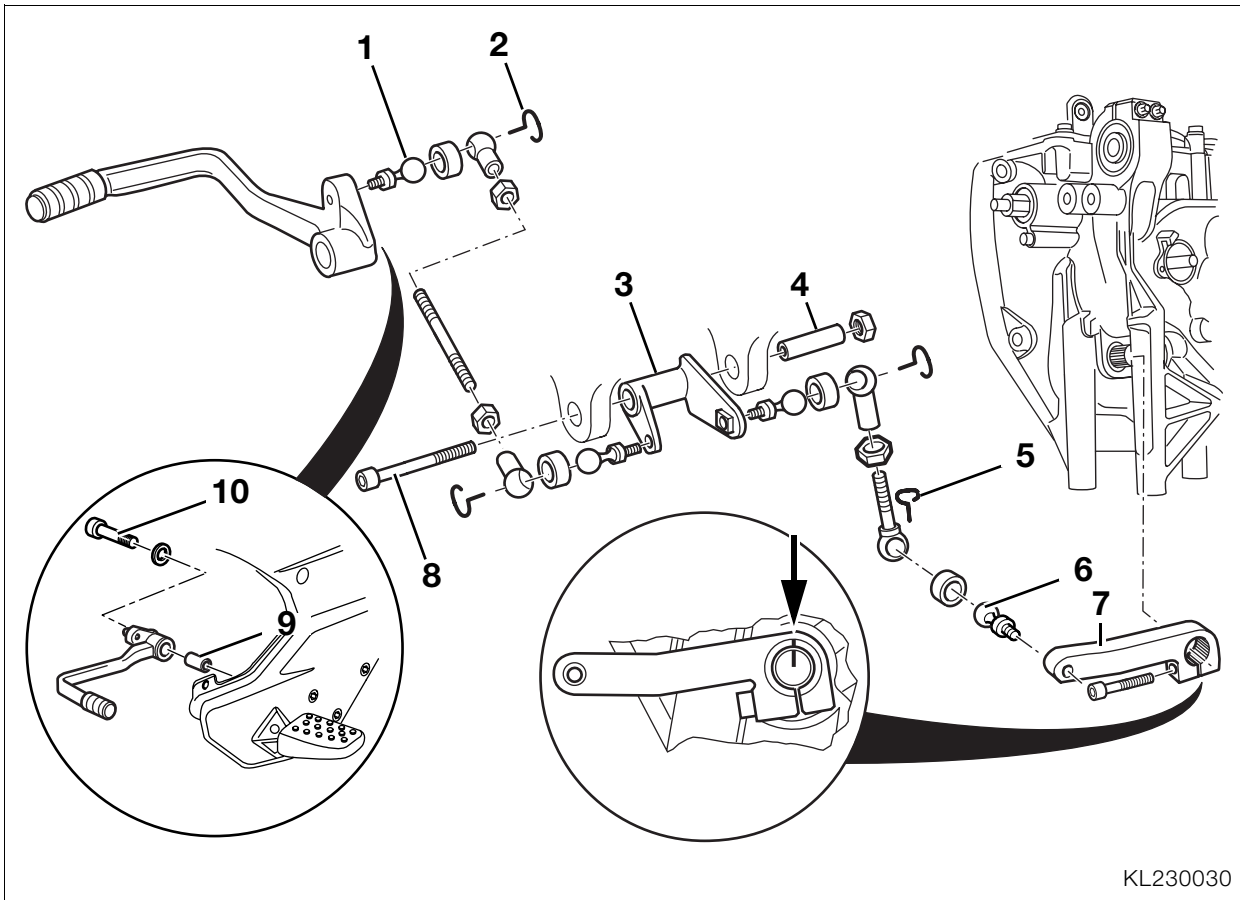
Initial filling approx. 0.6...0.75 l
(1.06...1.32 Imp. pint/0.63...0.79 US quarts)
Oil changes top up oil to bottom of filler neck



Tightening torques:

Oil drain plug.....	55 Nm
Oil filler/level check plug.....	23 Nm
Selector lever to selector shaft.....	9 Nm
Reverser shift lever to gearbox.....	9 Nm
Gearbox to intermediate flange M8	24 Nm
Link, reverser actuator to intermediate flange M8 (clean thread and Loctite 243).....	24 Nm
Starter motor to gearbox	6 Nm
Gearbox to frame	70 Nm
Pinch bolts, rubber mounts	9 Nm
Speed sensor for reverser	6 Nm
Slave cylinder to intermediate flange	9 Nm
Cross-members to engine.....	41 Nm
Pivot mount to gearbox	41 Nm
Actuating control, reverser (clean thread and Loctite 243).....	6 Nm
Footrest plate to frame	21 Nm
Cover plate, reverser, to gearbox (clean thread and Loctite 243).....	10 Nm
Cover of reverser to gearbox.....	10 Nm





KL230030

Removing and installing gearshift lever and linkage

- Slacken screws securing front footrest plate.
- Remove retainer pin (2).
- Disengage gearshift linkage at ball joint (1).
- Remove front footrest plate.
- Remove bearing screw (8).
- Remove retaining pin (5).
- Disengage gearshift linkage at ball joint (6).
- Remove relay lever (3).
- Remove selector lever (7).
- Installation is the reverse of the removal procedure: pay particular attention to the following.

Removing and installing gearshift lever

- Remove screw (10).
- Remove gearshift lever with bearing bushing (9).
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Lubricate bearing bushing (9) with **Staburags NBU 30 PTM** or equivalent.
- Clean threads of screw (10), coat with Loctite 243 and install.

⚠ Tightening torques:
 Gearshift lever to footrest plate
 (clean thread and Loctite 243)..... 41 Nm



Note:

Note mark (arrow) on gearshift lever.

- Lubricate bearing bushing (4) with **Staburags NBU 30 PTM** or equivalent.



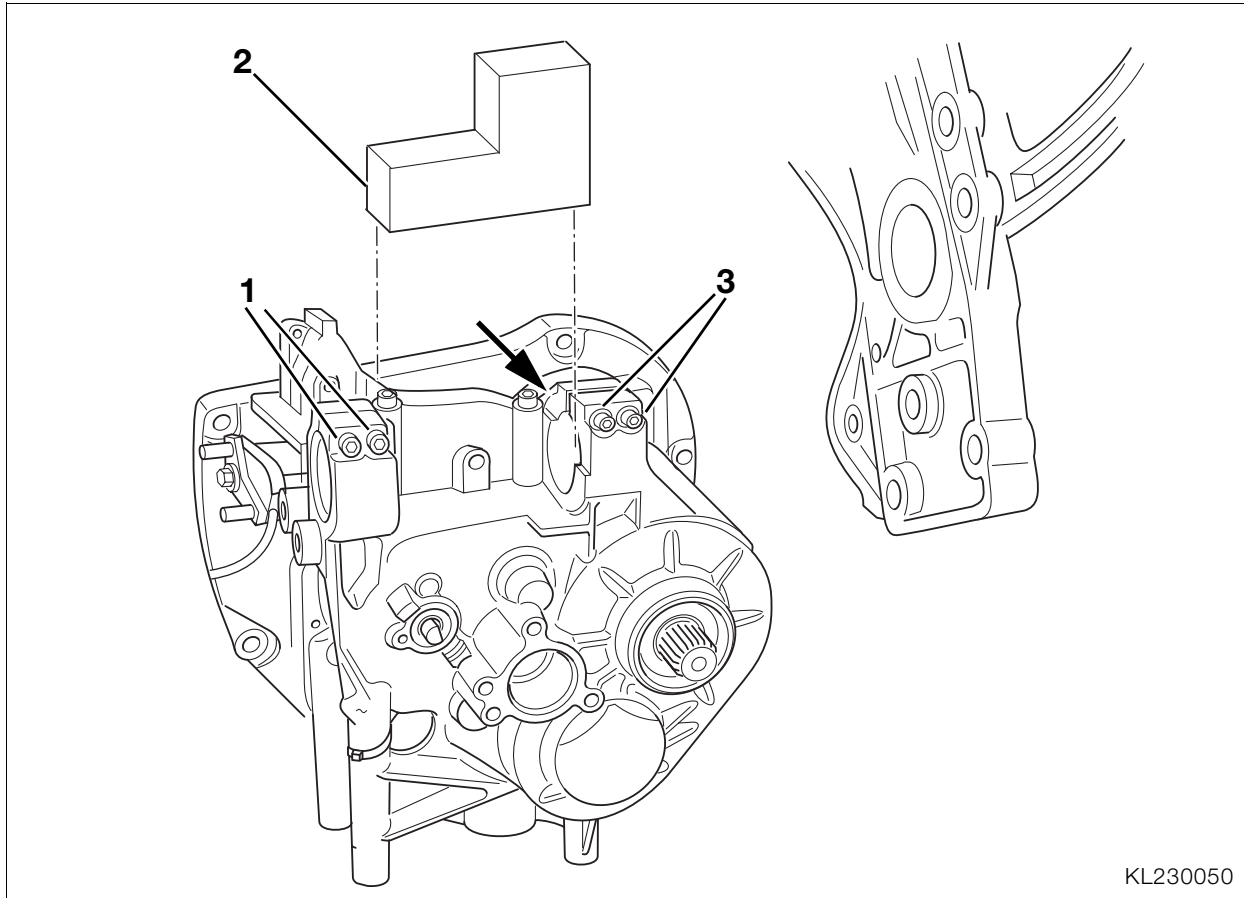
Note:

Ball joint (1) on gearshift lever is secured with locking compound. After removal of ball joint (1) clean threads and install with small washer and **Loctite 2701**.



⚠ Tightening torques:

Relay lever to cross tube..... 9 Nm
 Pinch bolt of gearshift lever (7) 9 Nm
 Ball head (1) to gearshift lever
 (clean thread + Loctite 2701)..... 8 Nm



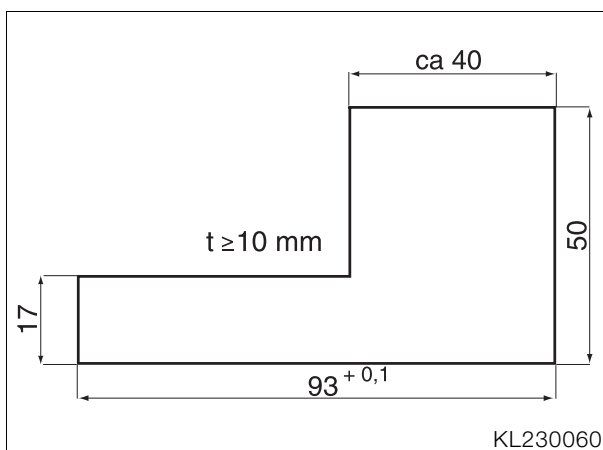
KL230050

Aligning rubber mounts

Aligning left-hand rubber mount

⚠ Caution:

The alignment of the left-hand rubber mounts relative to the frame is preset at the factory. Do not slacken the paint-marked Torx screws (1) unless the rubber mount has to be replaced.



KL230060

- Prepare a template as shown in the illustration above.
- Insert template (2) between left/right bearing mounts and press against machined face (arrow) on right.
- Slide left bearing bushing into its mount.

- Lightly press bearing bushing against template and uniformly tighten screws (1).

Aligning right-hand rubber mount

⚠ Caution:

It is not necessary to re-align the right-hand rubber mount unless the gearbox, the frame or the left-hand rubber mount has been replaced.

- Install the right-hand bearing bushing, but do not tighten the securing screws.
- Position gearbox against intermediate flange and tighten securing screws.
- Lower the frame.
- Tighten the left/right engine mountings on the cross-member.
- Install and tighten bolt securing gearbox to frame.

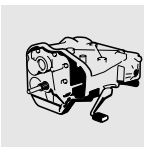
⚠ Caution:

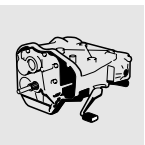
To avoid damaging the spacing plate in the clamp slot, uniformly tighten the left and right pinch bolts.

- Uniformly tighten the pinch bolts (3) securing the right-hand rubber mount.

🔧 Tightening torques:

Pinch bolts for rubber mounts 9 Nm



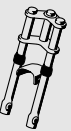


31 Front fork

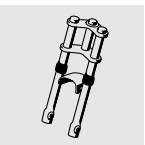
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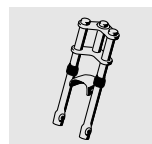
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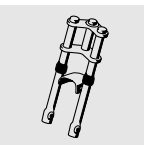


Installing left angular-contact ball bearing for leading link21
Installing leading link22
Measuring the leading link23



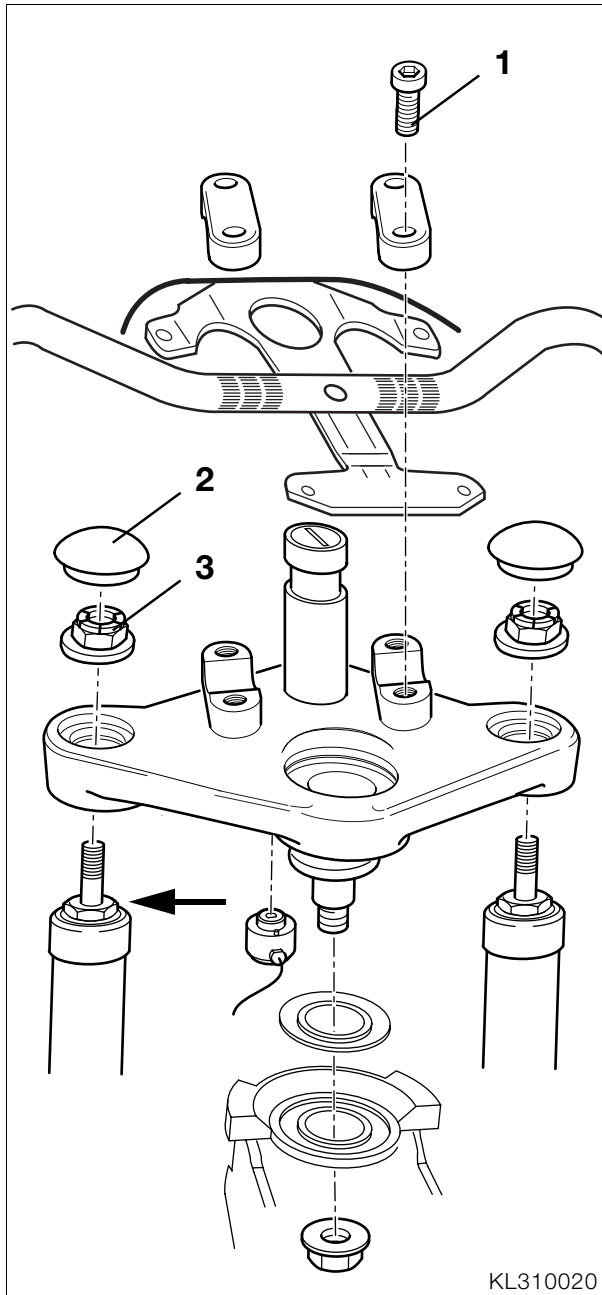
Technical Data		K 1200 LT	
Front suspension			
Type	Telelever with anti-dive, leading link pivoted centrally on main frame.		
Fixed telescopic fork tube			
Fixed fork tube surface	Hard chrome plated		
Fixed tube external dia.	mm (in)	35 (1.38)	
Maximum permissible fixed fork tube runout	mm (in)	0.4 (0.016)	
Telescopic fork oil			
Telescopic fork oil – approved grades	BMW telescopic fork oil, SHOWA ATF		
Capacity per fork leg, SHOWA	l (Imp. pints/ US quarts)	0.47 (0.827/0.496)	
Running gear			
Castor in normal-load position	mm (in)	108.7 (4.28)	
Steering head angle at unladen weight	°	63.96	
Total suspension travel	at wheel	mm (in)	102 (4.02)
	at suspension strut	mm (in)	55 (2.17)
Suspension strut			
Type	Coil-spring suspension strut with single-tube, gas-filled shock absorber, non-adjustable		





Removing and installing telescopic forks and fork bridge

- Remove left and right fairing side sections, tank cover and engine spoiler.
- Remove cover of fork bridge.
- ➡ See Group 46
- Attach hoist, **BMW No. 00 1 510**, to oil sump.



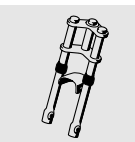
Removing telescopic fork

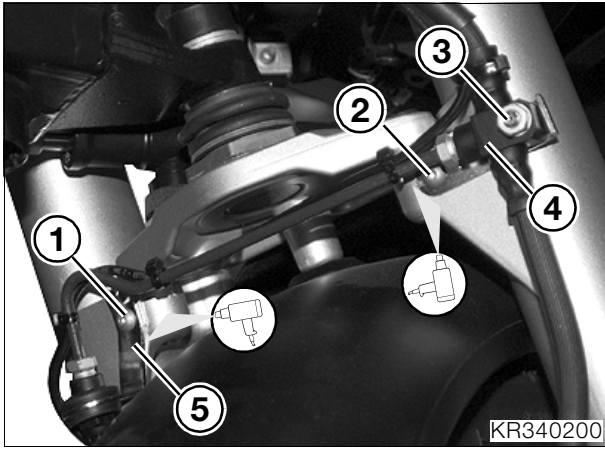


Caution:

Do not operate the handbrake lever when the brake calipers have been removed.
Protect painted parts from scratching: apply adhesive masking tape if necessary.

- Remove front and rear sections of the front mud-guard.
- ➡ See Group 46
- Remove front wheel.
- ➡ See Group 36
- Detach the ABS sensor and cable from the telescopic fork.
- Remove 4 screws (1) of handlebar clamps.
- Remove handlebars.
- Remove protective caps (2).
- Use spanner to hold fixed tube at w/f 22 flats (arrow) and remove 2 nuts (3) securing fixed tubes in fork bridge.

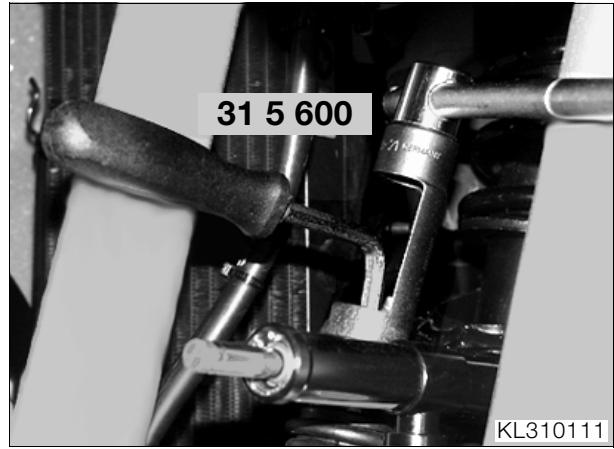




⚠ Caution:

Screws (1, 2) for retaining plates (5, 4) are secured with thread-locking compound. Carefully heat screws (1, 2); do not damage socket head when removing.

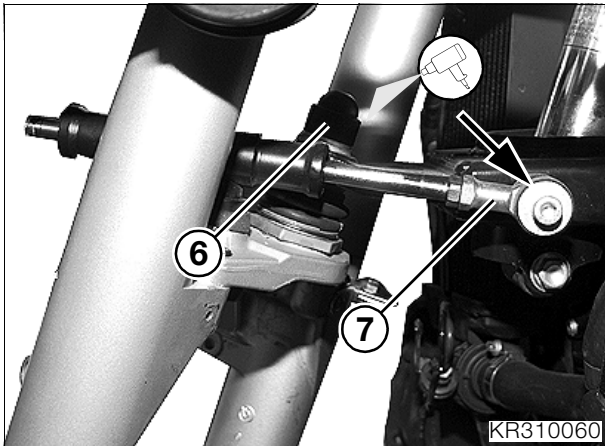
- Remove screw (1) from holder (5) securing left brake line to telescopic fork.
- Remove screw (3) securing brake distributor for right brake line at holder (4).
- If necessary, remove screw (2) securing holder (4) for brake distributor to telescopic fork.



⚠ Caution:

Screw is secured with thread-locking compound; heat to max. 120 °C (248 °F) if necessary.

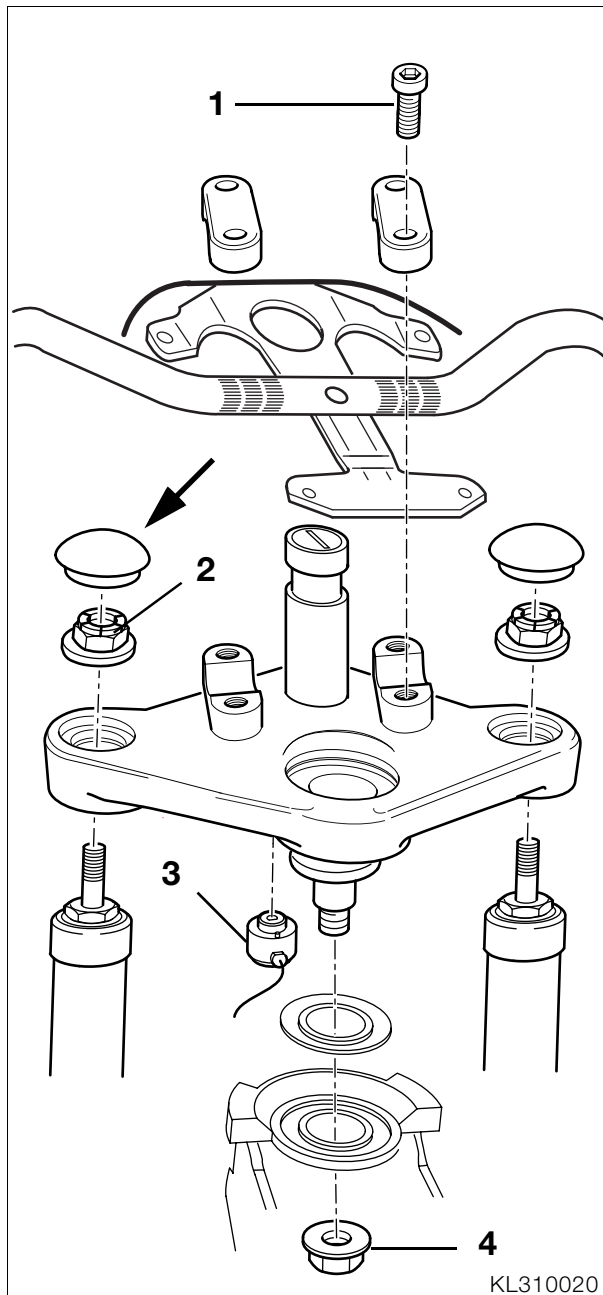
- Remove screw securing leading link to the fork slider tube bridge, using socket wrench insert and adapter for socket-head screw, **BMW No. 31 5 600**.
- Pull the telescopic fork down to remove.



- Unscrew the fastener (arrow) for steering damper (7) at the leading link.
- Take off protective cap (6).



Removing fork bridge



Caution:

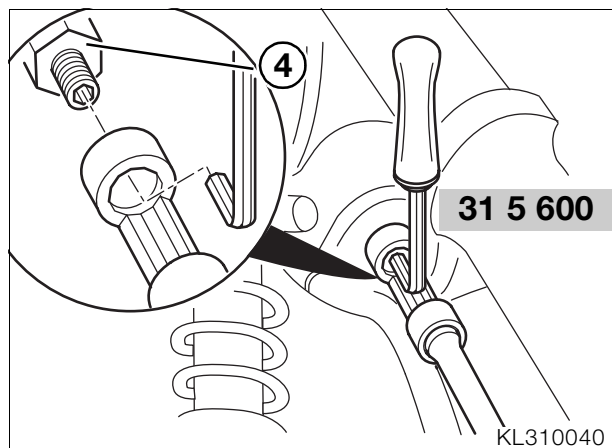
Do not operate the handbrake lever when the brake calipers have been removed.
Protect painted parts from scratching: apply adhesive masking tape if necessary.

- Remove screw (1) securing handlebar to fork bridge.
- Remove protective caps (arrow).
- Use spanner to hold fixed tube at w/f 22 flats and remove 2 nuts (2) securing fixed tubes in fork bridge.



Caution:

Nut is secured with thread-locking compound; heat if necessary, taking care not to overheat lines and cables.



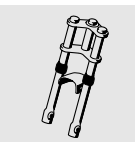
- Remove fastener (4) securing fork bridge to frame with socket and adapter for socket-head screw, **BMW No. 31 5 600**.



Note:

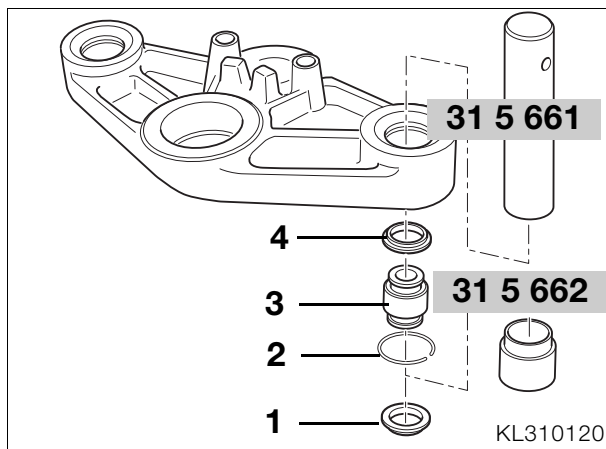
Stud is a press-fit in angular-contact ball bearing, so remove as a complete unit.
Inside trim is easily scratched, so cover with masking tape or remove, if necessary.

- Remove fork bridge.
- Remove plug for ignition switch/steering lock (3).

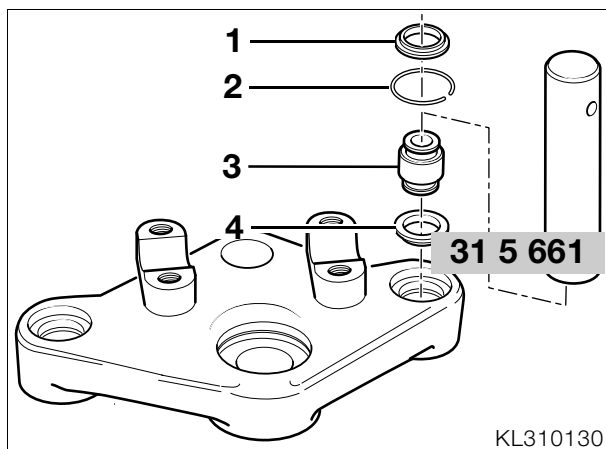


Disassembling fork bridge

Removing and installing pot-type joints



- Remove wiper (1).
- Remove snap ring (2).
- Press out pot-type joint (3) with wiper (4) using mandrel, **BMW No. 31 5 661**, and bushing, **BMW No. 31 5 662**.



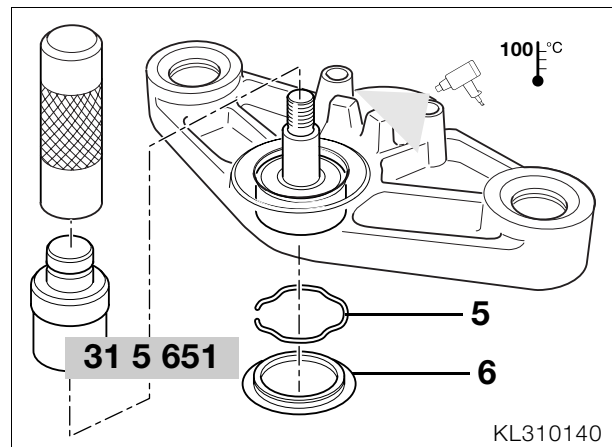
Note:

Always replace lower wiper (4); replace upper wiper (1) if necessary.

- Install wiper (4).
- Press in pot-type joint (3) with mandrel, **BMW No. 31 5 661**.
- Install snap ring (2).
- Install wiper (1).



Removing angular-contact ball bearing with stud



- Remove protective cap (6).

Note:

Always install a new angular-contact ball bearing.

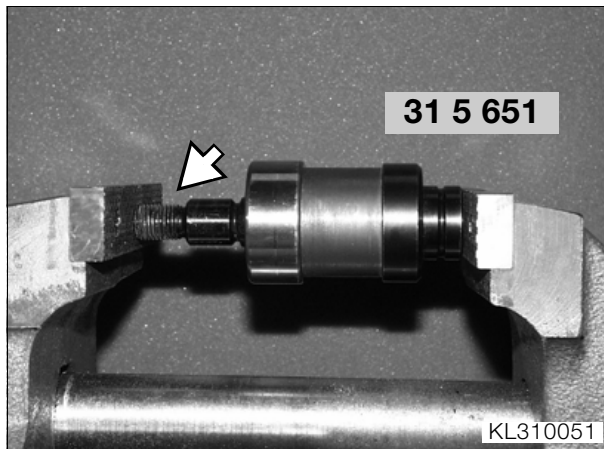
- Remove retaining ring (5).
- Heat fork bridge to 100 °C (212 °F).

Warning:

To avoid burns, always wear protective leather gloves when handling heated components.

- Use mandrel, **BMW No. 31 5 651**, to remove angular-contact ball bearing; tap mandrel lightly with plastic-headed hammer if necessary.

Removing stud



Note:

Do not damage thread (arrow).

- Press out stud with mandrel, **BMW No. 31 5 651**.

Installing stud



Note:

Always install a new bearing.



- Using mandrel, **BMW No. 31 5 651**, as a rest, press stud (1) into angular-contact ball bearing (2).

Installing angular-contact ball bearing with stud



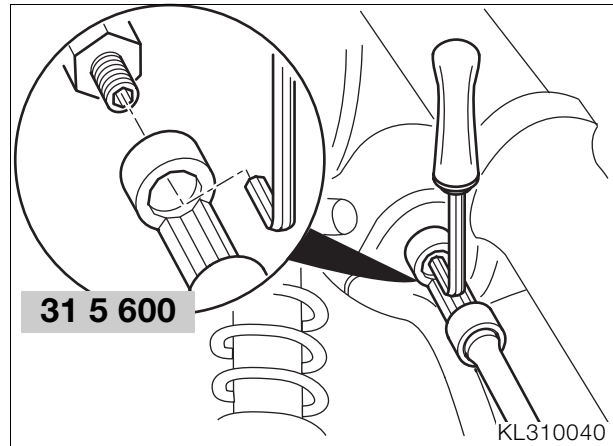
Note:

Use temperature measuring device, **BMW No. 00 1 900**, to check heat rise.

- Heat fork bridge to 100 °C (212 °F).
- Install angular-contact ball bearing in fork bridge.
- Install retaining ring.
- Install dust cap.

Installing fork bridge

- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:

When installing, always use new micro-encapsulated nut.

- Tighten fastener securing fork bridge to frame with socket and adapter for socket-head screw, **BMW No. 31 5 600**.



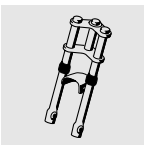
Tightening torques:

Fork bridge to frame

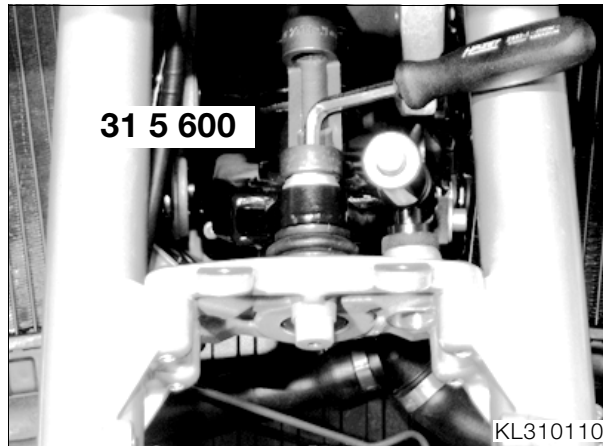
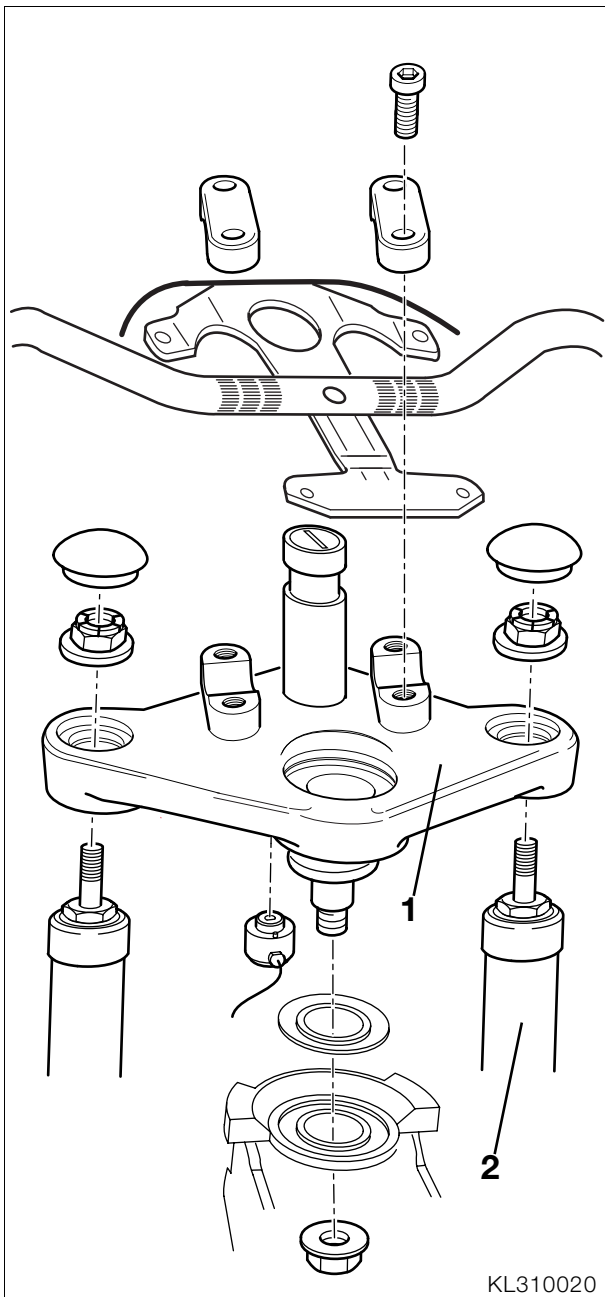
(clean thread, use new nut

or Loctite 2701)..... 130 Nm

Fixed tube to fork bridge 45 Nm



Installing telescopic fork



⚠ Caution:

When installing, always use new micro-encapsulated nut.

- Tighten fastener securing leading link to the fork slider tube bridge, using socket wrench insert and adapter for socket-head screw, **BMW No. 31 5 600.**

⚠ Caution:

Preinstall telescopic forks, make sure they are under no strain and tighten fasteners to specified torques.

- Insert left and right fixed fork tubes (2) into fork bridge (1).
- Compress the telescopic fork.

📄 Note:

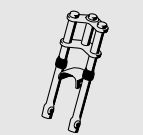
If the telescopic fork was disassembled, fill each leg with specified quantity of oil.

Capacity of each fixed fork tube..... 0.47 +/-0.01 l
(0.827 +/-0.018 Imp. pint; 0.496 +/-0.011 US quarts)

Telescopic fork oil gradeBMW telescopic fork oil

🔧 Tightening torque:

Oil drain plug..... 12 Nm



- From this point on, installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:

When installing holder for brake line, use new screws or clean threads and coat with Loctite 243.

- Tighten screws securing holders for brake lines.
- Check that the system moves freely by compressing/extending the suspension in the straight-ahead position and with the steering turned to the full lock positions.



Caution:

The quick-release axle must line up correctly with the locating bores and install easily, requiring no more than a slight turn back and forth.

- Check/adjust ABS sensor gap.
 → see Group 46

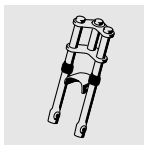
ABS sensor

gap, front..... 0.45...0.55 mm (0.018...0.022 in)



Tightening torques:

Leading link to fork bridge
 (use new nut or clean thread + Loctite 2701)..... 130 Nm
 Steering damper to leading link
 (clean thread, Loctite 243 or use new screw) 21 Nm
 Steering damper to fork bridge
 (clean thread, Loctite 243 or use new screw) 21 Nm
 Retaining plate for brake line to sliding tube
 (clean thread + Loctite 243)..... 4 Nm
 Fixed tube to fork bridge 45 Nm
 Brake distributor to holder/sliding tube, right.. 9 Nm
 Handlebar to fork bridge 21 Nm



Assembly specification for telescopic fork

Caution:

To ensure that the fork is installed without trapped stresses, observe the following instructions and the specified working sequence precisely.

- The front suspension strut is removed.

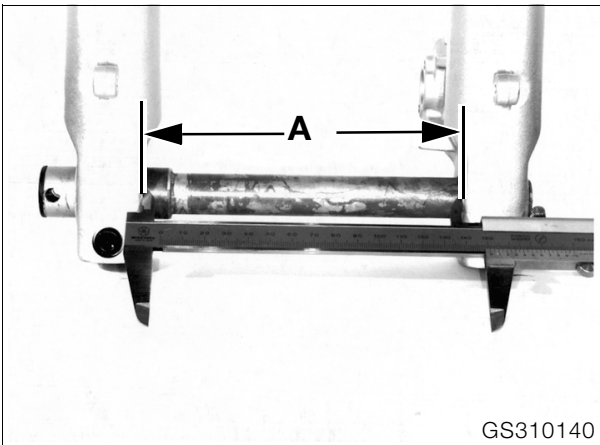
Caution:

Protect painted parts from scratching: apply adhesive masking tape if necessary.

- Secure fork bridge to frame.

Tightening torque:

Threaded stud to frame
(clean thread + Loctite 243)..... 130 Nm



- Pre-assemble fork legs with quick-release axle/adjust distance A.

Distance A:..... 165 ± 0.5 mm (6.50 ± 0.02 in)

Tightening torque:

Quick-release axle clamps 21 Nm

- Secure slider tube bridge/do not tighten to specified torque at this point.
- Secure slider tube bridge to leading link.

Tightening torque:

Leading link to ball joint
(clean thread + Loctite 2701)..... 130 Nm

- Using a strap or similar, pull fork towards frame until the fully retracted fixed tubes only need to be pulled out slightly to secure them to the fork bridge.
- Secure fixed tubes to the fork bridge.

Tightening torque:

Screw connection between fixed tube and fork bridge (free from oil and grease) 45 Nm

- Tighten down slider tube bridge.

Tightening torque:

Bridge to slider tube
(clean thread + Loctite 243)..... 21 Nm

- Check that the system moves freely by compressing and extending the suspension (but without the suspension strut) in the straight-ahead and left/right steering lock positions.
- Remove quick-release axle.

Caution:

The quick-release axle must line up correctly with the locating bores and install easily, requiring no more than a slight turn back and forth.

- Install suspension strut.

Tightening torque:

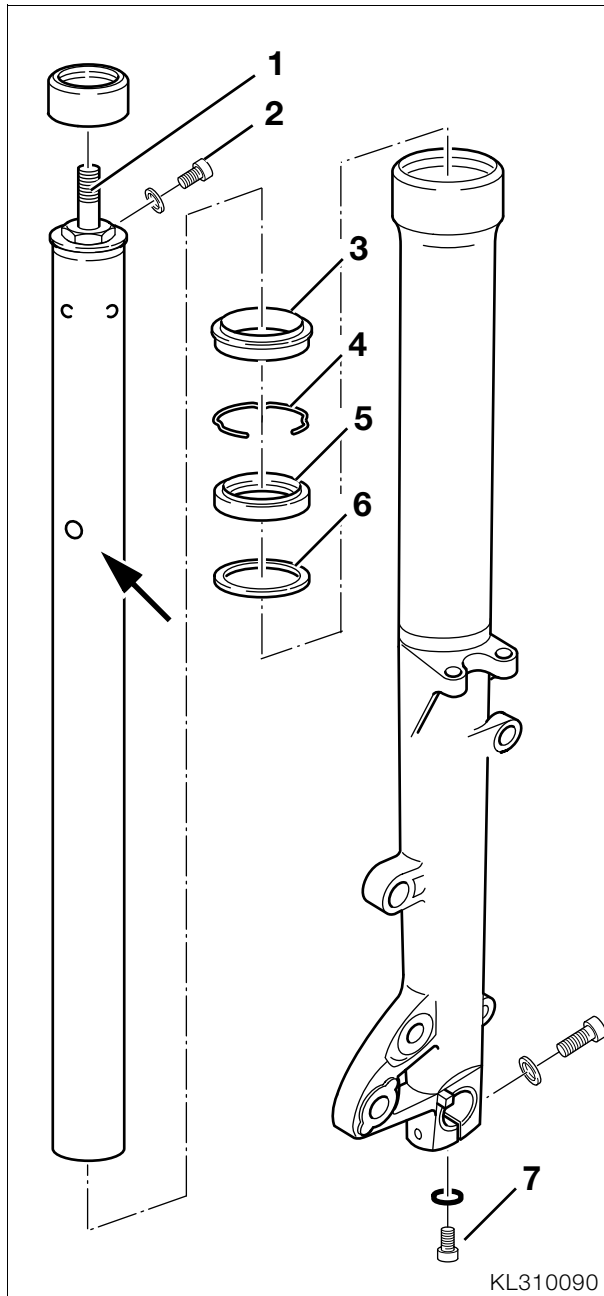
Suspension strut to frame 43 Nm
Suspension strut to leading link 43 Nm



Disassembling/assembling telescopic fork leg

- Remove telescopic fork.

Disassembling telescopic fork leg



Caution:

Screw plug (1) is press-fitted into top of fixed tube: do not attempt to slacken the plug.

Note:

Do not pull out fixed tube so far as to bring oil bore (arrow) past shaft sealing ring while leg is still filled with oil.

Oil collects under wiper (3).

- Remove bleed screw (2).
- Remove oil drain plug (7) and drain oil into suitable container.
- Pull out fixed tube.
- Lever out the wiper (3).
- Remove retaining ring (4).
- Lever out shaft seal (5).
- Remove washer (6).

Assembling telescopic fork leg

- Remove oil under wiper (3).

Note:

Traces of oil might indicate a leak.

- Install oil drain plug (7) with O-ring.
- Fill with oil.

Oil capacity of each fixed fork

tube0.47 l (0.827 Imp. pint/0.496 US quarts)

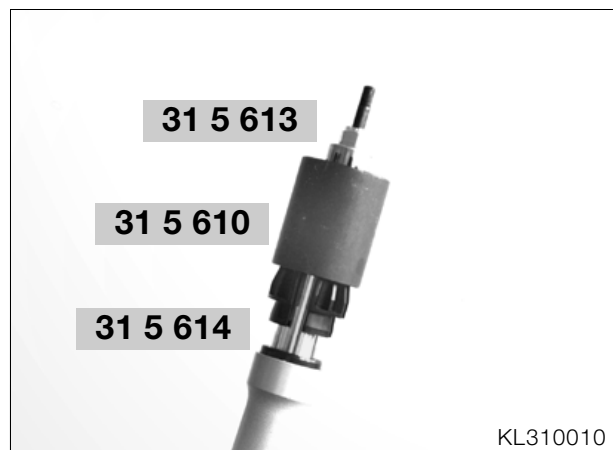
Telescopic

fork oil gradeBMW telescopic fork oil

Note:

No routine maintenance is needed, and therefore the fork oil does not have to be changed during inspections.

- Install fixed tube.
- Install washer (6).



- Lightly oil shaft sealing ring (5), slip it onto sliding tube until seated and then, by applying the dead weight of the tool, press in with drift, **BMW No. 31 5 610**, reduction with lugs, **BMW No. 31 5 613**, and sleeve, **BMW No. 31 5 614**.

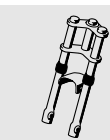
- Install retaining ring (4) and dust wiper (3).
- Bleed telescopic fork in no-load position.
- Install bleed screw (2) with O-ring.

Tightening torque:

Oil drain plug..... 12 Nm

Bleed screw, fixed tube..... 3 Nm

Screw plug is press-fitted into top of fixed tube: do not attempt to slacken the plug.



Measuring telescopic fork



Caution:

After an accident, always examine the telescopic fork for cracks and signs of damage.

Examining slider tube bridge and fork bridge

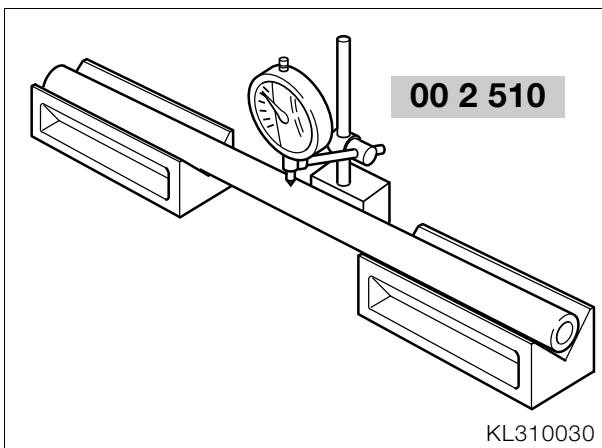
- Check slider tube bridge and fork bridge for surface irregularities.



Caution:

Replace slider tube bridge/fork bridge if deformed.

Checking runout of fixed tube



- Place both ends of fixed tube in V-blocks.
- Turn fixed tube slowly and measure it with a dial gauge, **BMW No. 00 2 510**.



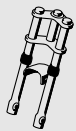
Caution:

Do not straighten distorted fixed tubes: always replace them.

Permissible runout: 0.4 mm (0.016 in)

Checking runout of slider tube

- New fixed tube must slide freely into slider tube without catching.



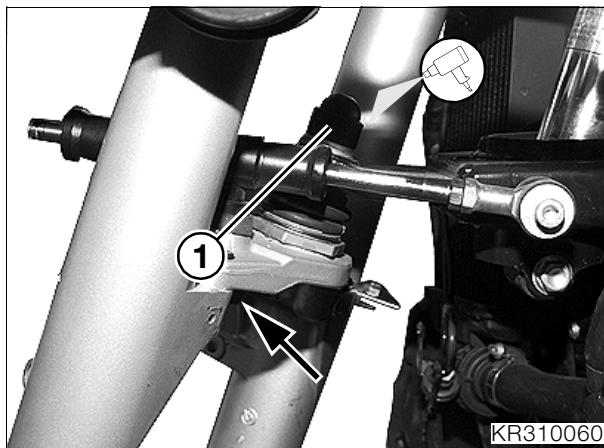
Removing and installing slider tube bridge

- Remove left and right fairing side sections and engine spoiler.
- ➔See Group 46
- Attach hoist, **BMW No. 00 1 510**, to oil sump.

Caution:

Do not operate the handbrake lever when the brake calipers have been removed.
Take care not to scratch wheel rim; cover with masking tape if necessary.

- Remove front and rear sections of the front mudguard.
- ➔See Group 46
- Remove front wheel.
- ➔See Group 36



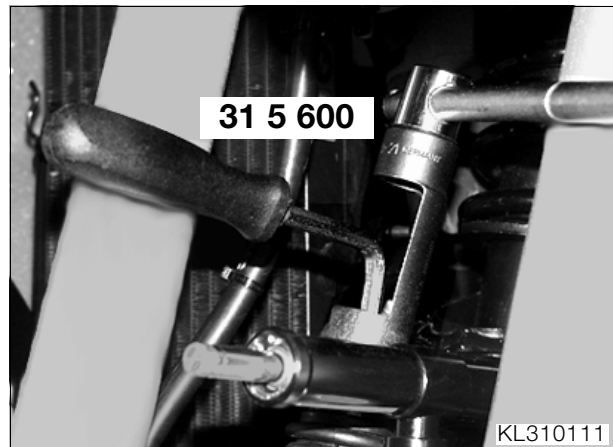
Caution:

Fastener under protective cap (1) is secured with thread-locking compound.

- Remove plug concealing fastener (arrow) of steering damper below slider tube bridge.
- Remove fastener (arrow) securing steering damper to slider tube bridge.
- Remove protective cap (1).

Caution:

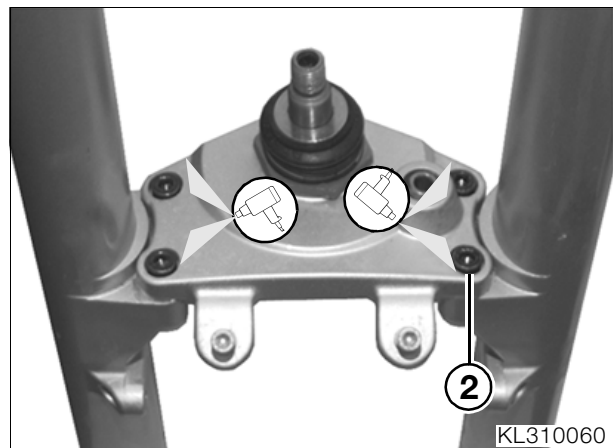
Make sure that brake line and front ABS sensor cable are not stretched when telescopic fork extends. Support the slider tubes.



Caution:

Fastener is secured with thread-locking compound; heat to max. 120 °C (248 °F) if necessary.

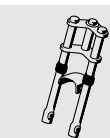
- Remove fastener securing leading link to the fork slider tube bridge, using socket wrench insert and adapter for socket-head screw, **BMW No. 31 5 600**.



Caution:

Screws (2) are secured with thread-locking compound.

- Heat screws (2) securing slider fork slider tube bridge to sliding tubes and remove.
- Remove slider tube bridge



- Installation is the reverse of the removal procedure: pay particular attention to the following.



Note:

Fixed tubes must be installed in fork bridge.

- Preinstall quick-release axle in sliding tubes.
- Install screws securing fork slider tube bridge, but do not fully tighten.



Caution:

When installing, clean threads, use new nut or coat threads with **Loctite 2701**.

- Tighten fastener securing leading link to the fork slider tube bridge, using socket wrench insert and adapter for socket-head screw, **BMW No. 31 5 600**.



Caution:

When installing, clean threads, use new screws or coat threads with Loctite 243.

- Tighten screws securing fork slider tube bridge to sliding tubes.



Caution:

The quick-release axle must line up correctly with the locating bores and install easily, requiring no more than a slight turn back and forth.

- Check/adjust ABS sensor gap.
 →See Group 34

ABS sensor gap, front..... 0.45...0.55 mm (0.018...0.022 in)

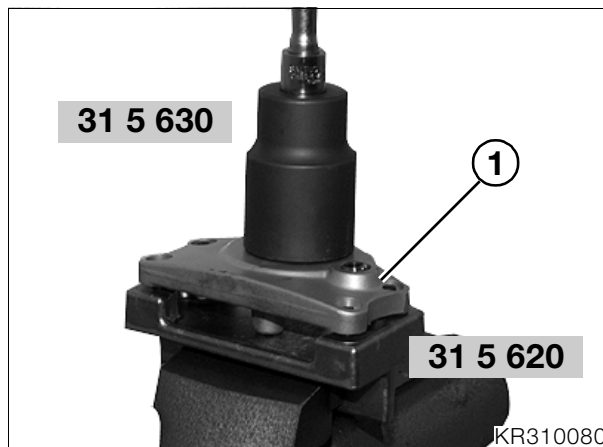


Tightening torques:

Quick-release axle clamp screws	21 Nm
Leading link to fork bridge (clean thread + Loctite 2701 or use new nut)	130 Nm
Steering damper to fork bridge (clean thread, Loctite 243 or use new screw)	21 Nm
Fork slider tube bridge to sliding tubes (clean thread, Loctite 243 or use new screws)	21 Nm
Brake distributor to holder/sliding tube, right..	9 Nm
Quick-release axle, front wheel	
Initial tightening	19 Nm
Final tightening	30 Nm



Removing and installing ball joint



- Secure sliding tube fork bridge (1) in retaining fixture, **BMW No. 31 5 620**.



Warning:

Note that high torque has to be applied to loosen the ball joint fastener.

- Release the ball joint fastener with the 46 mm (1.8 in) socket wrench insert, **BMW No. 31 5 630**.
- Coat the ball joint fastener with **Optimoly TA** and secure it with 46 mm (1.8 in) socket wrench insert, **BMW No. 31 5 630**, to sliding tube fork bridge (1).



Tightening torques:

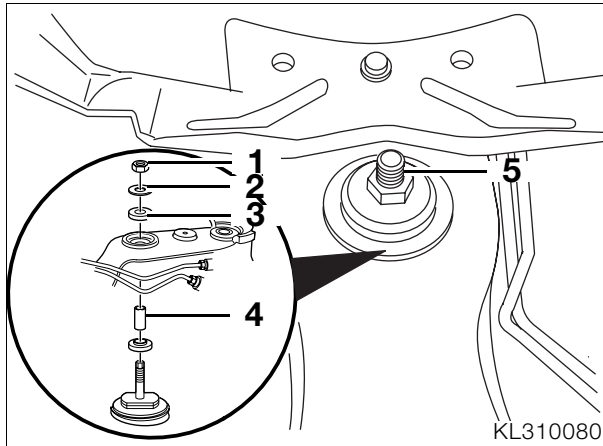
Ball joint to sliding tube fork bridge 230 Nm

Removing and installing front suspension strut

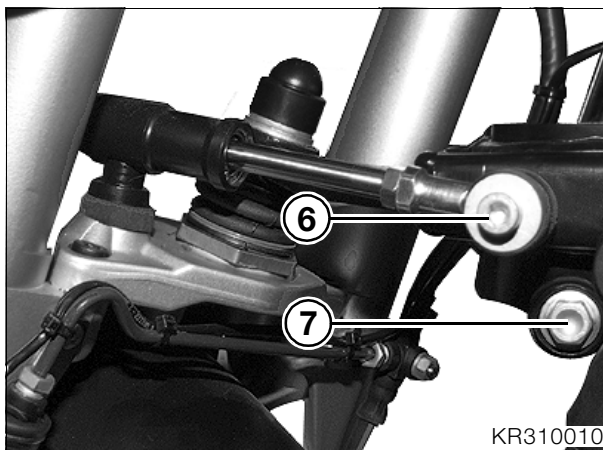
Removing front suspension strut

- Remove engine spoiler.
- Remove fairing side section.
- Remove upper section of fairing.
- Remove cover of fork bridge.

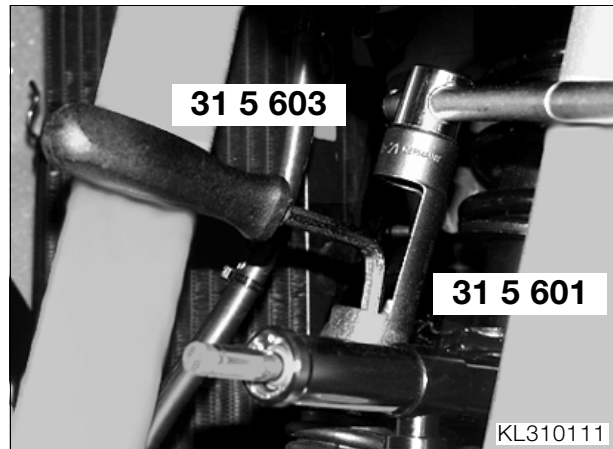
➔See Group 46



- Secure hoist, **BMW No. 00 1 510**, to oil sump.
- Remove fastener (5) securing suspension strut to frame.
- Remove nut (1), plain washer (2), rubber washer (3) and sleeve (4).
- Use cardboard or similar to protect ribs of left radiator.



- Remove fastener (7) securing suspension strut to leading link.
- Remove fastener (6) securing steering damper to leading link.



Caution:

Fastener securing leading link to slider tube fork bridge is secured with thread-locking compound; heat to max. 120°C (248°F) if necessary.

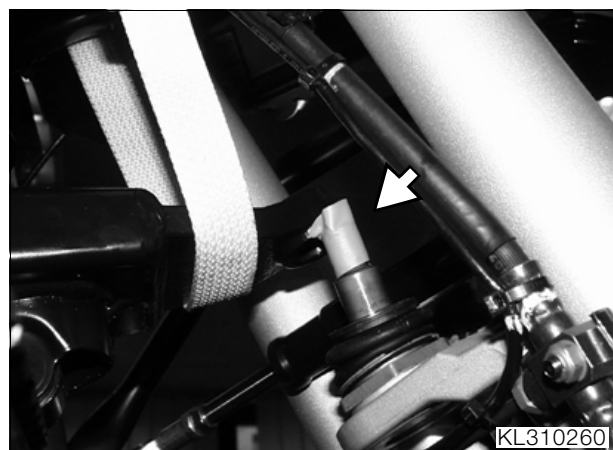
- Heat fastener securing leading link to slider tube fork bridge and use socket, **BMW No. 31 5 601**, and adapter for socket-head screw, **BMW No. 31 5 603**, to remove.
- Remove screw securing brake line to fairing bracket.



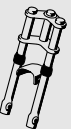
Caution:

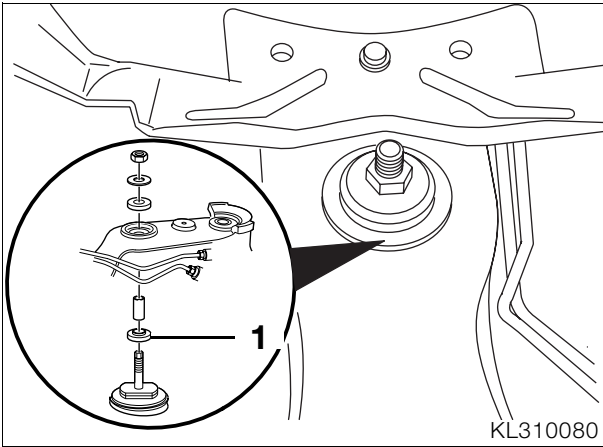
Do not raise motorcycle too far: it must be firm on its centre stand and the lines must be free of strain.

- Raise motorcycle with hoist.



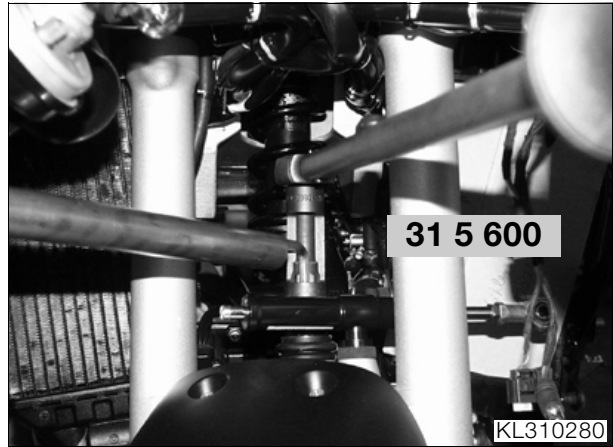
- Wrap a length of adhesive tape around thread of ball joint (arrow).
- Pull leading link up and disengage ball joint from leading link.





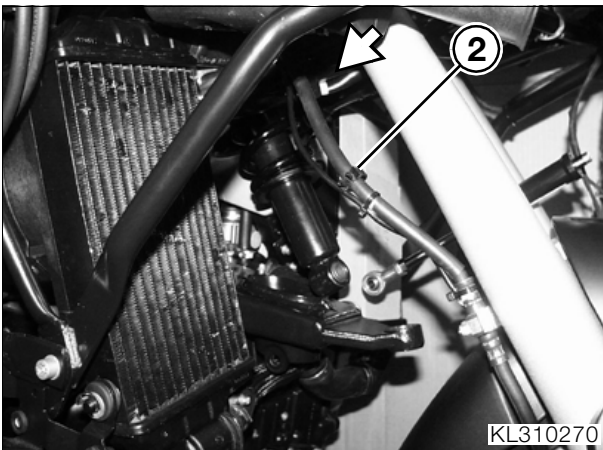
KL310080

- Turn suspension strut through 90°C and pull down, remove rubber ring (1).



KL310280

- Clean threads of fasteners securing leading link to slider tube fork bridge and steering damper to leading link.
- Coat thread with **Loctite 2701** and tighten fastener securing leading link to slider tube fork bridge with socket and adapter for socket-head screw, **BMW No. 36 5 500**.
- Coat thread with **Loctite 243** and tighten fastener securing steering damper to leading link.
- Clip holder (2) for brake line to fairing bracket (arrow).
- Grease bolt and tighten fastener securing suspension strut to leading link.
- Align lower rubber ring (1) with frame.



KL310270

- Push suspension strut up and out of leading link and remove.

Installing suspension strut

- Adjust suspension strut in frame and leading link without rubber ring.
- Place rubber ring (1) in position in suspension strut.
- Turn suspension strut to correct position for installation.



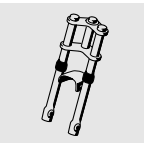
KL310290

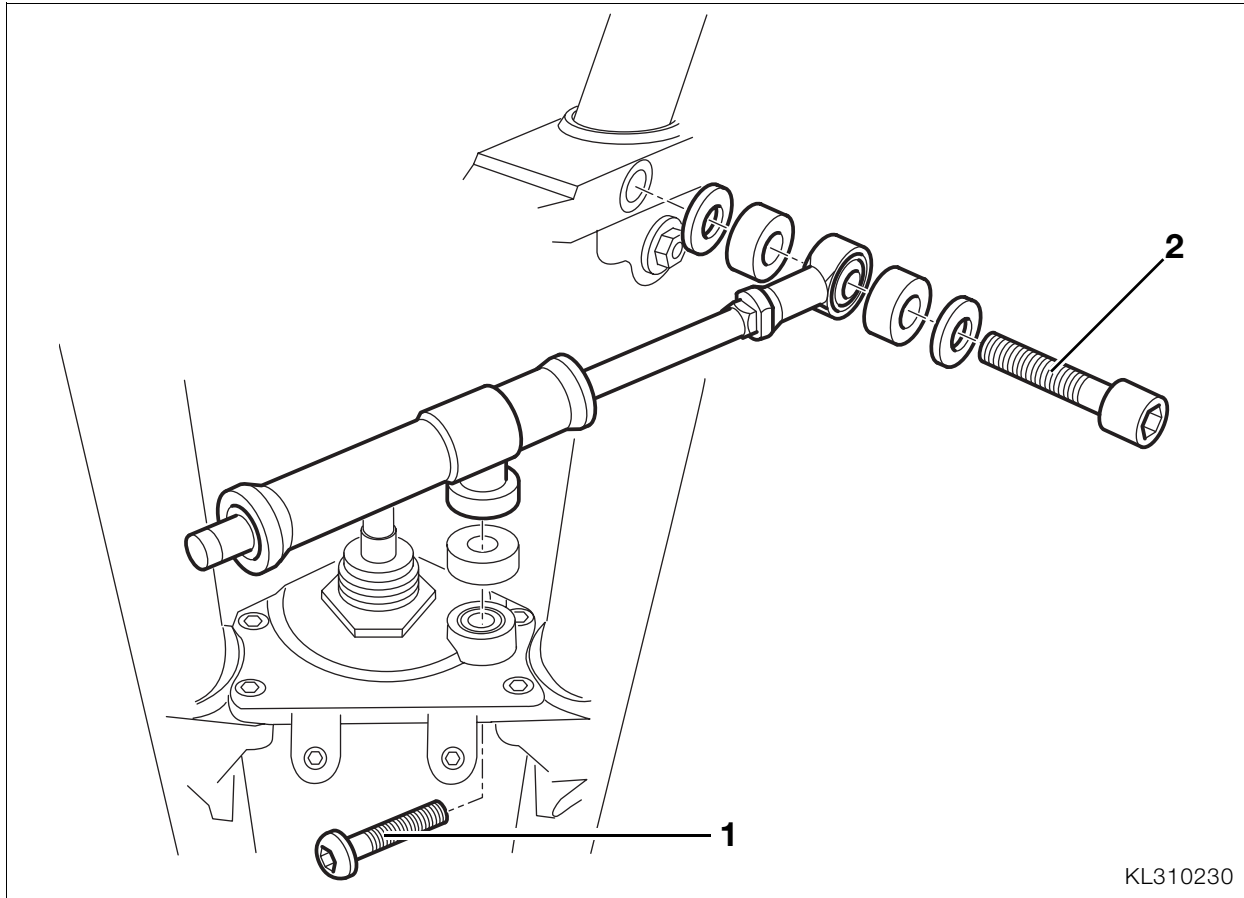
- Counter stud and tighten fastener securing suspension strut to frame with sleeve, rubber ring and washer.
- From this point on, installation is the reverse of the removal procedure.



Tightening torques:

Leading link to slider tube fork bridge (clean thread + Loctite 2701	130 Nm
Steering damper to leading link (clean thread + Loctite 243).....	21 Nm
Suspension strut to leading link	43 Nm
Suspension strut to frame	43 Nm

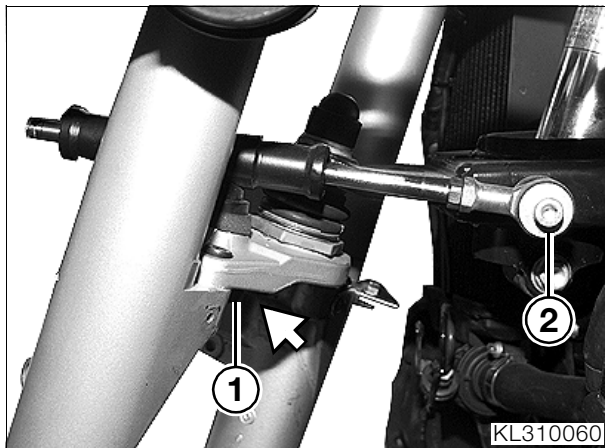




KL310230

Removing and installing steering damper

- Remove front and rear sections of the front mud-guard.
- ➡See Group 46
- Remove front wheel.
- ➡See Group 36



- Remove plug (arrow) in underside of slider tube fork bridge.
- Slacken fastener (2) securing steering damper to leading link.



Caution:

Fastener (1) securing steering damper to slider tube fork bridge (Torx) is secured with thread-locking compound.

- Remove fastener securing steering damper to slider tube fork bridge.
- Remove steering damper.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



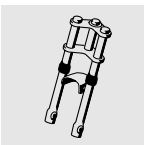
Caution:

Note length of screws.
Use only manufacturer's genuine screws, since the steering damper could be damaged if the screws are of the wrong length.



Tightening torque:

Steering damper to leading link
(Use new screw or clean thread + Loctite 243) 21 Nm
Steering damper to slider tube fork bridge
(Use new screw or clean thread + Loctite 243) 21 Nm



Checking the steering damper

See Group 00

Removing and installing leading link

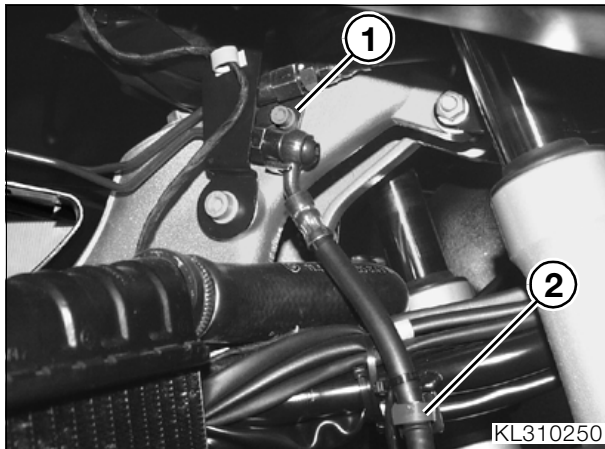
Removing leading link

- Disconnect ground lead from battery and insulate.

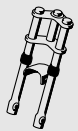
Caution:

Comply with safety regulations; fuel lines are pressurised.

- Remove fairing side sections.
- Remove engine spoiler.
- ➔See Group 46
- Remove fuel tank.
- ➔See Group 16
- Attach hoist, **BMW No. 00 1 510**, to oil sump.
- Remove the intake air pipe.
- Remove right skirt bracket.
- Detach the right radiator from its holder and press it forward.

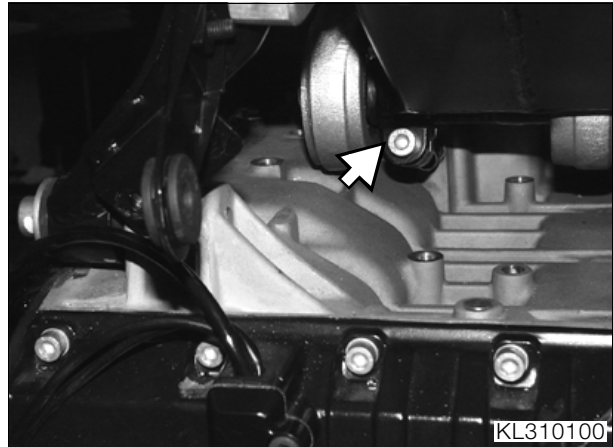


- Remove screw securing holder (1) for brake lines to frame at front right.
- Remove clip (2) for brake line from fairing bracket at front.
- Remove fastener securing brake lines to slider tube fork bridge.
- Detach the steering damper from the leading link.
- Loosen the front suspension strut at the top and detach it at the bottom from the leading link.
- Detach the leading link from the slider tube bridge.
- Remove both covers of the electronic equipment box.
- Remove Motronic control unit.
- ➔See Group 13
- Detach the electronic equipment box and wiring harness from the frame.

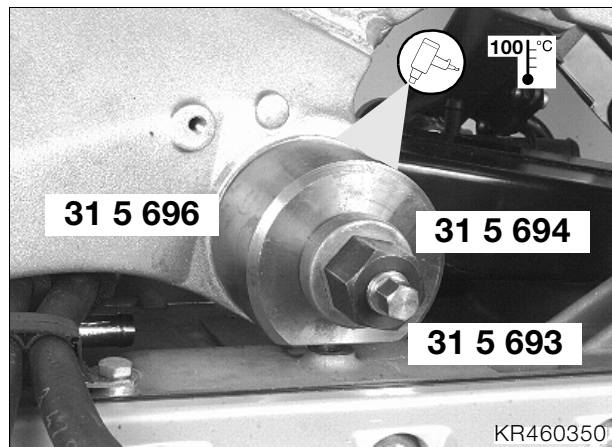


Caution:

Always replace the ball thrust bearing and the grooved ball bearing together.



- Detach the leading link at the clamp sleeve (arrow).
- Undo the leading link pivot at the frame.
- Heat the frame to approx. 100 °C (212 °F) at the right pivot bearing seat.

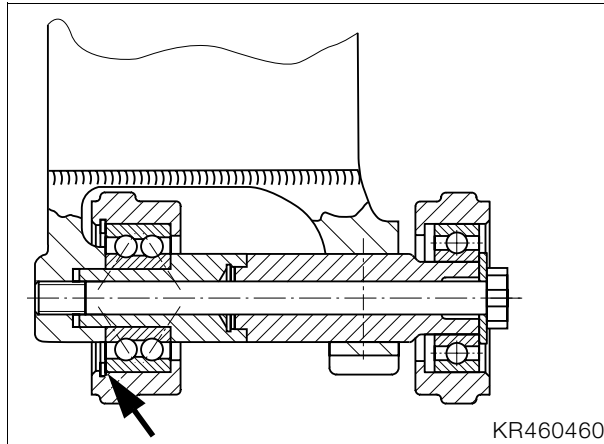


- Remove grooved ball bearing and clamping sleeve, using puller spindle M 14, **BMW No. 31 5 693**, M 14 nut with mount, **BMW No. 31 5 694**, and support, **BMW No. 31 5 696**.
- Push the leading link to the left and pull forward to remove.

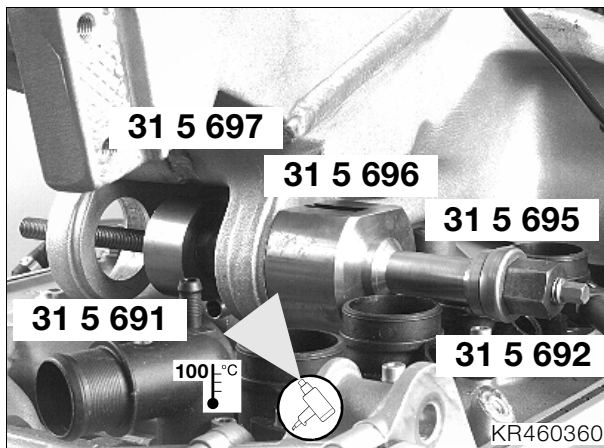
Note:

Extend the telescopic fork and press the suspension strut forwards.

Removing left angular-contact ball bearing for leading link



- Remove the leading link.
- Remove air outlet duct for left radiator.
- Remove left-hand skirt bracket.
- Detach the left radiator from its holder and press it forwards.
- Remove left-hand radiator bracket.
- Remove fasteners securing the fuel injection rail and secure it to the frame with the wiring harness.
- Remove fasteners securing throttle valve rail complete with intake air silencer.
- Remove retaining ring (arrow) for angular-contact ball bearing.



- Heat the frame at the left pivot bearing seat to approx. 100 °C (212 °F).



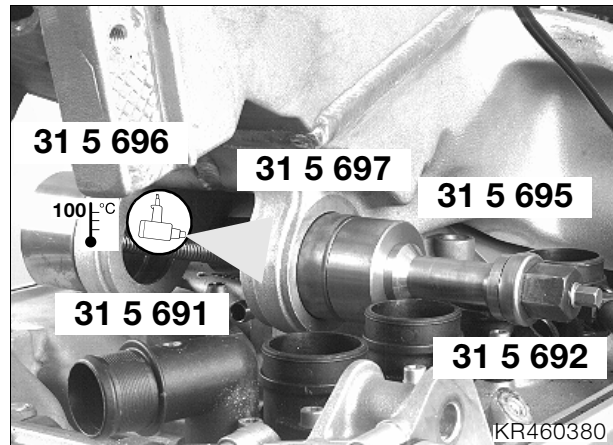
Note:

Recess in puller sleeve, **BMW No. 31 5 697**, must be toward the spacer sleeve.

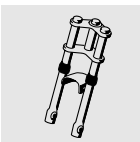
- Remove angular-contact ball bearing and spacer sleeve, using M 12 threaded rod, **BMW No. 31 5 691**, M 12 nut with mount, **BMW No. 31 5 692**, spacer, **BMW No. 31 5 695**, support, **BMW No. 31 5 696**, puller sleeve, **BMW No. 31 5 697**, and M 12 nut.
- Press the spacing bushing out of the angular-contact ball bearing.

Installing left angular-contact ball bearing for leading link

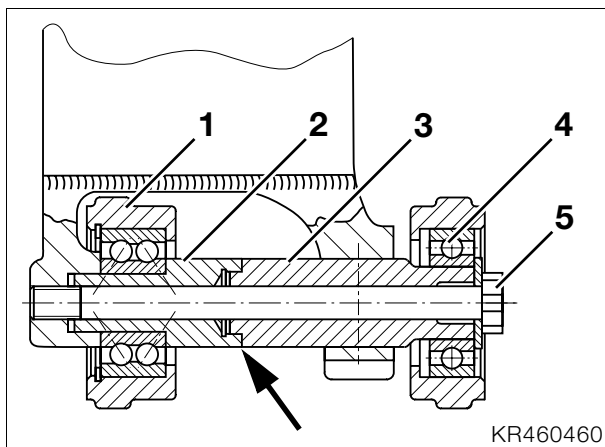
- Press the spacing sleeve fully into the angular-contact ball bearing.
- Cool the spacing sleeve with angular-contact ball bearing down to at least -10 °C (14 °F).
- Heat the frame at the left pivot bearing seat to approx. 100 °C (212 °F).
- Coat outer circumference of angular-contact ball bearing with assembly grease.



- Install angular-contact ball bearing and spacer sleeve, using M 12 threaded rod, **BMW No. 31 5 691**, M 12 nut with mount, **BMW No. 31 5 692**, spacer, **BMW No. 31 5 695**, support, **BMW No. 31 5 696**, puller sleeve, **BMW No. 31 5 697**, and M 12 nut.
- Install the circlip.
- Install throttle valve rail complete with intake air silencer.
- Install fuel injection rail.
- Install left-hand radiator bracket.
- Install the left radiator.
- Install left-hand skirt bracket.
- Install the air guide for the left radiator.
- Install the leading link.



Installing leading link



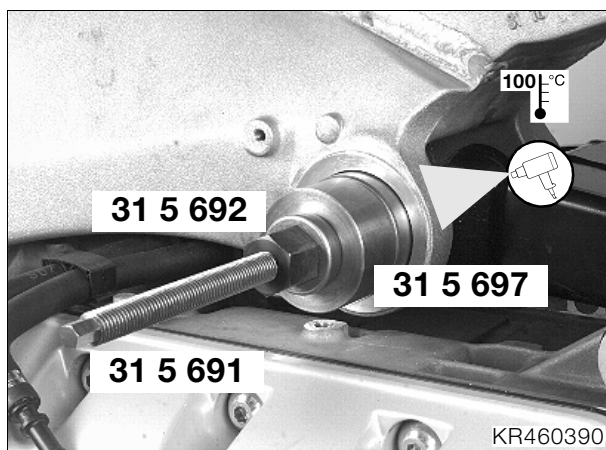
- Press the clamping sleeve (3) into the grooved ball bearing until flush.
- Chill clamping sleeve and grooved ball bearing (4) to at least -10 °C (14 °F).
- Push the leading link on to the shoulder of the spacing sleeve (2).



Note:

Extend the telescopic fork and press the suspension strut forwards.

- Heat the frame to approx. 100 °C (212 °F) at the right pivot bearing seat.
- Coat outer circumference of grooved ball bearing with assembly grease.



Note:

Recess in puller sleeve, **BMW No. 31 5 697**, must face out.

- Install angular-contact ball bearing and clamping sleeve in frame, using M 12 threaded rod, **BMW No. 31 5 691**, M 12 nut with mount, **BMW No. 31 5 692**, and puller sleeve, **BMW No. 31 5 697**; by screwing the M 12 threaded rod into the leading link from the left.



Note:

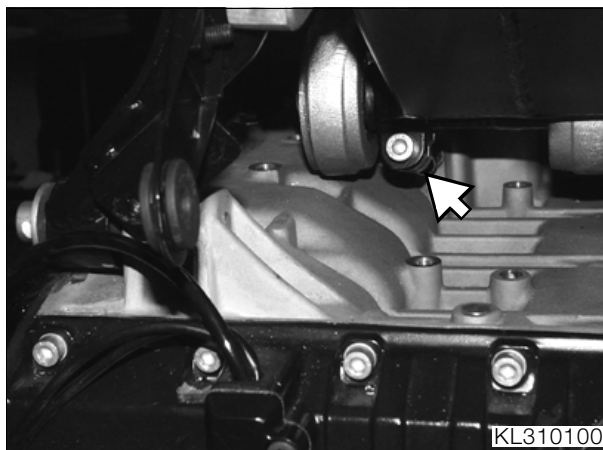
Pull clamping sleeve and spacing sleeve together until gap is closed (arrow).

- Tighten fastener (5) securing pivot of leading link to frame.



Note:

Insert the bolt for the front suspension strut.



- Tighten leading link at clamping sleeve (arrow).
- Run the wiring harness into the electronic equipment box.
- Secure the electronic equipment box and wiring harness to the frame.
- Install the Motronic control unit.
-See Group 13
- Install both covers of the electronic equipment box.
-See Group 61
- Secure the leading link to the slider tube bridge, and tighten.
- Tighten the front suspension strut.
- Secure the steering damper to the leading link, and tighten.
- Attach the front brake pipe to the fairing holder and the slider tube bridge.
- Secure the holder for the brake lines to the frame at the front right.
- Install the right-hand radiator.
- Install the intake air pipe.
-See Group 46
- Detach the hoist, **BMW No. 00 1 510**, from the sump.
- Install right skirt bracket.



- Install engine spoiler.
- ➔See Group 46
- Install the fuel tank.
- ➔See Group 16
- Connect earth (ground) strap to battery.
- Install fairing.

Tightening torques:

Leading link to frame (clean thread + Loctite 243).....	107 Nm
Leading link to clamping sleeve.....	21 Nm
Leading link to slider tube fork bridge (clean thread + Loctite 2701).....	130 Nm
Suspension strut to leading link	43 Nm
Suspension strut to frame	43 Nm
Steering damper to leading link (clean thread + Loctite 243).....	21 Nm

Measuring the leading link

Warning:

The leading link must be measured after an accident which could have damaged or distorted it.

- Remove right side section of fairing.
- ➔See Group 46



- Remove fastener (2) securing steering damper to leading link.
- Take off the protective cap (1) for the leading link pivot.

Caution:

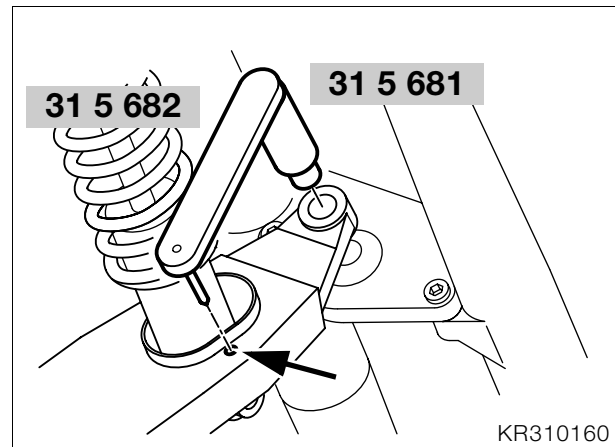
The fastener is secured with thread-locking compound.

- Remove fastener securing leading link to the fork slider tube bridge, using socket wrench insert and adapter for socket-head screw, **BMW No. 31 5 600.**

Caution:

Make sure that brake line and front sensor cable are not stretched when telescopic fork extends.

- Extend the telescopic fork.



- Install test pin, **BMW No. 31 5 681**, with gauge, **BMW No. 31 5 682**, in leading link.
- Stylus of gauge, **BMW No. 31 5 682**, must be located in punch mark (arrow) in leading link on right.
- Installation is the reverse of the removal procedure: pay particular attention to the following.

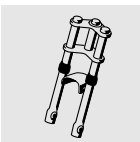
Caution:

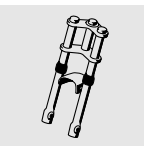
When installing, use a new nut.

- Tighten fastener securing leading link to the fork slider tube bridge, using socket wrench insert and adapter for socket-head screw, **BMW No. 31 5 600.**

Tightening torques:

Leading link to slider tube fork bridge	130 Nm
(clean thread + Loctite 2701)	
Steering damper to leading link.....	21 Nm
(clean thread+ Loctite 243)	
Slider tube fork bridge to sliding tube.....	21 Nm
(clean thread + Loctite 243)	



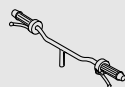


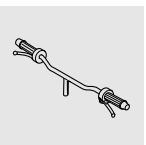
32 Steering

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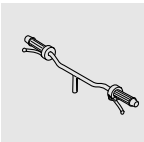
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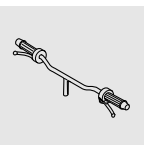
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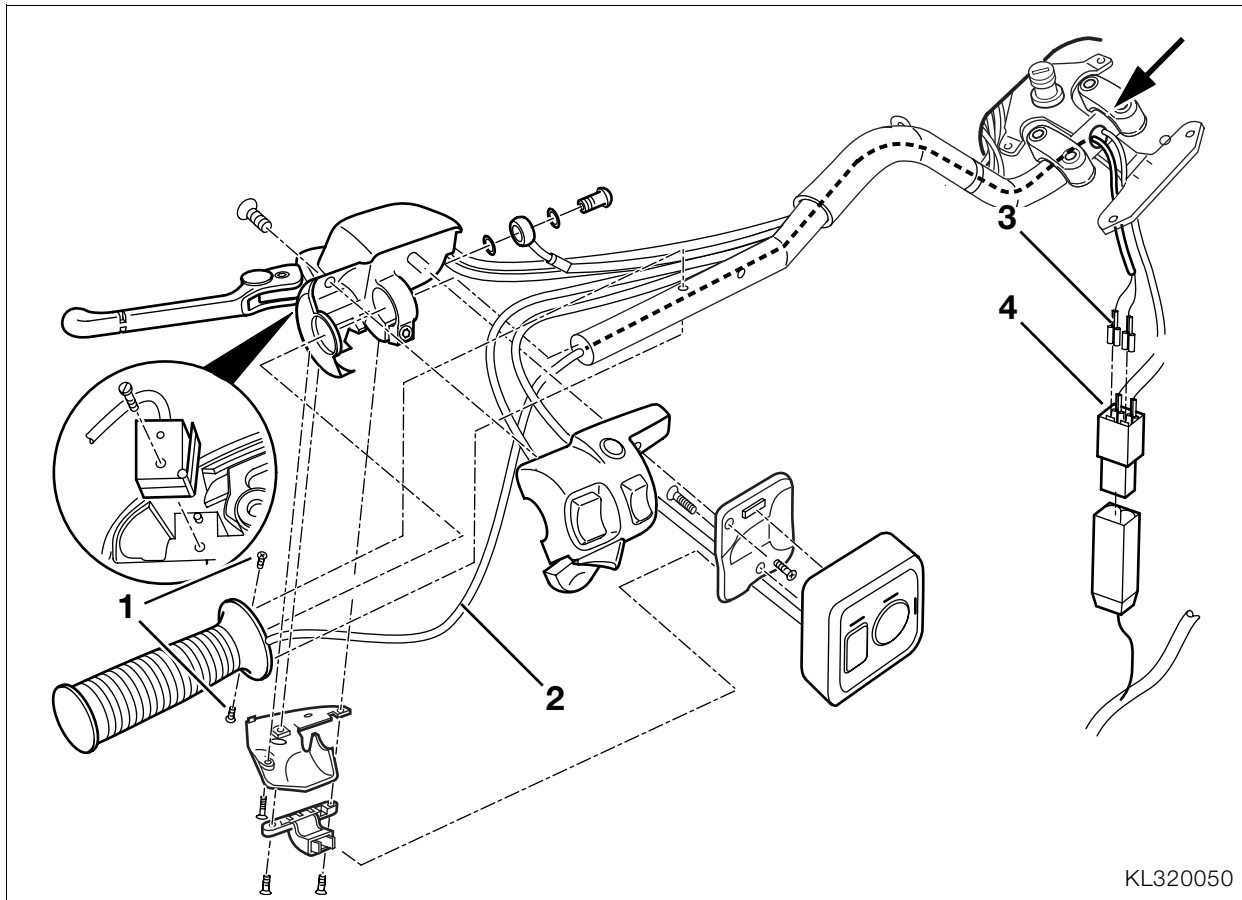




Technical Data		K 1200 LT
Type		One-part jacketed tubular handlebar; without weights
Handlebar diameter, inner tube	mm (in)	22 (0.87)
Handlebar diameter, outer tube	mm (in)	28 (1.10)
Steering lock angle	°	32
Handlebar width with grip tube	mm (in)	826 (32.52)





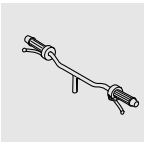


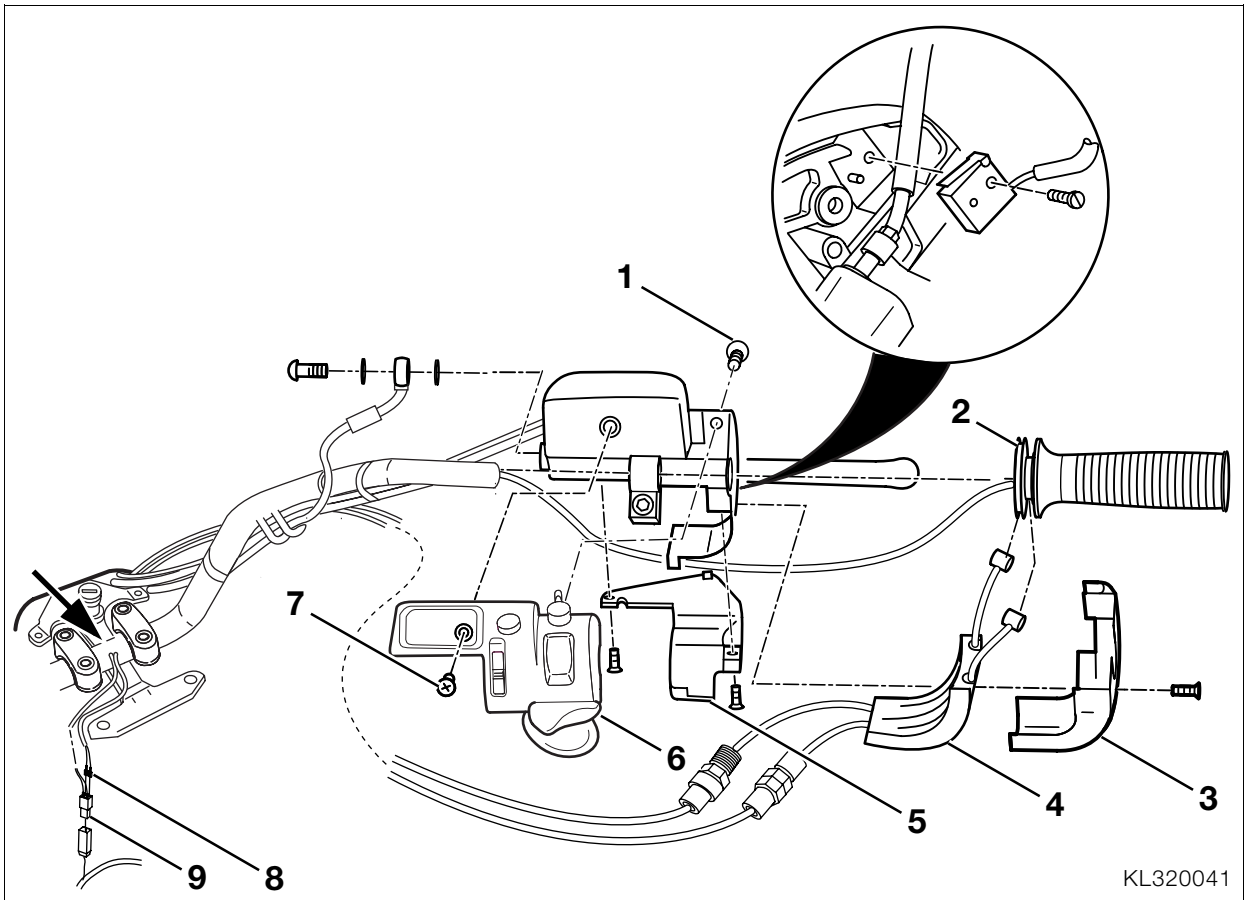
Removing and installing left grip tube

- **[With heated grip]** Remove left and right fairing side sections.
- ➡See Group 46
- **[With heated grip]** Remove tank cover.
- **[With heated grip]** Remove handlebar trim.
- **[With heated grip]** Remove fork bridge cover.
- **[With heated grip]** Disconnect plug (4) for the heated grip.
- **[With heated grip]** Pull cable shoe (3) out of connector.
- Remove fasteners (1) for grip.
- **[With heated grip]** Pull grip complete with cable (2) off handlebar, feeding cable through bore (arrow) until clear.
- Pull grip off handlebar.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:
Make sure that lines and cables are routed correctly.

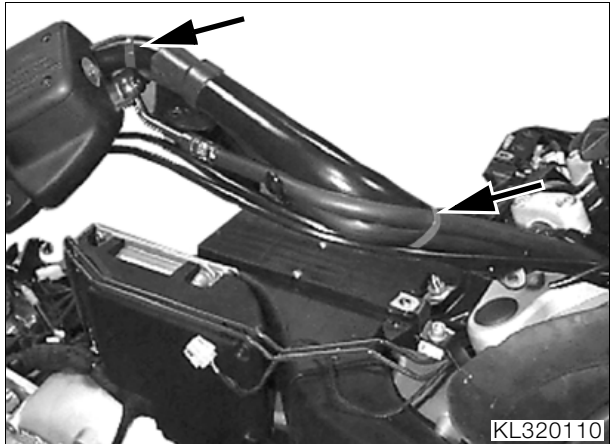




KL320041

Removing and installing right grip tube

- **[With heated grip]** Remove left and right fairing side sections.
- ➡See Group 46
- **[With heated grip]** Remove tank cover.
- **[With heated grip]** Remove handlebar trim.
- **[With heated grip]** Remove fork bridge cover.
- **[With heated grip]** Disconnect plug (9) for the heated grip.
- **[With heated grip]** Pull cable shoe (8) out of connector.
- Remove cover (3) for throttle-cable relay.
- Remove lower cover (5).
- Remove screws (1, 7) and remove multi-function switch (6) from brake-lever fitting.
- Disengage Bowden cables at cam disc (2).
- Remove throttle-cable relay (4).
- **[With heated grip]** Turn grip all the way forward and pull it off handlebar, feeding cable through bore (arrow) until clear.
- Turn grip all the way forward and pull it off handlebar.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



KL320110



Caution:

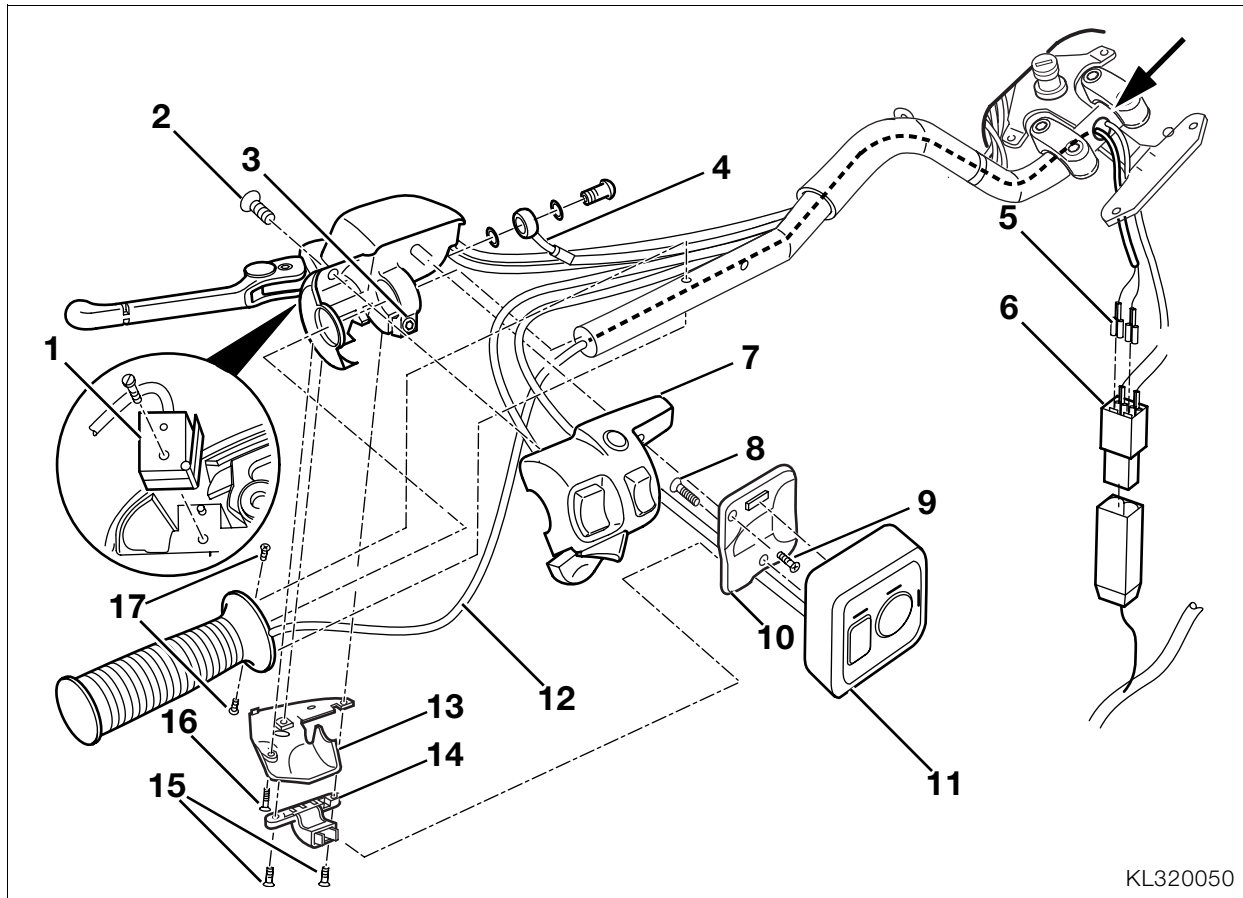
Make sure lines and Bowden cables are routed correctly; secure lines with cable ties (arrows).

- Check throttle cable play, adjust if necessary.
- ➡See Group 00

Settings:

[Without cruise control system]
throttle-cable play, engine warm ... 0.5 mm (0.02 in)

[With cruise control system]
total play at throttle twist grip,
engine warm 1 mm ... 1.5 mm (0.04 in ... 0.06 in)



Removing and installing clutch lever fitting

- Remove left and right fairing side sections.
- Remove tank cover.
- Remove handlebar trim.
- Remove cover of fork bridge.

Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid attacks paint.

- Drain the clutch operating system.
- Disconnect clutch line (4) from clutch-lever fitting.
- **[With heated grip]** Disconnect plug (6) for the heated grip.
- **[With heated grip]** Pull cable shoe (5) for heated grip, left, out of connector.
- Remove fastener (8) and move radio control unit (11) clear.
- Remove screws (15) and remove holder (14).
- Remove screw (9) and remove radio control unit (11) with rear panel (10).
- Remove screw (16) and remove lower cover (13).
- Remove screw (2) and remove multi-function switch (7).

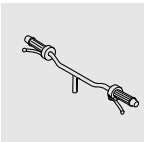
- Remove clutch switch (1).
- Remove fasteners (17) for grip.
- **[With heated grip]** Pull grip complete with cable (12) off handlebar, feeding cable through bore (arrow) until clear.
- Pull grip off handlebar.
- Slacken clamping screw (3) for clutch-lever fitting.
- Pull clutch-lever fitting off handlebar.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- When assembling, press connector of clutch pressure line (4) against stop on clutch-lever fitting.

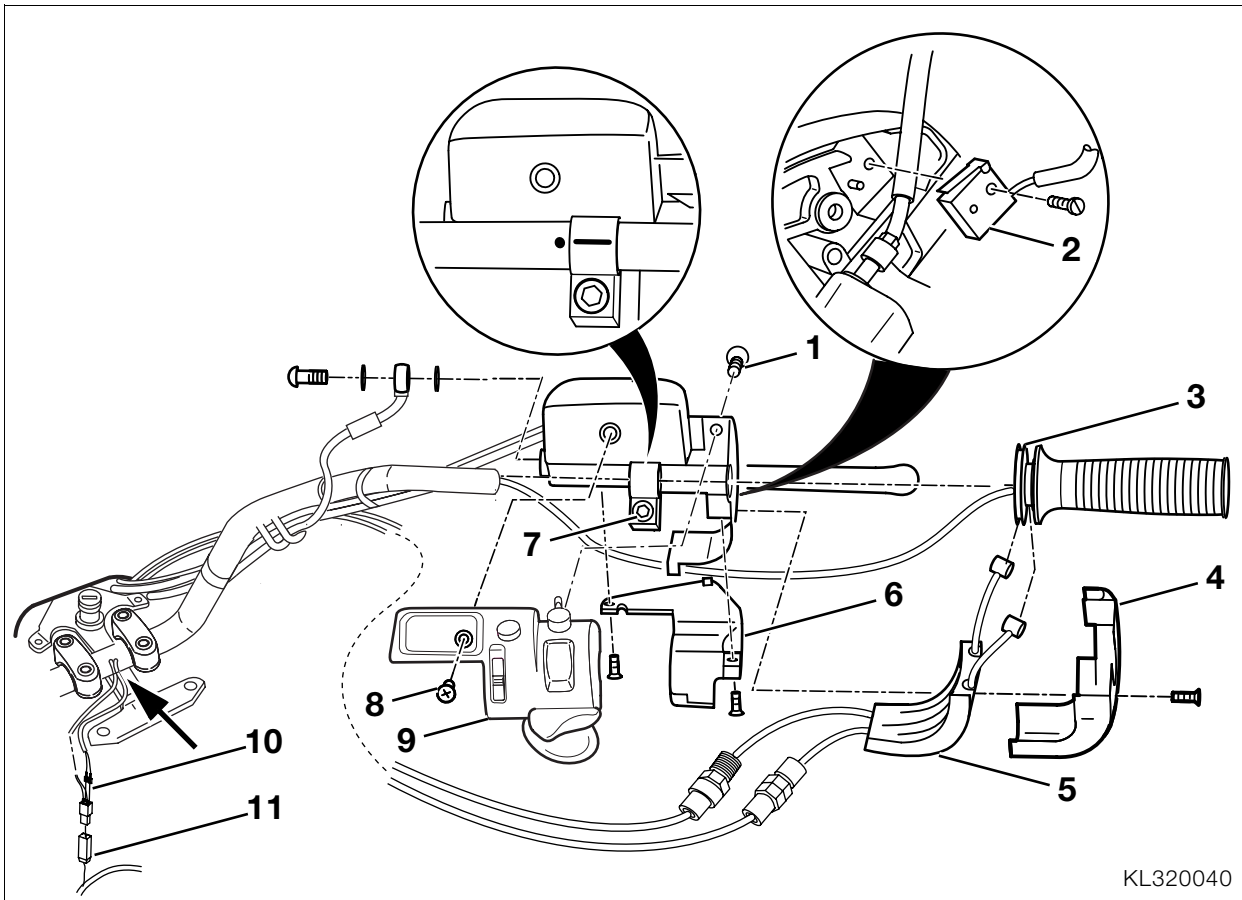
Caution:

Make sure that all lines are correctly routed.

Tightening torques:

Clutch lever fitting to handlebar 5 Nm
 Pressure line to clutch-lever fitting 18 Nm





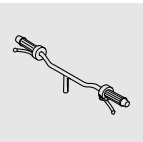
Removing and installing brake lever fitting

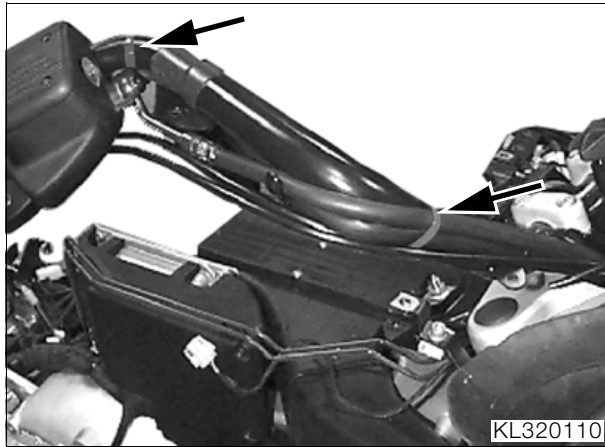
- Remove left and right fairing side sections.
 ➔See Group 46
- Remove tank cover.
- Remove handlebar trim.
- Remove cover of fork bridge.

Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid attacks paint.

- Drain fluid from brake system.
- Disconnect brake line from brake-lever fitting.
- **[With heated grip]** Disconnect plug (11) for the heated grip.
- **[With heated grip]** Pull cable shoe (10) for heated grip, right, out of connector.
- Remove cover (4) for throttle-cable relay.
- Remove lower cover (6).
- Remove screws (1, 8) and remove multi-function switch (9) from brake-lever fitting.
- Remove brake light switch (2).
- Disengage Bowden cables at cam disc (3).
- Remove throttle-cable relay (5).
- **[With heated grip]** Turn grip all the way forward and pull it off handlebar, feeding cable through bore (arrow) until clear.
- Turn grip all the way forward and pull it off handlebar.
- Slacken clamping screw (7) for brake-lever fitting.
- Pull brake-lever fitting off handlebar.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- When assembling, press connector of brake line against stop on brake-lever fitting.





Caution:

Make sure lines and Bowden cables are routed correctly; secure lines with cable ties (arrows).

- Check throttle cable play, adjust if necessary.
 ➔ See Group 00

Settings:

[Without cruise control system]

throttle-cable play, engine warm ... 0.5 mm (0.02 in)

[With cruise control system]

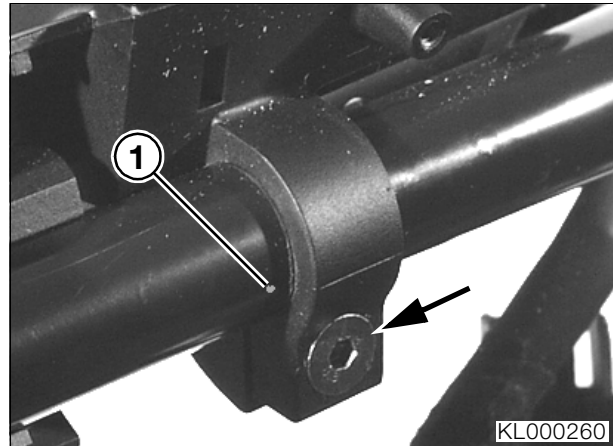
total play at throttle twist grip,
 engine warm 1 mm ... 1.5 mm (0.04 in ... 0.06 in)

Tightening torques:

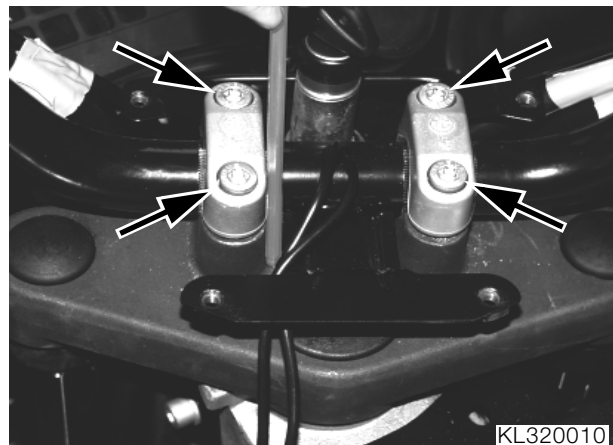
Brake-lever fitting to handlebar 5 Nm
 Pressure line to brake-lever fitting 18 Nm

Removing and installing handlebar

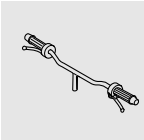
- Remove left and right fairing side sections.
 ➔ See Group 46
- Remove tank cover.
- Remove handlebar trim.
- Remove cover of fork bridge.
- Remove cable ties from handlebar.
- Remove left grip.
- Remove right grip.

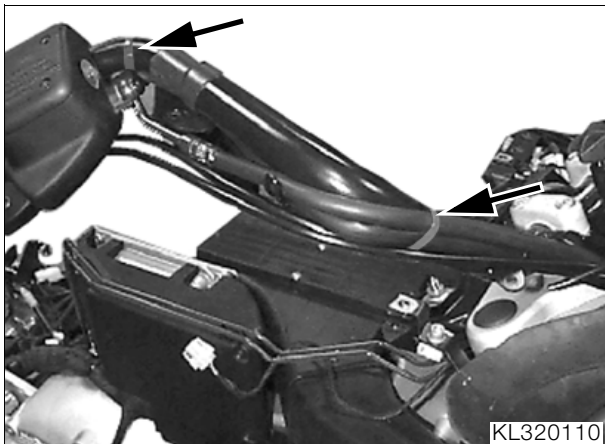


- Slacken clamping screws (arrow) on left and right fittings.



- Remove clamping screws (arrows) and lift off clamping blocks.
- Pull right and left fittings off handlebar and remove handlebar.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Return clutch-lever fitting and brake-lever fittings to their original positions, as marked (1).





Caution:

Make sure lines and Bowden cables are routed correctly; secure lines with cable ties (arrows).

- Adjust handlebar in compliance with installation instructions.

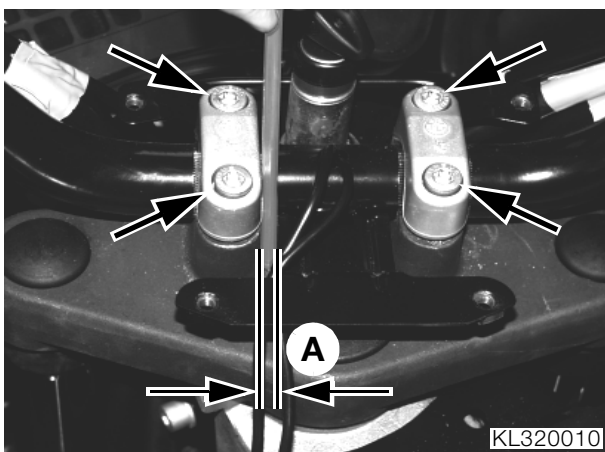
Installation instructions for adjusting handlebar

Note:

The handlebar trim cannot be installed unless the handlebar is correctly adjusted.

- Remove left and right fairing side sections.
 ↳See Group 46
- Remove tank cover.
- Remove upper handlebar trim.
- Remove cover of fork bridge.
- Make sure front wheel is in straight-ahead position.
- Slacken clamping screws (arrows).

Handlebar: adjusting horizontally



Note:

Use w/f 5 Allen key as gauge for adjusting.

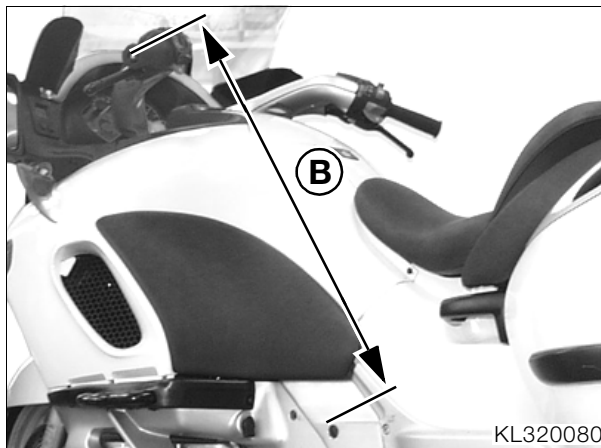
- Set distance "A".

Setting:

Distance "A" 5 mm (0.20 in)

- Slightly tighten clamping screws.

Handlebar: adjusting height



- Adjust handlebar so that distance "B" from edge of side bore in main frame to center of handlebar end is to specification.

Setting:

Distance "B" 695 ± 5 mm (27.36 ± 0.20 in)

- Check distance "B" at other side of motorcycle; readjust if necessary.



Warning:

Make sure that the gaps at the two clamping blocks are equal.

- Uniformly tighten clamping screws.



Tightening torques:

Clamping screws 21 Nm

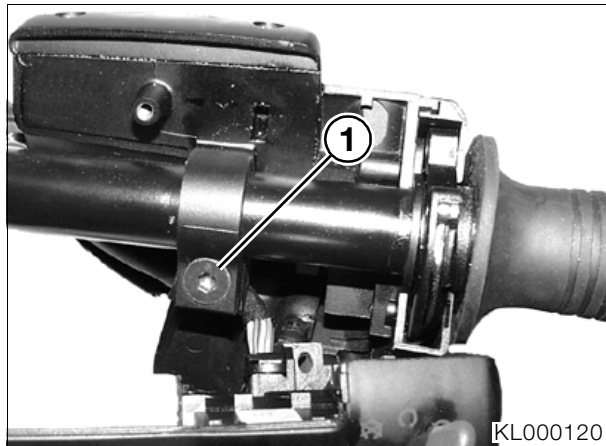
Removing and installing piston in brake-lever fitting



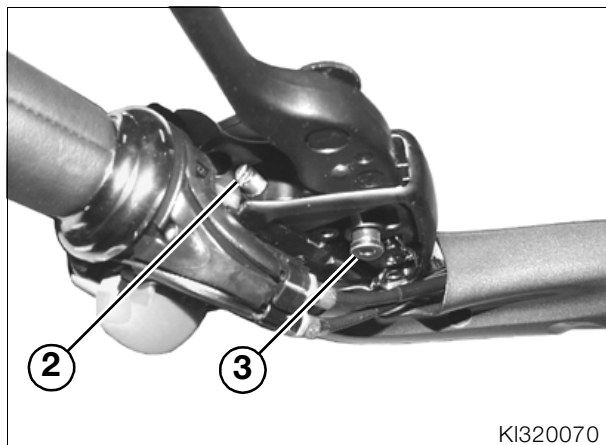
Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid attacks paint.

- Remove right handlebar cover.
- Remove multi-function switch.
- Turn the handlebar fully to the left.



- Loosen the clamping screw (1).
- Turn the brake-lever fitting so that the sealing surface on the reservoir cap is horizontal when viewed from the side.
- Tighten the clamping screw.
- Remove the reservoir cap together with the diaphragm.
- Draw off approx. 10 cm³ (0.34 fl. oz.) of brake fluid at brake caliper, for example.
- Remove lower plastic cover from brake-lever fitting.
- Remove cover for throttle-cable relay.

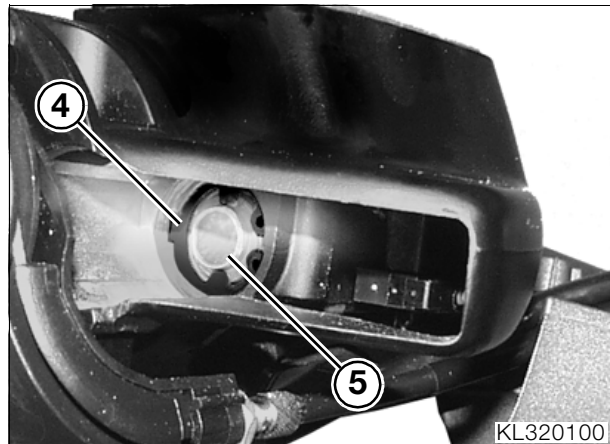


Note:

Screws are secured with Loctite; heat slightly before removal if necessary.

- Back off adjusting screw (2) with pressure pin.

- Remove pivot screw (3) and remove lever.
- Clean threads of adjusting screw and pivot screw and threads in tapped bores of brake-lever fitting.
- Remove rubber diaphragm from brake-lever fitting.



- Carefully press back brake piston (5) and remove retaining ring (4).
- Remove brake piston.
- Check brake cylinder for scoring; replace brake-lever fitting if necessary.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Adjust lever play by turning adjusting screw (2).
- Fill and bleed the brake system.



Tightening torques:

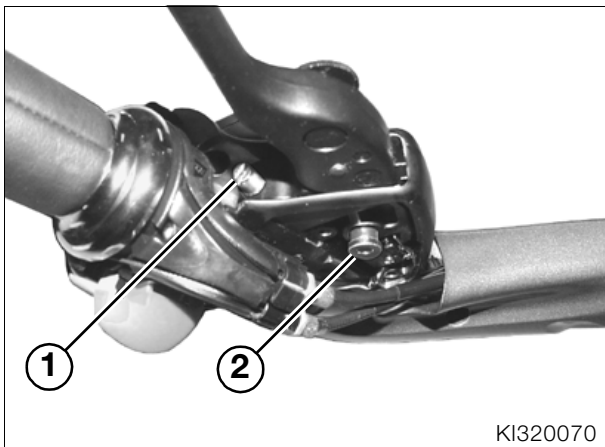
Pivot screw (clean thread + Loctite 2701).....	11 Nm
Clamp screw in handlebar fitting	5 Nm
Bleed screw	10 Nm



Adjusting lever play for front brake/clutch

Front brake

- Remove lower plastic cover from brake-lever fitting.
- Remove cover for throttle-cable relay.



KI320070



Note:

Screws are secured with Loctite; heat slightly before removal if necessary.

- Back off adjusting screw (1) with pressure pin.
- Remove pivot screw (2) and remove lever.
- Clean threads of adjusting screw and pivot screw and threads in tapped bores of lever fitting.
- Coat thread of adjusting screw with **Loctite 270**, install screw in its bore and tighten down a few turns.
- Install lever.
- Tighten adjusting screw until all play is taken up at lever.
- Tighten adjusting screw one more turn.
- Apply sealing paint to adjusting screw.
- Complete assembly of handlebar fitting.



Tightening torques:

Pivot screw
(clean thread + Loctite 2701)..... 11 Nm

Clutch

- Remove radio control unit.
- Remove lower plastic cover.
- **[Without heated grip]** Remove grip.
- **[With heated grip]** Slacken grip.
- Remove side lower plastic from clutch-lever fitting.

- Back off adjusting screw (1) with pressure pin.
- Remove pivot screw (2) and remove lever.
- Clean threads of adjusting screw and pivot screw and threads in tapped bores of lever fitting.
- Coat thread of adjusting screw with **Loctite 270**, install screw in its bore and tighten down a few turns.
- Install lever.
- Tighten adjusting screw until all play is taken up at lever.
- Tighten adjusting screw one half turn more.
- Apply sealing paint to adjusting screw.

- Complete assembly of handlebar fitting.



Tightening torques:

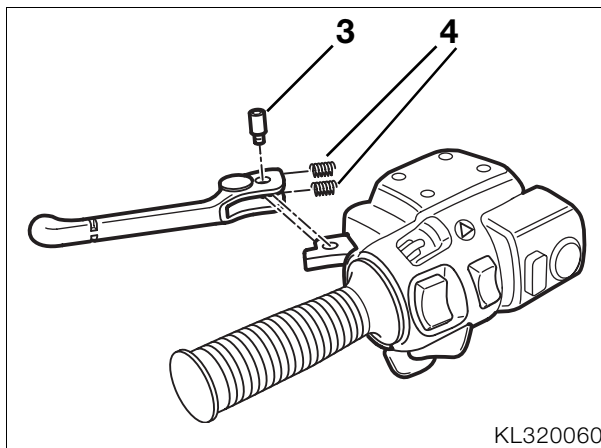
Pivot screw
(clean thread + Loctite 2701)..... 11 Nm

Removing and installing left and right handlebar levers



Caution:

Pivot screw (3) is secured with thread-locking compound.



KL320060



Note:

Note springs (4).

- Remove pivot screw (3) from lever and remove lever.
- When installing, apply **Loctite 2701** to pivot screw (3) and tighten.



Tightening torques:

Pivot screw
(clean thread + Loctite 2701)..... 5 Nm

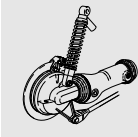
Removing and installing throttle cables

See Group 13

33 Rear wheel drive

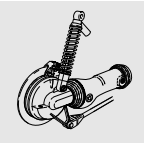
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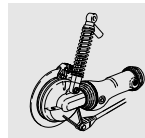


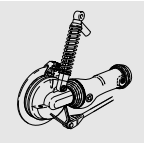
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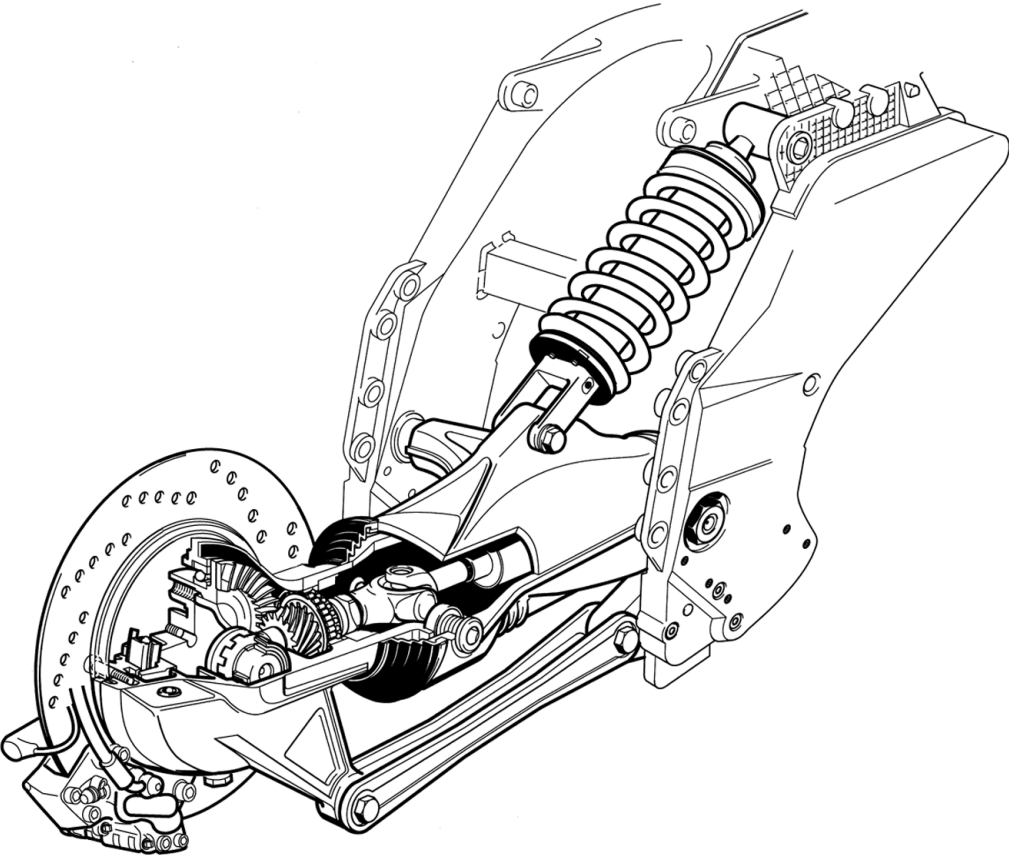
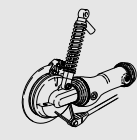


Technical Data		K 1200 LT
Rear wheel drive		
Gear tooth pattern		Klingelberg-Paloid spiral bevel
Gear ratio		2.75 : 1
Number of teeth		33 : 12
Backlash	mm (in)	0.07...0.016 (0.003...0.0006)
Taper roller bearing preload	mm (in)	0.05...0.1 (0.002...0.004)
Oil grades		Hypoid gear oil, SAE 90 API-GL-5
Capacity		
Initial filling	cc (fl. oz.)	240...250 (8.11...8.45)
Oil changes	cc (fl. oz.)	230 (7.78), or to bottom edge of filler neck
Drive shaft		
Layout		2-section drive shaft with integral torsional vibration damper in hollow swinging arm (BMW PARALEVER), universal joint at each end, with sliding section at rear wheel drive end.
Swinging arm		
Type		Paralever, new swinging arm with suspension strut attached off-centre; kinematic progressive rate.
Swinging arm length	mm (in)	552 (21.73)
Rear suspension		
Suspension strut		Gas-filled strut with hydraulic spring preload adjustment by handwheel
Suspension travel	mm (in)	130 (5.12) at wheel
	mm (in)	45 (1.77) at suspension strut

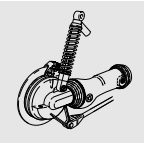




Rear wheel drive – cutaway drawing



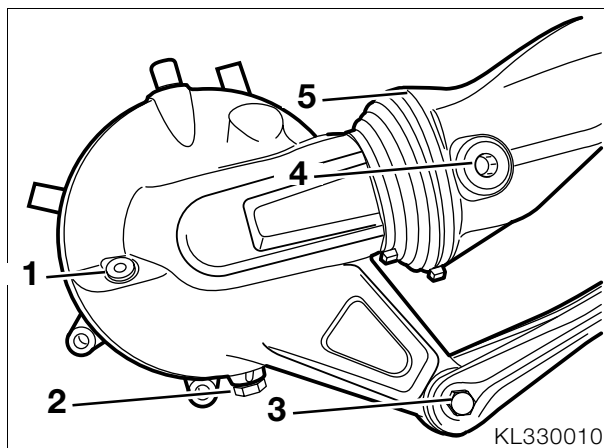
KL339000



Removing, disassembling, reassembling and installing rear wheel drive

- Remove rear wheel.
- ➔ See Group 36
- Remove the inductive signal transmitter.
- ➔ See Group 61
- Remove the brake caliper.
- ➔ See Group 34
- Remove the rear wheel brake caliper and, fasten to the rear frame with the inductive sensor using a cable tie.
- Remove brake disc.
- ➔ See Group 34

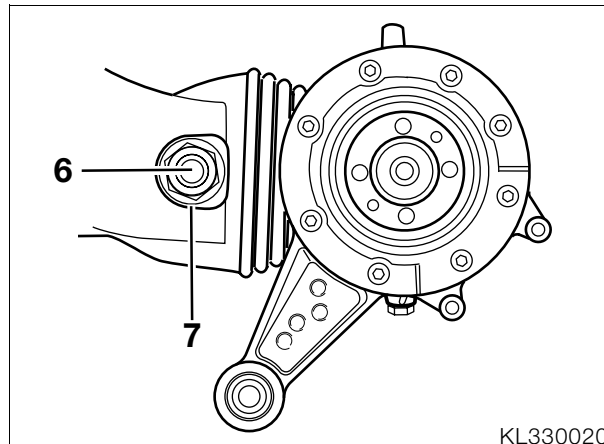
Removing rear wheel drive



Caution:

Do not lay oil-filled rear-wheel drive on its side prior to installation, as this will cause oil to escape when the motorcycle is on the road (suction effect).

- Unscrew the oil filler plug (1).
- Remove oil drain plug (2) and drain oil into a suitable container.
- Loosen reaction link (3) at the rear wheel drive.
- Release clamping strap (5).



Warning:

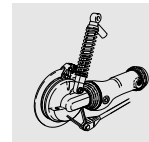
Note high release torques for locknut and fixed bearing stud.

- Loosen floating bearing stud (6) and locknut (7).
- Loosen fixed bearing stud (4).
- Slacken floating bearing stud (6) with locknut (7) and fixed bearing stud (4).

Note:

Note inner races of needle bearings.

- Detach reaction link (3) at rear wheel drive.
- Disconnect rear wheel drive from drive shaft.

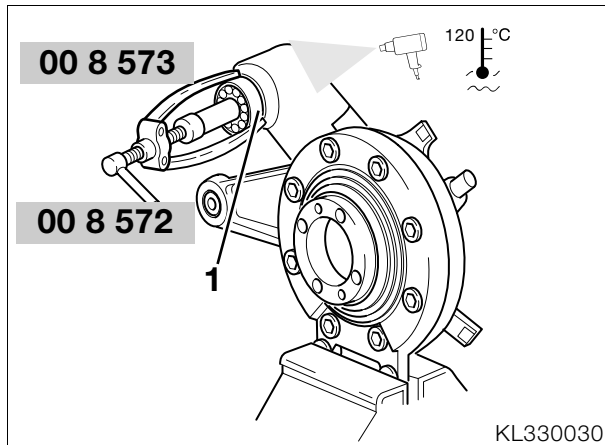
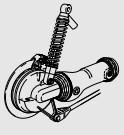


Replacing taper roller bearing in rear wheel drive



Caution:

Do not damage the mating faces on the housing.



- Pull out needle roller bearing (1) with reaction support, **BMW No. 00 8 572**, and internal puller, **BMW No. 00 8 573**.

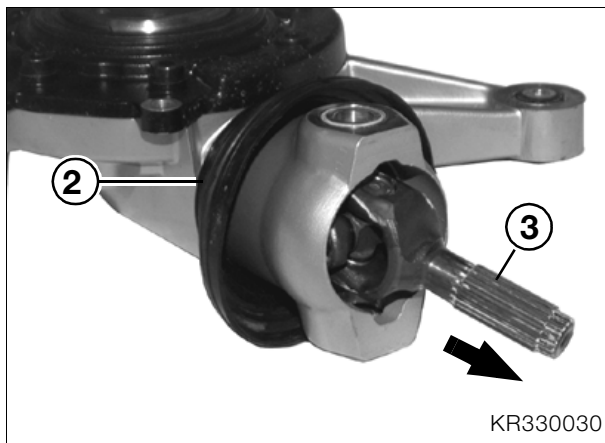


Note:

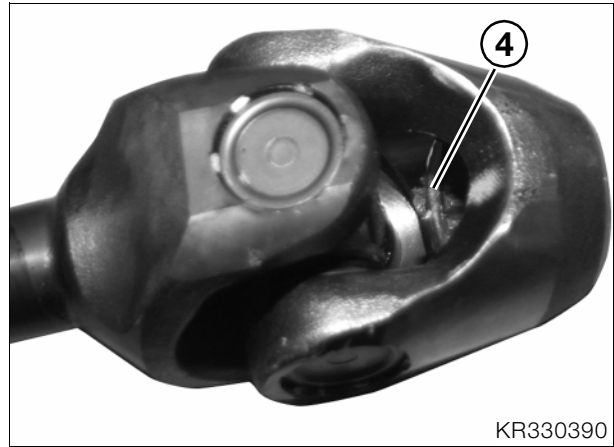
Use temperature measuring device, **BMW No. 00 1 900**, to check heat rise.

- Heat neck of housing to 120 °C (248 °F).
- Press in needle roller bearing (1) with the inner race on driver, **BMW No. 36 3 700**.

Removing input bevel pinion



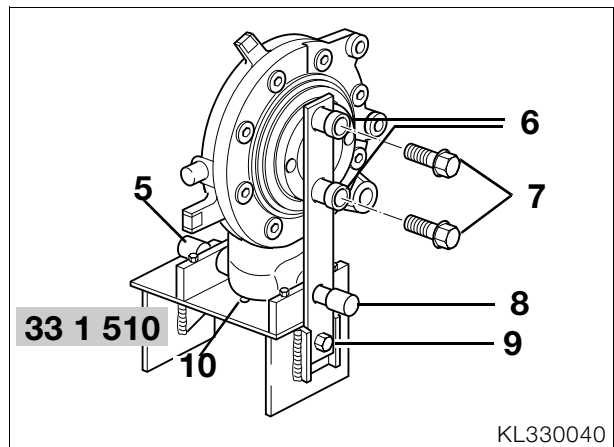
- Use a tyre lever or similar tool to force off the rear drive shaft (3).
- Unscrew tensioning strap (2) and pull off the flexible gaiter.



Note:

Note circlip (4) at rear drive shaft.

- Replace circlip (4) if necessary.



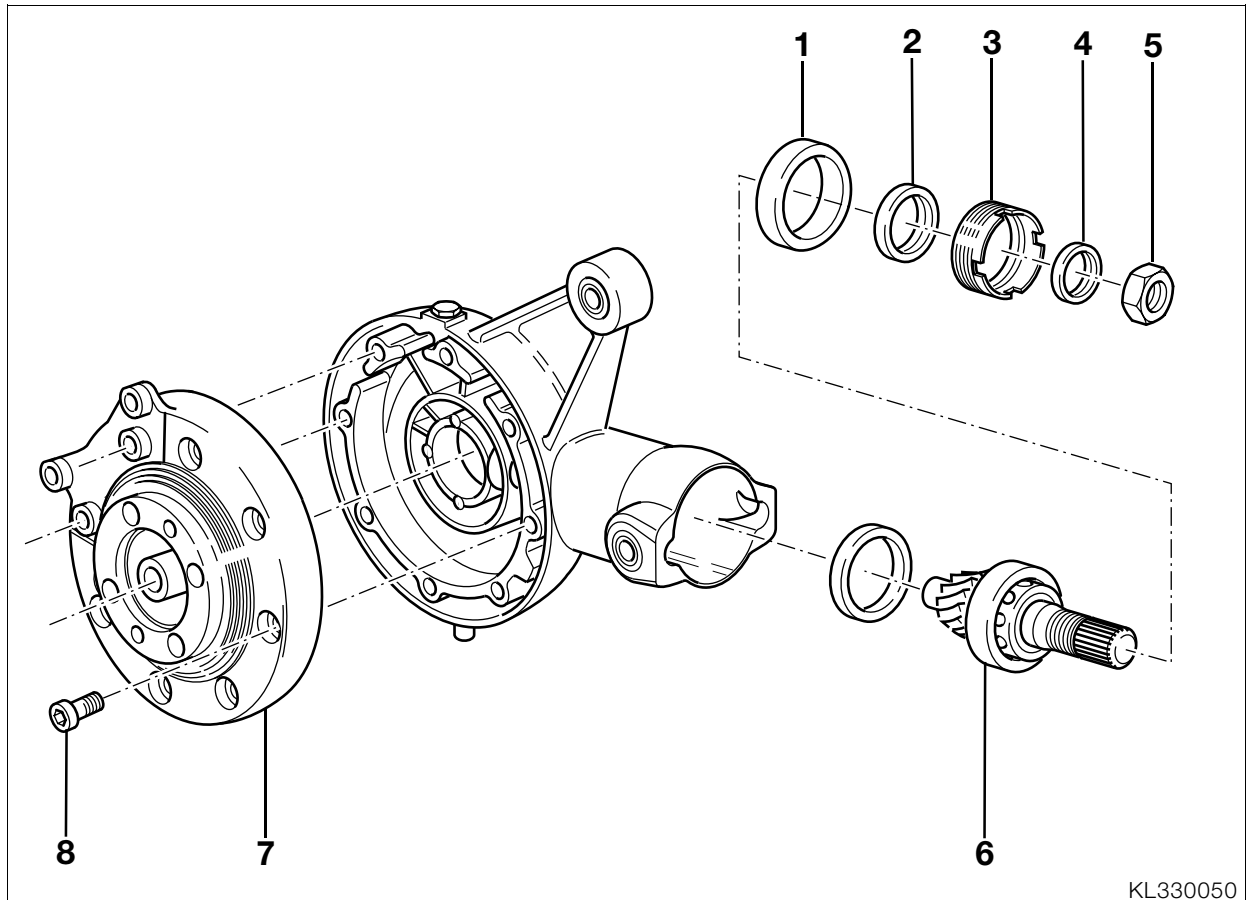
- Screw rear wheel drive centrally to holder, **BMW No. 33 1 510**, using bearing stud (8).
- Screw locking arm (9) on firmly.
- Move threaded sockets (6) up to rear wheel drive.
- Tighten with wheel studs (7).



Caution:

Make sure that the grub screws (10) do not project as otherwise the neck of the housing could be damaged.

- Tighten grub screws (10) until they are seated.



KL330050

⚠ Caution:

Never use a hammer when slackening off hex nut (5), or else the splines may be damaged.

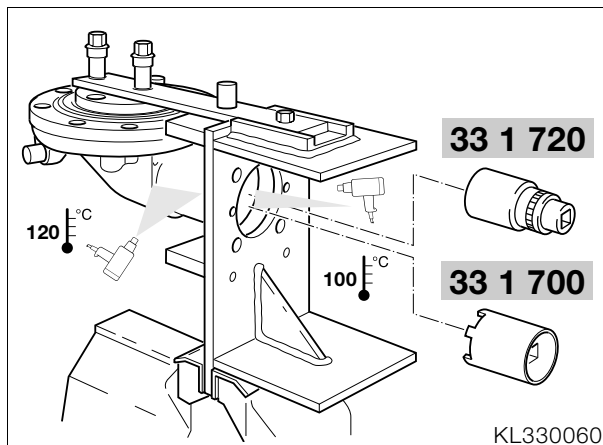
🖐 Warning:

Hex nut (5) requires a high torque to loosen it.

📄 Note:

Use temperature measuring device, **BMW No. 00 1 900**, to check heat rise.

- Heat hex nut (5) on the input bevel pinion (6) to 100 °C (212 °F) and unscrew with a 36 mm (1.4 in) socket wrench insert and reducing adapter, **BMW No. 33 1 720**.



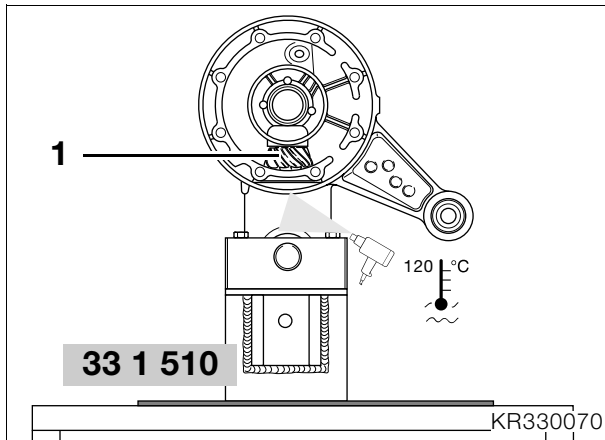
KL330060

🖐 Warning:

Threaded ring (3) requires a high torque to loosen it.

- Heat the housing neck to 120 °C (248 °F) and unscrew threaded ring (3) with pin wrench, **BMW No. 33 1 700**.
- Remove thrust ring (4) and outer race (1).
- Slacken screws (8).
- Remove locking arm from holder, **BMW No. 33 1 510**.
- Remove screws (8).
- Remove housing cover (7).
- If necessary, use a drift to drive out shaft sealing ring (2).

Disassembling input bevel pinion



- Position rear wheel drive with retaining fixture, **BMW No. 33 1 510**, upright.

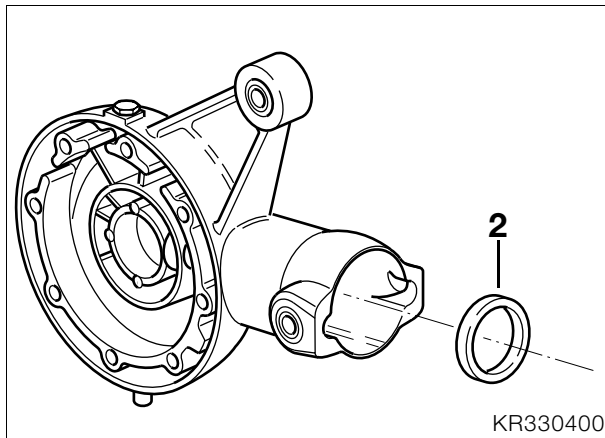
Caution:

To prevent the input bevel pinion (1) from being damaged if it falls out, use a soft underlay.

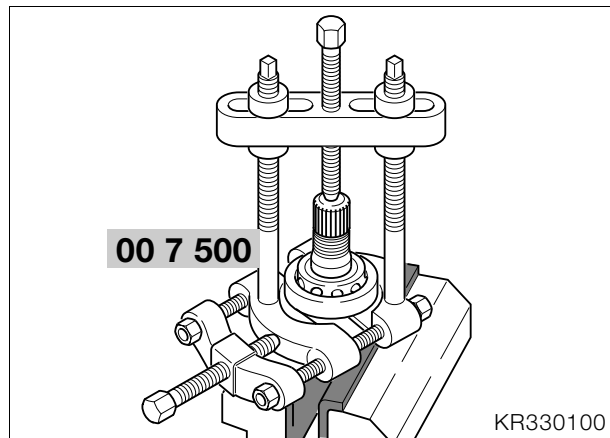
- Heat bearing seat to 120 °C (248 °F).
- Remove input bevel pinion (1).

Note:

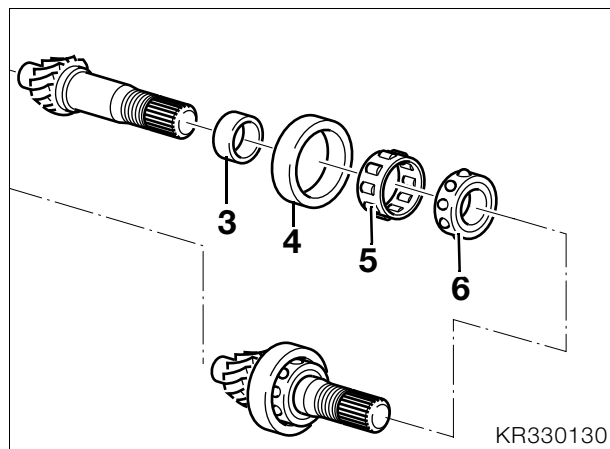
If necessary, lightly tap input bevel pinion (1) to release.



- Remove shim (2) from housing.



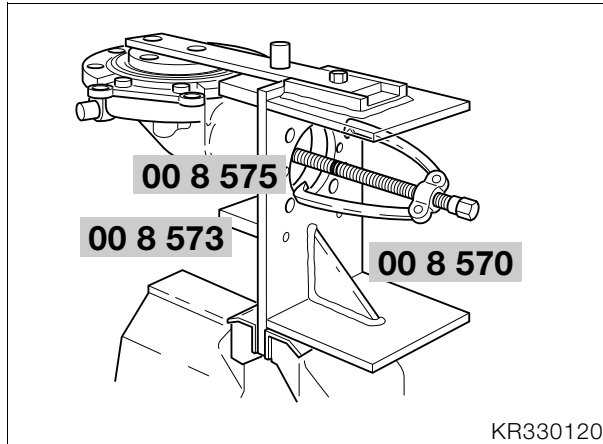
- Clamp input bevel pinion (1) into vise with protective jaws (splines facing upwards).
- Using puller, **BMW No. 00 7 500**, pull off both bearings at the same time.



- Take off radial-thrust bearing (6), roller bearing cage (5), outer race (4) and inner race (3).

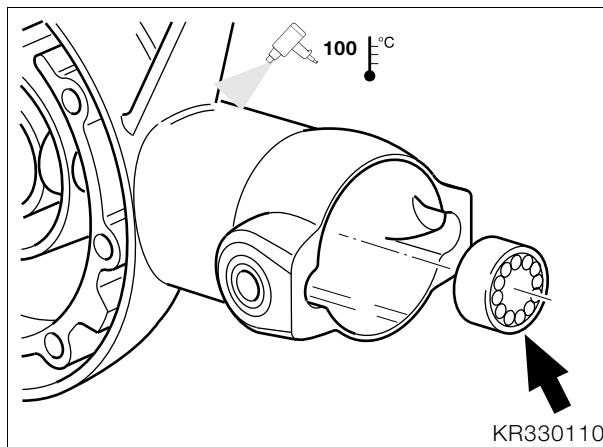
Removing needle roller bearing for input bevel pinion

- Heat the housing to 100 °C (212 °F).



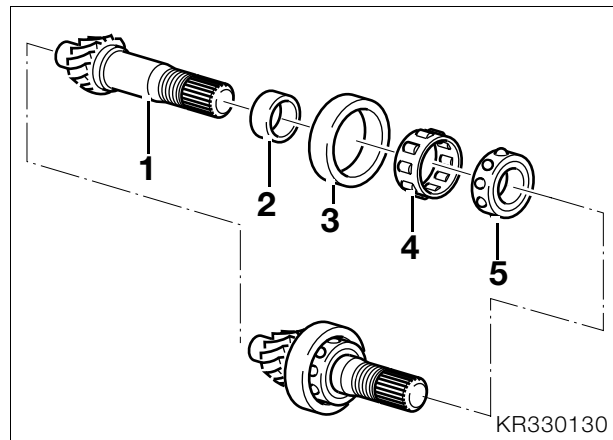
- Pull out the outer race of the needle roller bearing using internal puller, **BMW No. 00 8 573**, extension, **BMW No. 00 8 575**, and reaction support, **BMW No. 00 8 570**.

Installing needle roller bearing for input bevel pinion



- Heat the needle roller bearing seat to 100 °C (212 °F).
- Press in needle roller bearing using drift or the input bevel pinion.

Assembling input bevel pinion



Note:

Clean the threads of the input bevel pinion prior to assembly.

- Heat the inner race (2) to 100 °C (212 °F) and push onto input bevel pinion (1) until seated.
- Slide outer race (3) together with roller cage (4) onto inner race (2).

Note:

Do not overheat the ball cage.

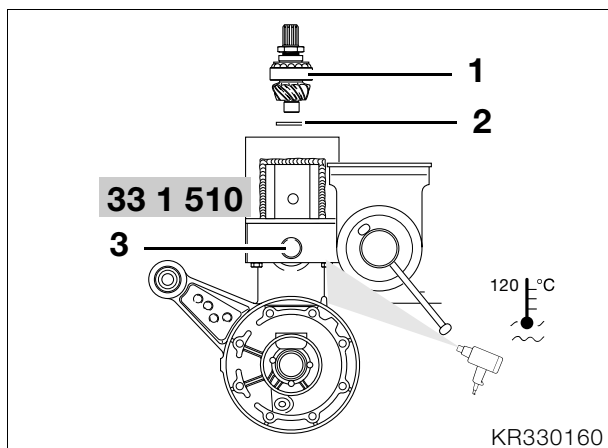
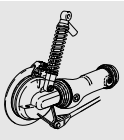
- Heat ball thrust bearing (5) to 100 °C (212 °F) and push onto input bevel pinion (1) until seated.
- Allow input bevel pinion to cool down.

Installing input bevel pinion



Note:

Clean the threads in the housing neck prior to assembly.



- Secure the housing centrally in holder, **BMW No. 33 1 510**, using bearing stud (3).



Caution:

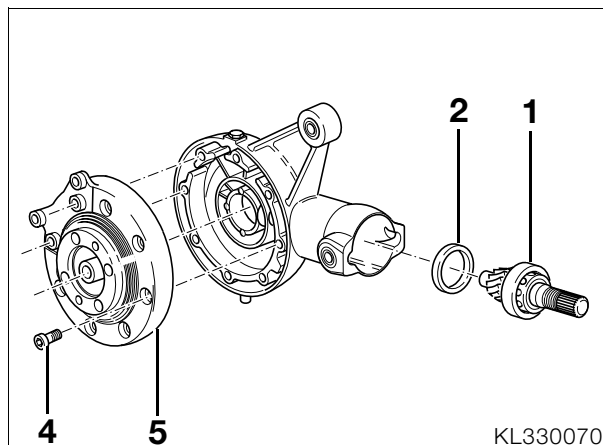
Make sure that the grub screws do not project as otherwise the neck of the housing could be damaged.

- Seat the grub screws in holder, **BMW No. 33 1 510**.
- Using holder, **BMW No. 33 1 510**, clamp the housing upright as illustrated.
- Insert shim (2) into neck of housing.
- Chill input bevel pinion prior to installation in refrigerator/freezer, or similar.
- Heat bearing seat to 120 °C (248 °F).



Note:

When inserting input bevel pinion (1), make sure that it is not tilted.

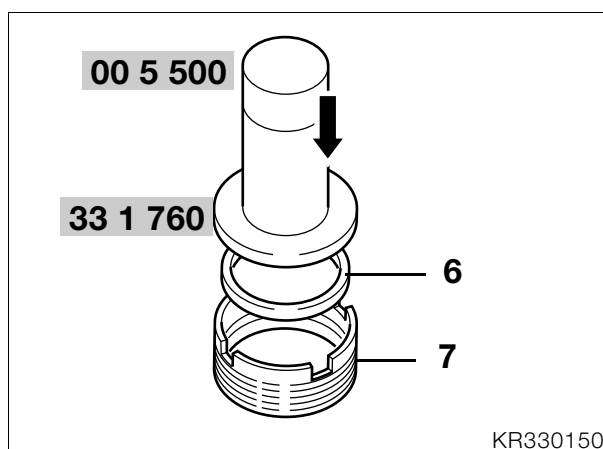


- Insert input bevel pinion (1) into housing.
- Install housing cover (5).
- Tighten fasteners (4) in diagonally opposite sequence.



Tightening torques:

Housing cover to housing 35 Nm



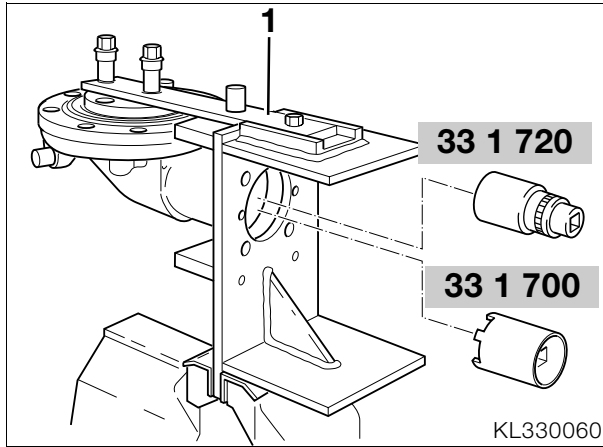
- Clean threads of threaded ring (7).



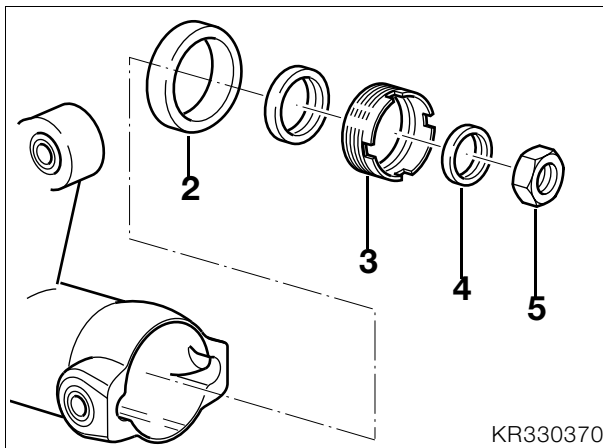
Caution:

Install shaft sealing ring (6) with the sealing lips facing the input bevel pinion.

- Oil shaft sealing ring (6) lightly and drive into threaded ring (7) with drift, **BMW No. 33 1 760**, and handle, **BMW No. 00 5 500**.



- Attach locking arm (1).



- Insert outer race (2).
- Coat threaded ring (3) with **Hylomar SQ 32**.
- Tighten threaded ring (3) with pin wrench, **BMW No. 33 1 700**.
- Oil thrust ring (4) lightly and place in position.



Make sure that the lip of the shaft seal is seated correctly on the thrust ring.

- Clean the threads of hex nut (5).
- Coat the thread of hex nut (5) with **Loctite 270**.



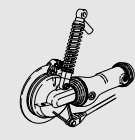
Caution:

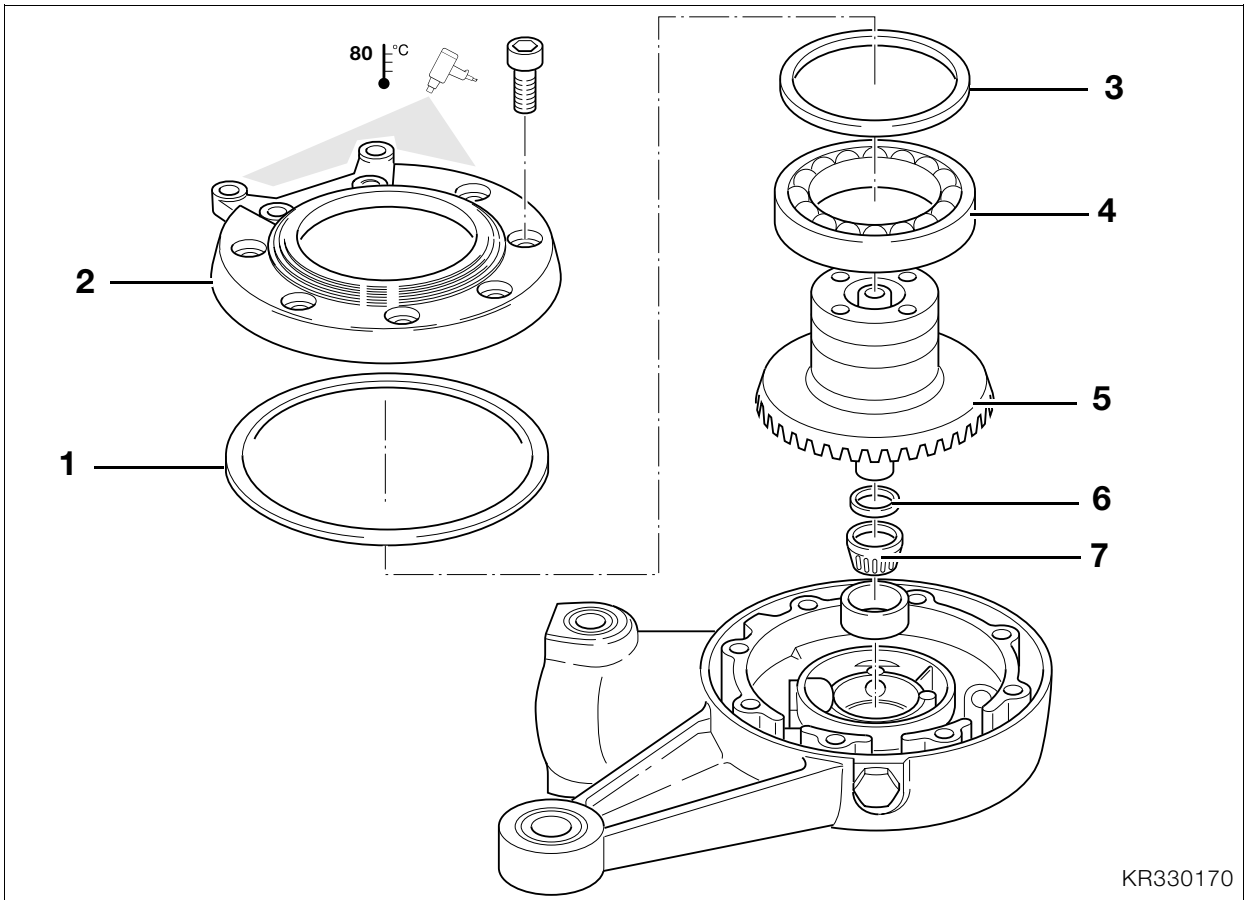
Make sure that the nut does not damage the shaft sealing ring.
Keep thread-locking compound well clear of splined shaft: wipe off all deposits immediately.

- Tighten hex nut (5) with 36 mm (1.4 in) socket wrench insert and reducing adapter, **BMW No. 33 1 720**.

Tightening torques:

Threaded ring (clean thread + Hylomar SQ 32)	118 Nm
Nut for input bevel pinion (clean thread + Loctite 270).....	200 Nm
Housing cover.....	35 Nm

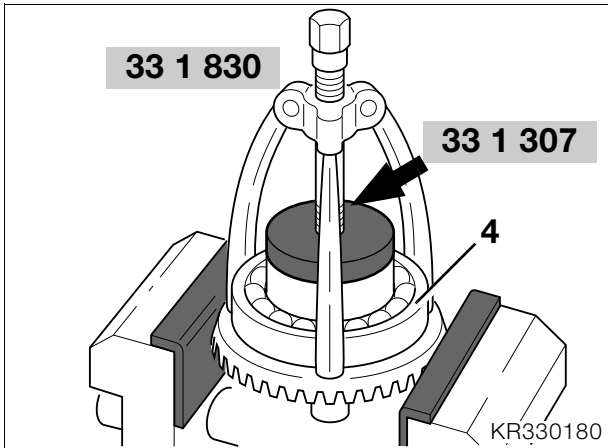




KR330170

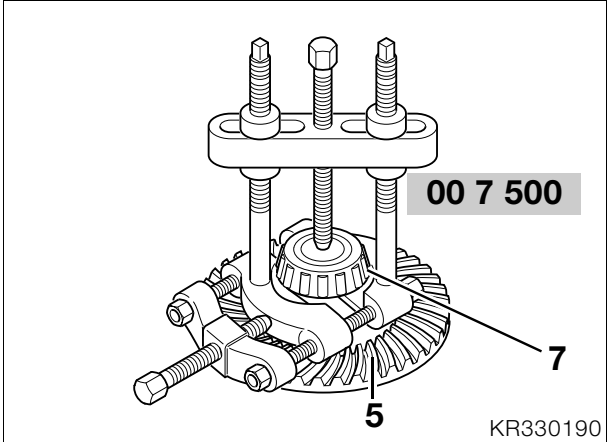
Removing crown wheel

- Remove housing cover (2).
- Remove shim (1).
- Heat housing cover (2) to max. 80 °C (176 °F) and remove from crown wheel (5).
- Drive shaft sealing ring (3) from the inside out of housing cover (2) with a suitable drift.



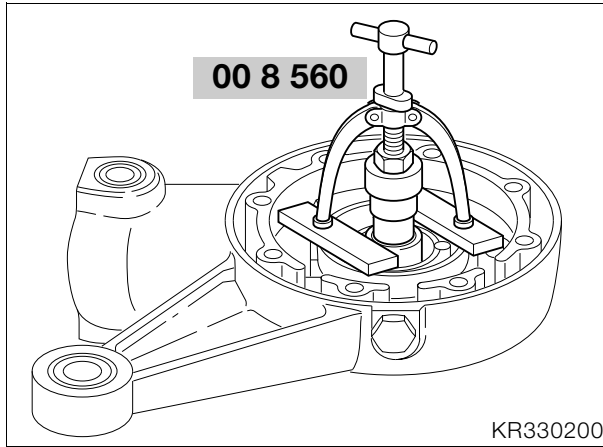
KR330180

- Clamp crown wheel (5) into vise with soft jaws.
- Insert thrust block (arrow), **BMW No. 33 1 307**.
- Using puller, **BMW No. 33 1 830**, pull off grooved ball bearing (4).



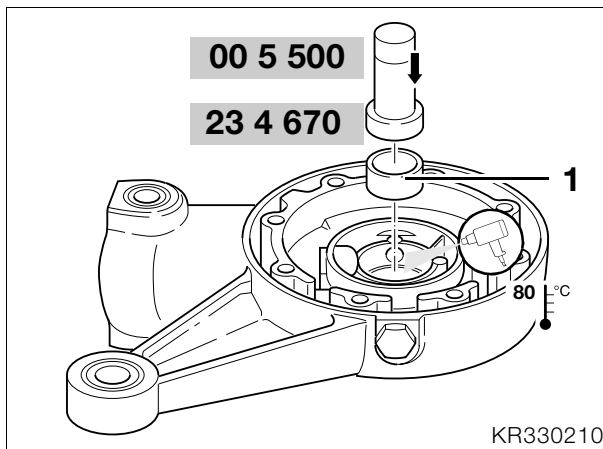
KR330190

- Pull taper roller bearing (7) off crown wheel (5) using puller, **BMW No. 00 7 500**.
- Remove thrust washer (6).



- Pull out the outer race using internal puller, **BMW No. 00 8 560**.

Installing crown wheel

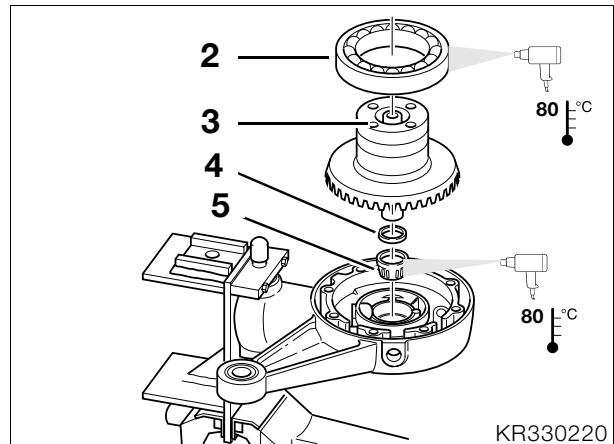


- Heat the housing to 80 °C (176 °F).
- Insert outer race (1) into bearing seat with drift, **BMW No. 23 4 670**, and handle, **BMW No. 00 5 500**.
- Check that outer race is correctly fitted by tapping it gently.

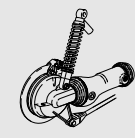


Note:

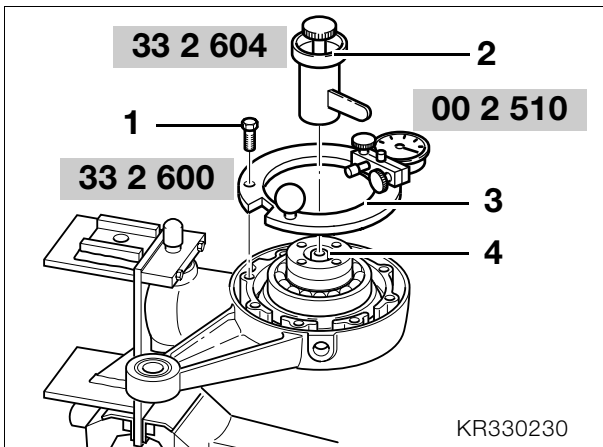
If new parts are installed (e.g. taper roller bearing), check tooth backlash and adjust if necessary.



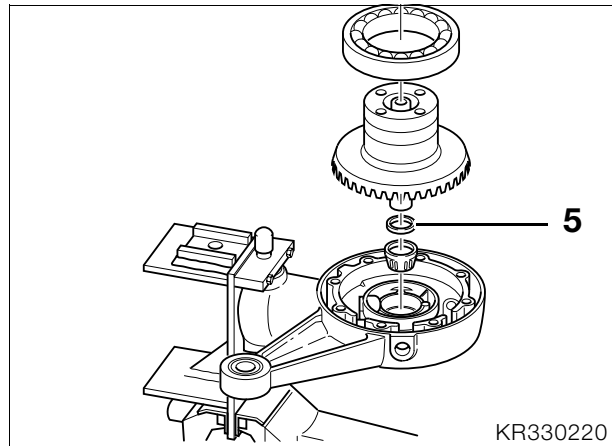
- Affix original shim washer (4) to crown wheel (3) with grease.
- Heat taper roller bearing (5) to 80 °C (176 °F) and push it on.
- Install crown wheel (3).
- Heat grooved ball bearing (2) to 80 °C (176 °F) and place it in position.



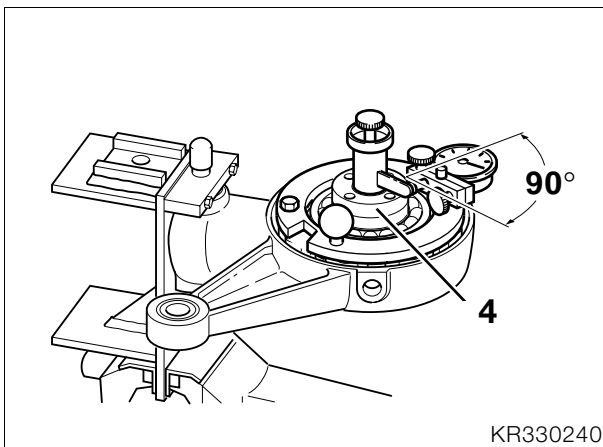
Checking/adjusting backlash



- Position measuring fixture (3), **BMW No. 33 2 600**, with dial gauge, **BMW No. 00 2 510**, on crown wheel (4) and secure to housing by means of screw (1).
- Secure measuring arm (2), **BMW No. 33 2 604**, centrally to crown wheel (4).



- Compensate for excessive tooth backlash by inserting a thinner shim washer (4) or insert a thicker one if tooth backlash is insufficient.



Note:

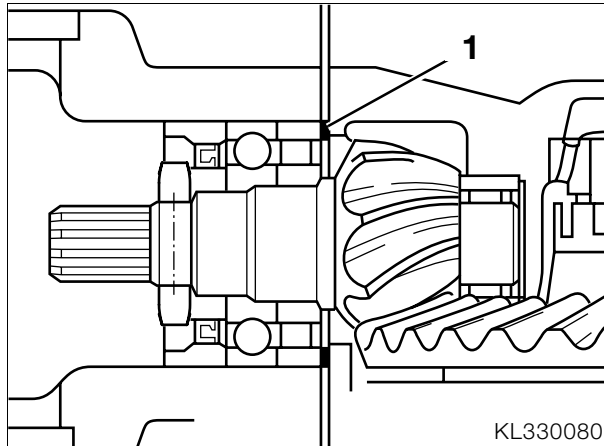
Check tooth backlash at three points 120 degrees apart; turn the bevel pinion with the crown wheel.

- Press the crown wheel (4) into the housing with the palm of the hand and turn to and fro to check tooth backlash.

Backlash:

(without oil) 0.07...0.16 mm (0.003...0.006 in)

Checking tooth contact pattern

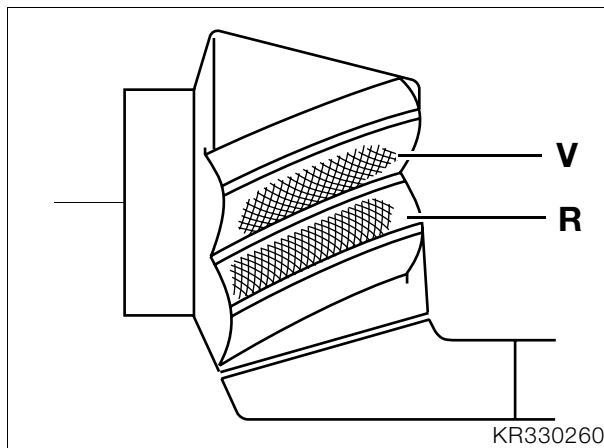


Note:

The tooth contact pattern must be checked if the gear set, housing or input bevel pinion bearing has been replaced.

The contact pattern is adjusted by means of the shim washer (1) on the input bevel pinion.

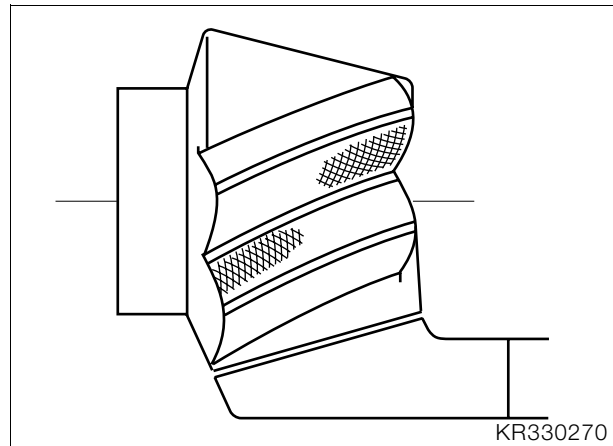
- Use measuring fixture, **BMW No. 33 2 600**, to centre crown wheel.
- Degrease tooth flanks of crown wheel and pinion and coat with **engineer's blue**.
- Insert the crown wheel, press into housing with the palms of the hands and turn to and fro.



Caution:

Teeth should never make contact at the smaller diameter.

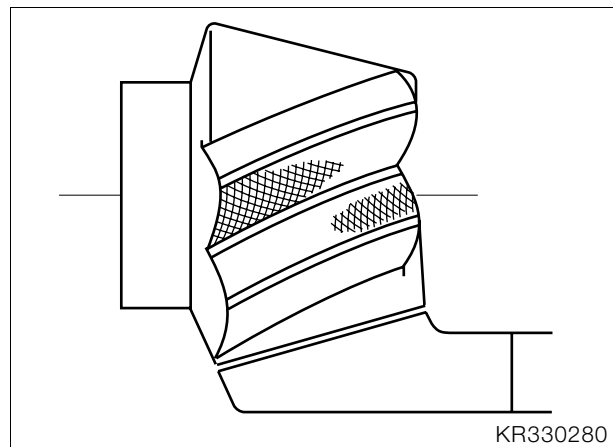
- This is the contact pattern with a shim of the correct thickness and no load applied.



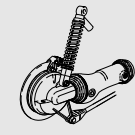
Note:

The contact point is central on front flank V.
The contact point is closer to the larger diameter on back flank R.

- Install a thinner shim if the contact pattern looks like this.

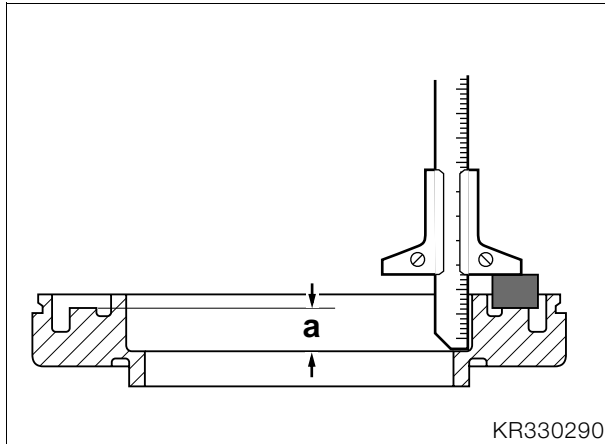


- Install a thicker shim if the contact pattern looks like this.

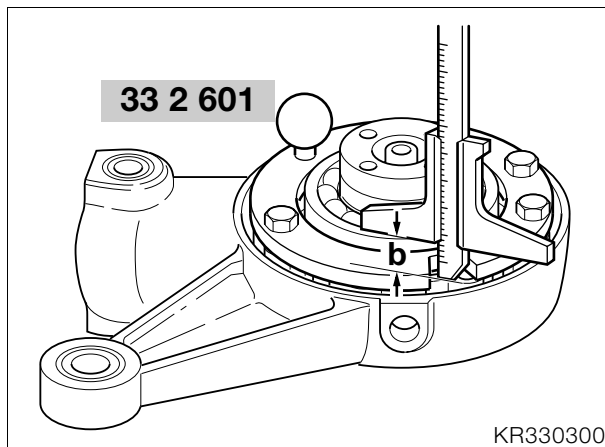


Shimming housing cover

- In order to obtain the correct taper roller bearing preload, the housing cover must be correctly shimmed.



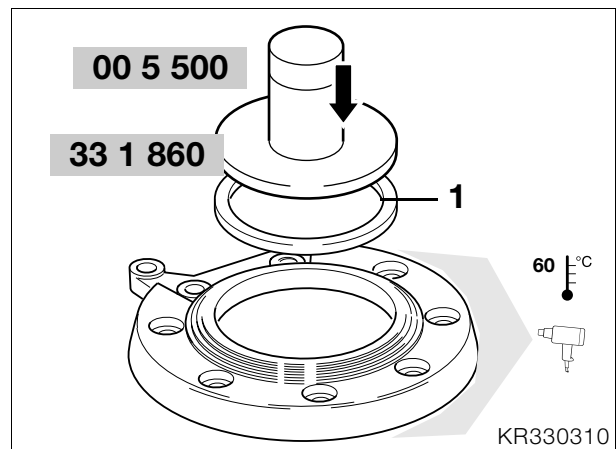
- Using depth gauge, measure distance "a".



- Place measuring ring, **BMW No. 33 2 601**, in position and secure.
- Measure from the outer ball bearing race through the cutout in the measuring ring to the housing mating face and determine distance "b".
 - Distance "a" – distance "b" = shim thickness (without preload).
- Lightly grease the shim of the selected thickness, and place it on the crown wheel.

Preload:..... 0.05...0.1 mm (0.002...0.004 in)

Installing housing cover



- Lightly oil the shaft sealing ring (1).
- Using drift, **BMW No. 33 1 860**, and handle, **BMW No. 00 5 500**, drive in shaft sealing ring (1).



Caution:

Do not overheat shaft sealing ring and cordring seal.

- Lightly oil or grease cordring seal and install.
- Heat the housing cover to 60 °C (140 °F) and place it on the crown wheel.
- Tighten securing screws in diagonally opposite sequence.



Tightening torque:

Housing cover to housing 35 Nm

Installing rear drive shaft

- Coat teeth of drive pinion with **Optimoly MP 3**.
- Place the rear drive shaft on the input pinion.

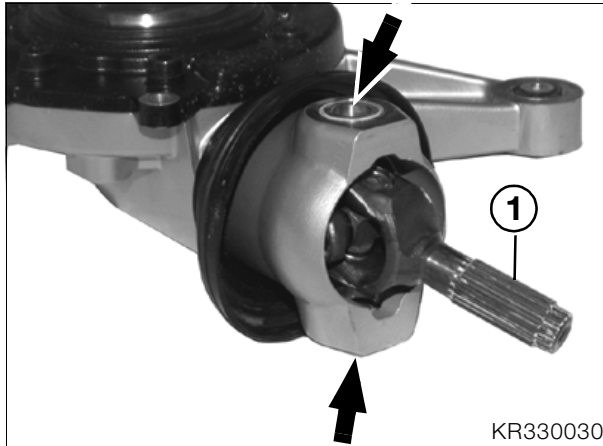


Caution:

Make sure that the circlip is correctly seated in the drive shaft.

- Snap the circlip into position by striking the rear drive shaft lightly with a plastic-headed mallet.

Installing rear wheel drive

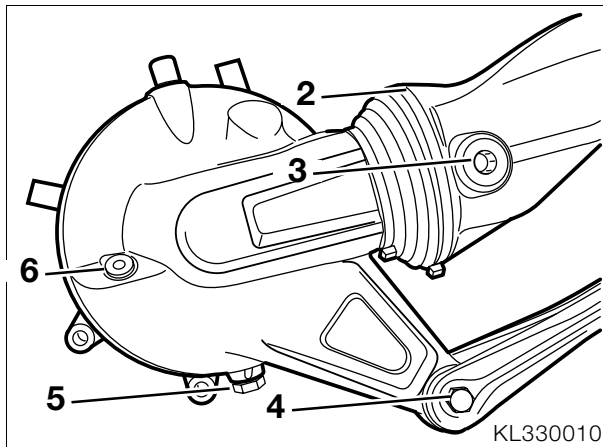


- Coat splines of rear universal shaft (1) with **Optimoly MP 3**.

Caution:

Make sure that the inner race never presses against the ends of the needles.

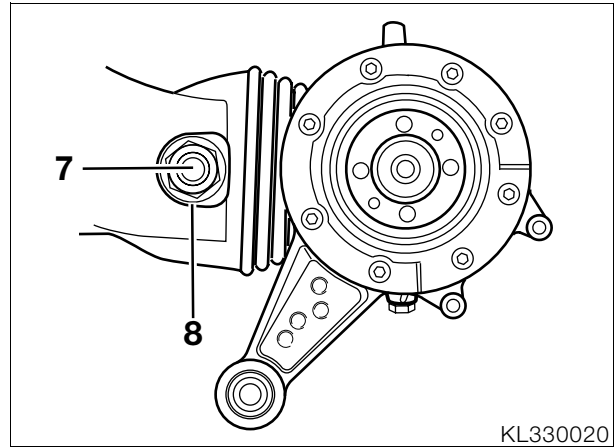
- Install the inner races (arrows) of the left and right needle roller bearings with a small quantity of grease.
- Push the flexible gaiter on to the neck of the housing and secure it with the clamping strap.
- Hold the rear wheel drive with flexible gaiter in position and push the rear drive shaft (1) on to the journal of the front drive shaft.



Caution:

Support the rear wheel drive.

- Screw in the fixed bearing stud (3).



- Install floating bearing stud (7).
- Tighten fixed bearing stud (3).
- Tighten the floating bearing stud (7).
- Hold floating bearing stud (7) with socket wrench, **BMW No. 33 5 642**, to prevent it turning and tighten locknut (8) with socket, **BMW No. 33 6 641**.
- Tighten loose reaction link (4).
- Tighten clamping strap (2) on gaiter.
- Install oil drain plug (5) with new sealing ring and tighten.
- Refill with gearbox oil to correct level.
- Tighten the oil filler plug (6), using a new sealing ring.

Tightening torques:

Fixed bearing stud	160 Nm
Floating bearing stud	7 Nm
Locknut	160 Nm
Reaction link to rear wheel drive	43 Nm
Reaction link to frame	43 Nm
Oil filler/drain plug	23 Nm

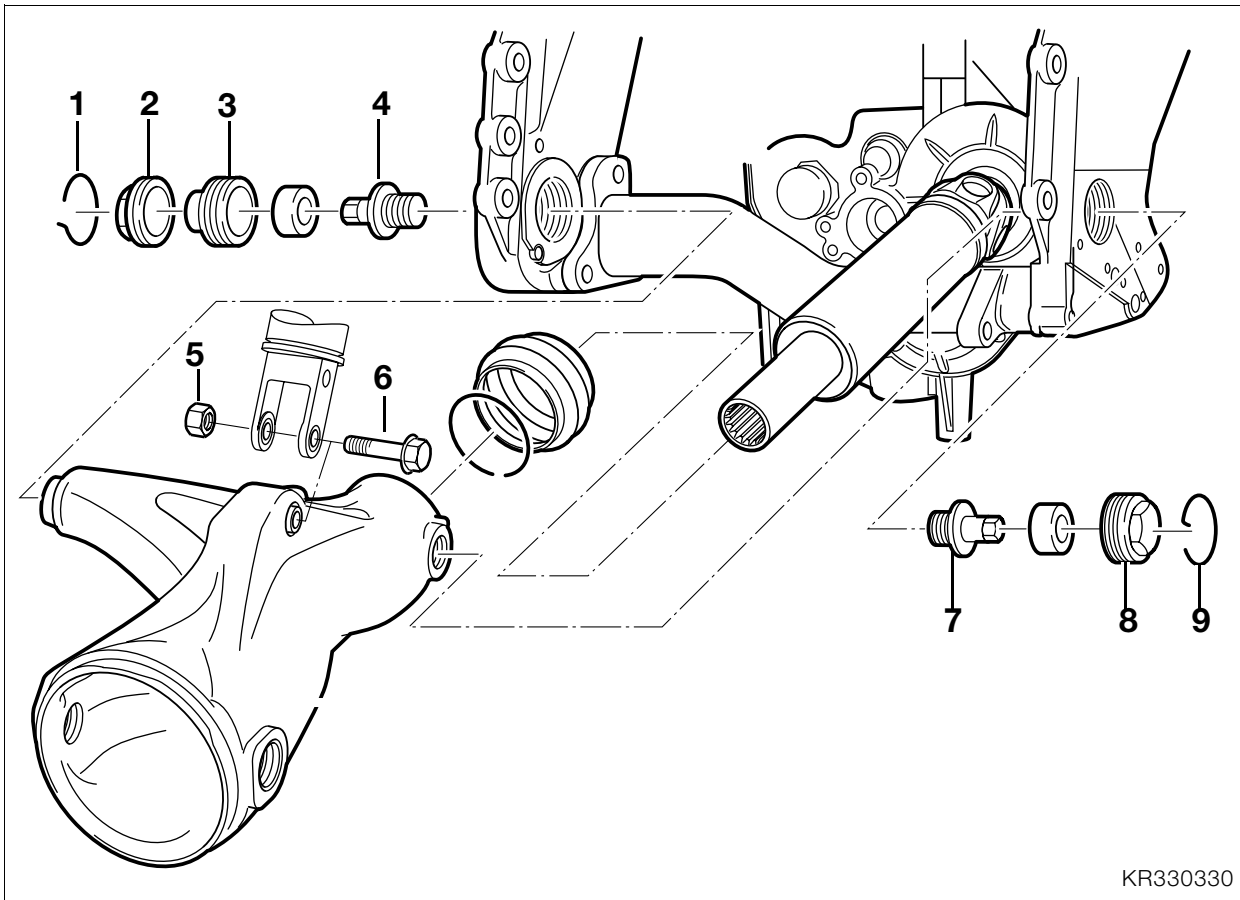
Quantity:

Initial filling0.25 l (0.44 Imp. pint/0.26 US quarts)
Oil
changes0.23 l (0.40 Imp. pint/0.24 US quarts) or
to bottom edge of filler neck

Oil grade:

Brand-name hypoid gear oil, SAE 90, API class GL 5

- Install the brake disc.
- ➡ See Group 34
- Install brake caliper.
- ➡ See Group 34
- Install the inductive signal transmitter.
- ➡ See Group 61
- Install the rear wheel.
- ➡ See Group 36



KR330330

Removing, disassembling, reassembling and installing rear swinging arm

Removing rear swinging arm

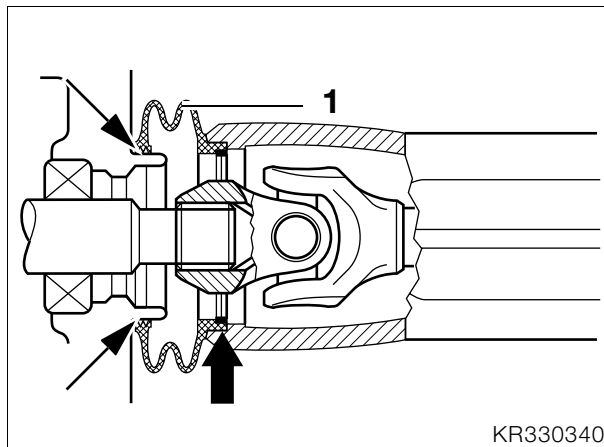
- Remove the right and left front and rear footrest plates.
- ➔See Group 46
- Remove left trim panel and battery cover.
- ➔See Group 46
- Remove exhaust system.
- ➔See Group 18
- Remove rear wheel.
- ➔See Group 36
- Remove the inductive signal transmitter.
- ➔See Group 61
- Remove brake caliper.
- ➔See Group 34
- Secure brake caliper with inductive sensor to rear frame, using a cable tie.
- Remove rear wheel drive unit.
- ➔ See above

Caution:

Note high release torques for lock ring and left and right threaded rings and bearing studs.

- Remove retaining rings (1, 9).
- Remove right threaded ring (8).
- Remove lock ring (2).
- Remove left threaded ring (3).
- Using socket wrench insert, **BMW No. 33 6 643**, slacken bearing studs (4, 7) on left and right.
- Remove screws (5, 6) for shock absorber.
- Push shock absorber up and secure to frame with cable ties.
- Remove bearing studs (4, 7) on left and right.
- Pull swinging arm off drive shaft.

Removing and installing flexible gaiter



- Take out the inner circlip (arrow) and pull the flexible gaiter (1) out of the swinging arm.
- When installing, coat inner and outer sealing lips (arrows) with **Staburags NBU 30 PTM**.

Removing and installing threaded ring bearings



Removing bearing from left/right threaded ring

- Engage pins (arrows) of press-out tool, **BMW No. 33 6 644**, in bores of threaded ring.
- Press the left/right bearing out of the threaded ring.

Installing bearing in left/right threaded ring

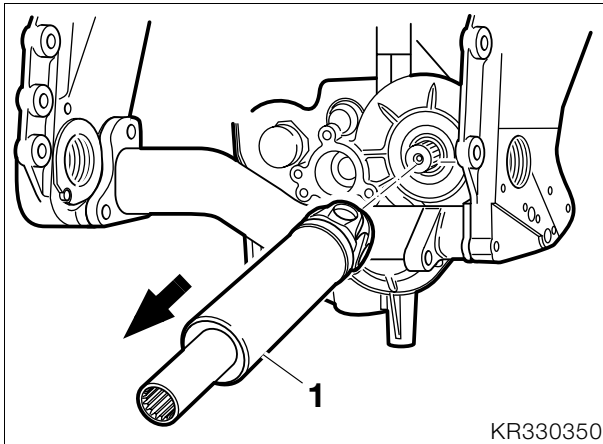


Caution:

Install with the open side of the bearing facing the threaded ring.

- Grease the bearing.
- Press the bearing into the left/right threaded ring.

Removing drive shaft



- Use a tyre lever or similar tool to press off the front drive shaft (1).



Caution:

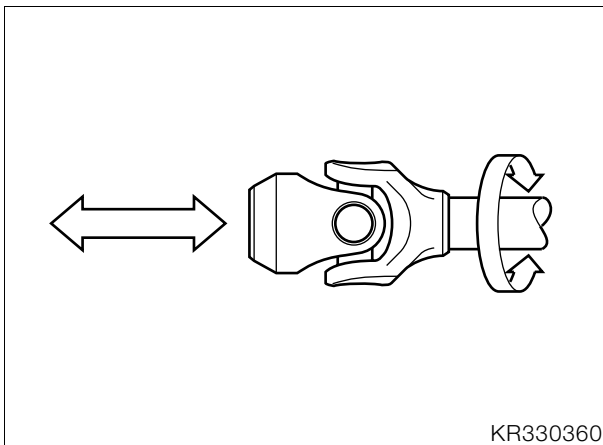
Do not scratch painted components: if necessary, use a rubber mat.



Note:

If necessary, remove/install the circlip in the joint element.

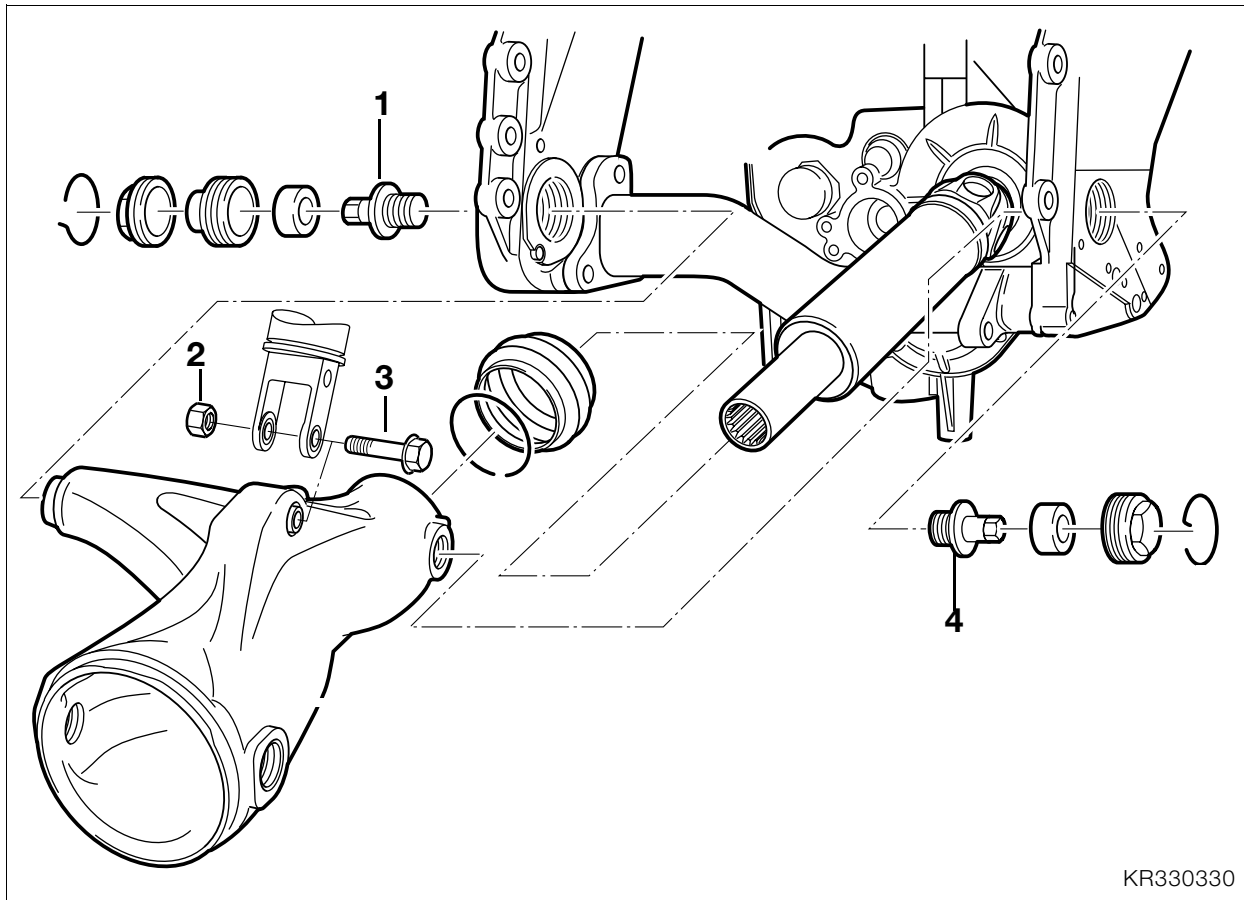
Checking universal joint for wear



- Determine endplay and radial play (arrows).
- Make sure that no play is perceptible at universal joint.

Installing drive shaft

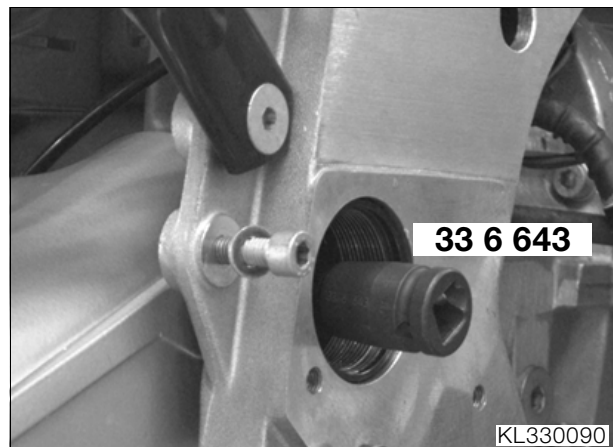
- Coat the output shaft splines with **Optimoly MP 3**.
- Slide the front drive shaft on to the output shaft.
- Snap the circlip into position by striking the drive shaft lightly with a plastic-faced hammer.



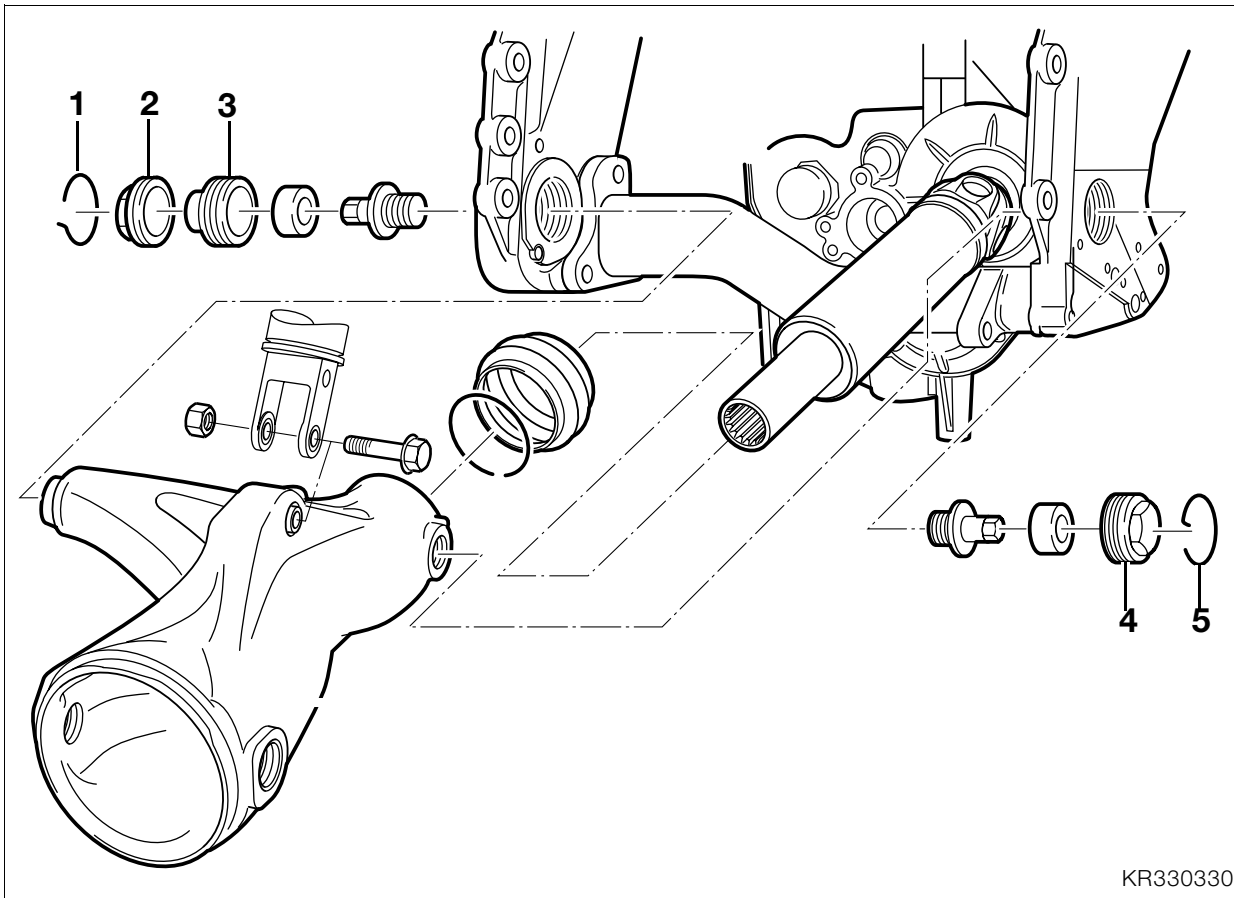
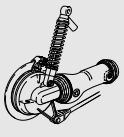
KR330330

Installing rear swinging arm

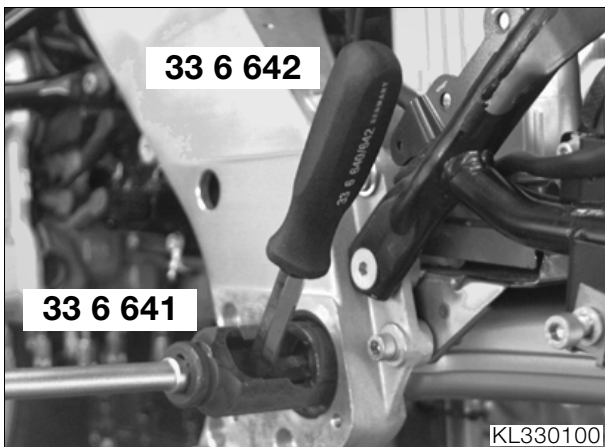
- Slide swinging arm over drive shaft and push forward as far as possible until rubber gaiter clicks into place on housing neck.
- Screw in left/right bearing studs (1, 4).
- Tighten screws (2, 3) securing suspension strut to swinging arm.



- Using socket wrench insert, **BMW No. 33 6 643**, tighten bearing studs (1, 4) on left and right.



KR330330



- Install the rear wheel drive.
 ➞ See above
- Install brake caliper.
 ➞ See Group 34
- Install the inductive signal transmitter.
 ➞ See Group 61
- Install the rear wheel.
 ➞ See Group 36
- Install exhaust system.
 ➞ See Group 18
- Install left trim panel and battery cover.
 ➞ See Group 46
- Install the right and left front and rear footrest plates.
 ➞ See Group 46

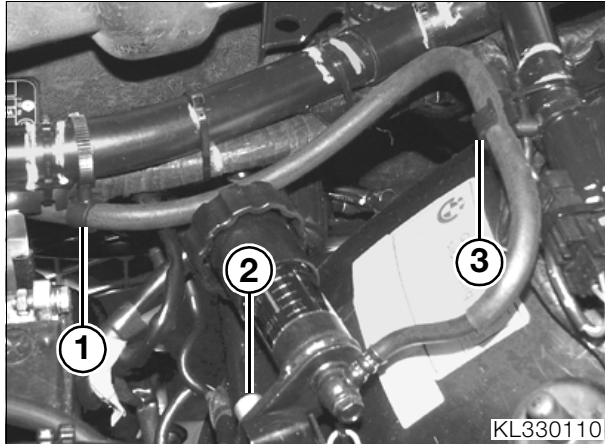
- Tighten the right threaded ring (4).
- Tighten the left threaded ring (3).
- Hold left threaded ring (3) with socket wrench, **BMW No. 33 5 642**, to prevent it turning and tighten locking ring (2) with socket, **BMW No. 33 6 641**.
- Insert circlips (1, 5) on left and right with the hook toward the outside.

⚠ Tightening torques:

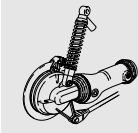
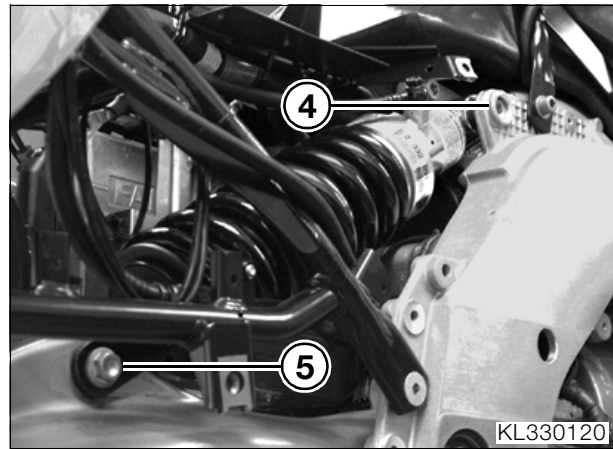
Swinging arm to frame	
Release the left/right bearing stud.....	160 Nm
Threaded ring, right.....	200 Nm
Threaded ring, left.....	10 Nm
Lock ring.....	160 Nm
Suspension strut to swinging arm.....	50 Nm

Removing and installing suspension strut

- Remove left and right fairing side sections.
 ➡See Group 46
- Remove left and right rear footrest plates.
 ➡See Group 46
- Remove the right-hand battery cover.
 ➡See Group 46
- Remove fuel tank.
 ➡See Group 16



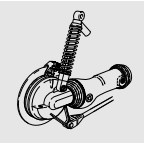
- Remove screw (2) securing handwheel for spring-strut adjustment.
- Disengage line for spring-strut adjustment from holders (1, 3) and pull handwheel down and away.
- Remove protective cap from top spring-strut screw.
- Slightly raise rear wheel to ease load.



- Remove screw (5) securing spring strut at bottom.
- Remove screw (4) securing spring strut at top and remove spring strut.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Clip line for spring-strut securely into holders (1, 3).

! Tightening torques:

Suspension strut to swinging arm	50 Nm
Suspension strut to frame	43 Nm
Handwheel to rear frame	21 Nm

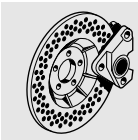


34 Brakes

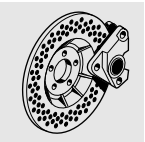
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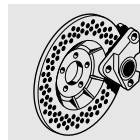
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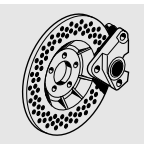


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Technical Data	K 1200 LT	
Brake fluid		DOT 4
Brake actuation		Hydraulic
Front wheel		
Front brake		4-piston fixed callipers, floating discs
Brake disc dia.	mm (in)	305 (12.0)
Brake disc thickness	mm (in)	5.0 (0.20)
Minimum thickness	mm (in)	4.5 (0.18)
Brake pad surface area	mm ² (sq in)	2460 (3.81)
Minimum lining thickness	mm (in)	1.0 (0.04)
Piston dia. in brake calliper	mm (in)	32/34 (1.26/1.34)
Wheel cylinder dia.	mm (in)	16 (0.6)
Sensor gap, front	mm (in)	0.45 ... 0.55 (0.018 ... 0.022)
Brake pad lining		Sintered metal
Rear wheel		
Rear brake		4-piston fixed calliper, floating disc
Brake disc dia.	mm (in)	285 (11.2)
Brake disc thickness	mm (in)	7.0 (0.28)
Minimum thickness	mm (in)	6.5 (0.26)
Brake pad surface area	mm ² (sq in)	2460 (3.81)
Minimum lining thickness	mm (in)	1.0 (0.04)
Piston dia. in brake calliper	mm (in)	32/34 (1.26/1.34)
Wheel cylinder dia.	mm (in)	14 (0.6)
Sensor gap, rear	mm (in)	0.45 ... 0.55 (0.018 ... 0.022)
Brake pad lining		Organic





Front brake calliper

Removing and installing front brake calliper

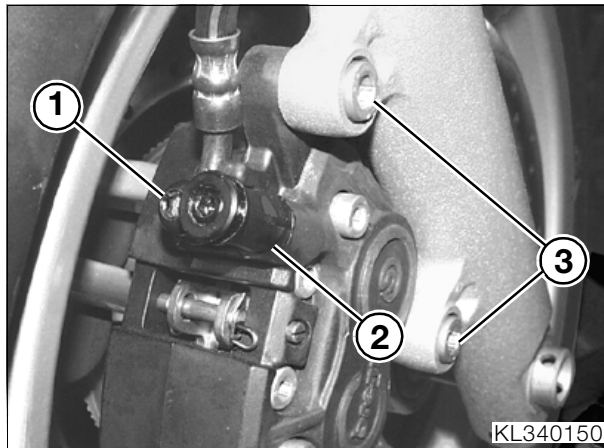


Warning:
Do not separate the two halves of the brake calliper.



Caution:
Do not allow brake fluid to come into contact with painted parts of the motorcycle or with the brake pads.

- Drain the brake system.



Caution:
Avoid scratching the wheel rim; if necessary mask off the brake calliper.

- Remove screws (3) securing brake calliper.
 - Carefully remove brake calliper, if necessary press it back and forth against the brake disc to force back the brake pads and pistons.
 - Remove the brake pads.
- ➔See Group 00



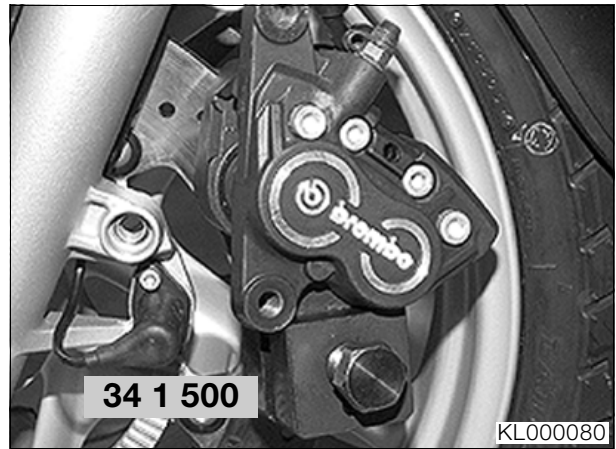
Caution:
Do not operate the brake with the brake callipers removed from the motorcycle.

- Remove banjo bolt (1) for brake hose and remove brake hose.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:
Do not damage the brake pads when installing.

- Replace sealing rings of banjo bolt (1).



- If necessary, press the brake pads/pistons fully back with resetting tool, **BMW No. 34 1 500**.
 - Fill and bleed the brake system.
- ➔See Group 00
- Check/adjust ABS sensor gap.

Sensor gap 0.45...0.55 mm (0.018...0.022 in)



Tightening torques:

Brake calliper to fork slider tube.....	40 Nm
Brake hose to brake calliper.....	18 Nm
Grubscrew in filler adapter	10 Nm
Bleed screw	10 Nm

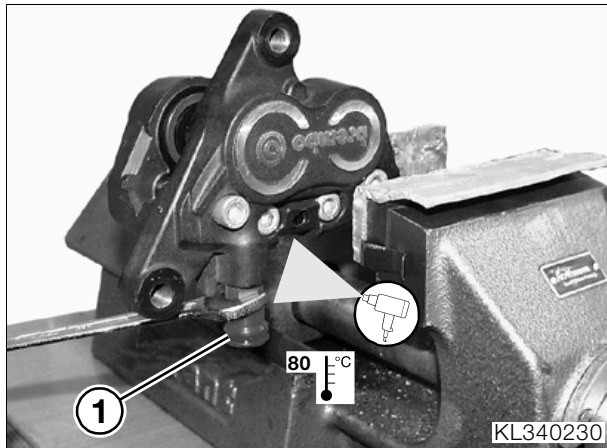
Removing and installing filler adapter

- Remove right-hand brake calliper.
- Remove the brake pads.

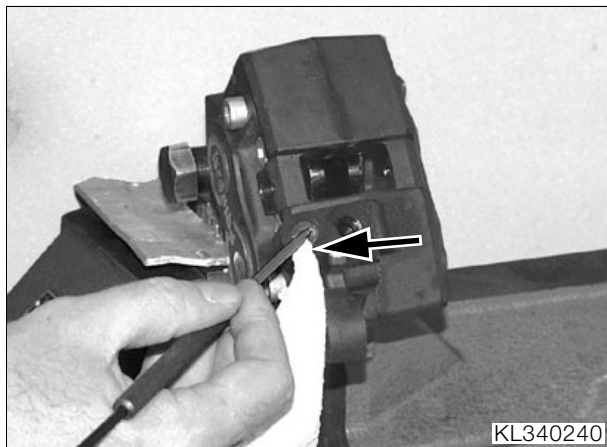


Caution:

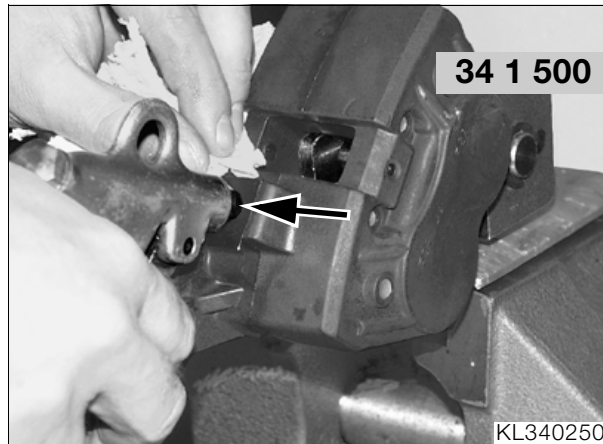
Make sure no traces of thread-locking compound penetrate the brake callipers.



- Clamp the brake calliper in a vise. Filler adapter (1) must point down to ensure that no traces of thread-locking compound can penetrate into the brake calliper when the filler adapter is slackened.
- Heat filler adapter (1) to approx. 80° C (176 °F) and use an open-ended wrench to remove.



- Seal tapped bore in brake calliper with paper towel or similar (arrow).
- Clean threads; use a scribing tool or similar to loosen thread-locking compound residues and blow clear with a low-pressure jet of compressed air.



- Use piston resetting tool, **BMW No. 34 1 500**, to locate brake pistons.
- Apply compressed air to the connection bore (arrow) in the brake calliper to blow the interior clear of all traces of thread-locking compound.
- Remove all traces of brake fluid from threads.
- From this point on, installation is the reverse of the removal procedure.



Tightening torques:

Filler adapter in brake calliper.....	18 Nm
(clean thread + new filler adapter or Loctite 243)	
Brake hose to brake calliper.....	18 Nm
Brake calliper to fork slider tube.....	40 Nm
Grubscrew in filler adapter	10 Nm
Bleed screw	10 Nm

Removing and installing front brake pistons

- Remove the brake calliper.
- Use piston resetting tool, **BMW No. 34 1 500**, to locate two opposing brake pistons.
- Insert a piece of cloth between the two brake pistons not located by the resetting tool.



Warning:

Do not allow your fingers to become trapped between the pistons; risk of injury.

- Carefully press out one of the brake pistons, by applying a compressed air gun to the brake hose connection.
- Wrap a cloth round the empty bore for the brake piston to seal it as tightly as possible.
- Carefully press out the second brake piston, by applying the compressed air gun to the brake hose connection.
- Check brake pistons for hairline cracks, scores and damage.
- Remove the sealing rings from the bores for the brake pistons.
- Coat new sealing rings with brake fluid and install.



Caution:

The brake pistons have a tendency to tilt in their bores during installation: always be careful to keep the pistons square to their bores when installing.

- Coat the brake pistons with brake fluid and carefully insert them into their bores.
- Remove and install the other two brake pistons in the same way.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Before installing the brake calliper, force the pistons fully back with resetting tool, **BMW No. 34 1 500**.

Rear brake calliper

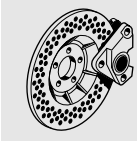
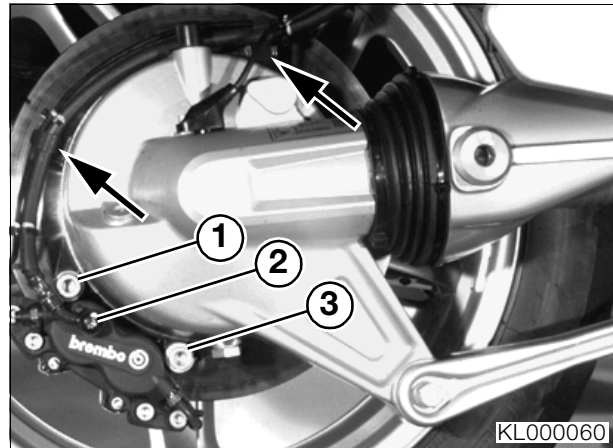
Removing and installing rear brake calliper



Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint.

- Drain the brake system.



Caution:

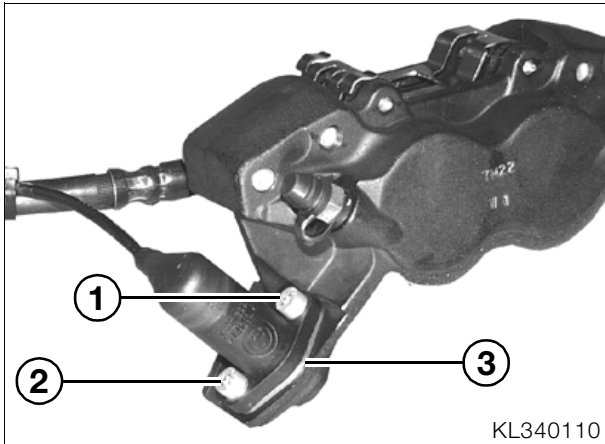
Do not separate the two halves of the brake calliper.

- Release the brake hose from the clips (arrows) on the rear-wheel drive.
- Remove fasteners (1, 3), and remove brake calliper.
- Remove the brake pads.
- ➔See Group 00
- Remove banjo bolt (2) for brake hose from brake calliper and remove brake hose.



Note:

Clean ABS sensor and bore before removing/installing.



- Remove screws (1, 2) and remove ABS sensor with spacer plate (3).
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Replace sealing rings of banjo bolt for brake hose.



Caution:

Do not damage the brake pads when installing.

- If necessary, press the brake pads/pistons fully back with resetting tool, **BMW No. 34 1 500**.
- Check/adjust ABS sensor gap.

Sensor gap..... 0.45...0.55 mm (0.018...0.022 in)



Tightening torques:

Brake calliper to rear wheel drive 40 Nm
 Brake hose to brake calliper 18 Nm
 Bleed screw in brake calliper 10 Nm
 ABS sensor to brake calliper 4 Nm

Removing and installing rear brake pistons

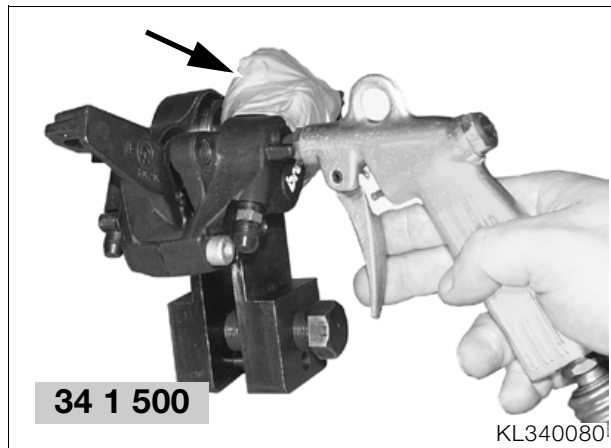
- Remove rear brake calliper.
- Remove the brake pads.
- ➔ See Group 00
- Remove pressure pads from brake pistons.
- Use piston resetting tool, **BMW No. 34 1 500**, to locate two opposing brake pistons.
- Insert a piece of cloth between the two brake pistons not located by the resetting tool.



Warning:

Do not allow your fingers to become trapped between the pistons; risk of injury.

- Carefully press out one of the brake pistons, by applying a compressed air gun to the brake hose connection.



- Wrap a cloth or similar as tightly as possible around the empty bore for the brake piston and secure in place with adhesive tape (arrow).
- Carefully press out the second brake piston, by applying the compressed air gun to the brake hose connection.
- Check brake pistons for hairline cracks, scores and damage.
- Remove the sealing rings from the bores for the brake pistons.
- Coat new sealing rings with brake fluid and install.



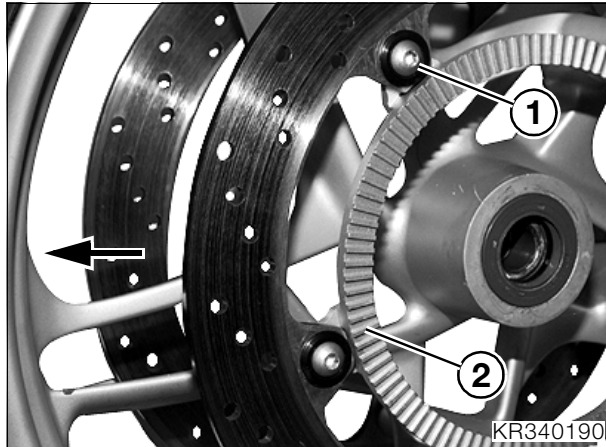
Caution:

The brake pistons have a tendency to tilt in their bores during installation: always be careful to keep the pistons square to their bores when installing.

- Coat the brake pistons with brake fluid and carefully insert them into their bores.
- Remove and install the other two brake pistons in the same way.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Before installing the brake calliper, force the pistons fully back with resetting tool, **BMW No. 34 1 500**.

Removing and installing front brake disc

- Remove front wheel.
- ➡See Group 36



⚠ Caution:

Retaining screws are secured with thread-locking compound and should be heated if necessary before removal.

- Remove five screws (1) securing the brake disc.
- Remove brake disc along with sensor ring (2) on left-hand side.
- Installation is the reverse of the removal procedure: pay particular attention to the following.

⚠ Caution:

Degrease the brake disc before installing. Note the pattern of the holes in the brake disc; the arrow in the illustration points in the forward direction of travel. If a new brake disc is installed, the sensor ring must be re-marked.

- Check/adjust ABS sensor gap.

Sensor gap 0.45...0.55 mm (0.018...0.022 in)

🔧 Tightening torques:

Brake disc to front wheel
(clean thread + Loctite 243) 21 Nm

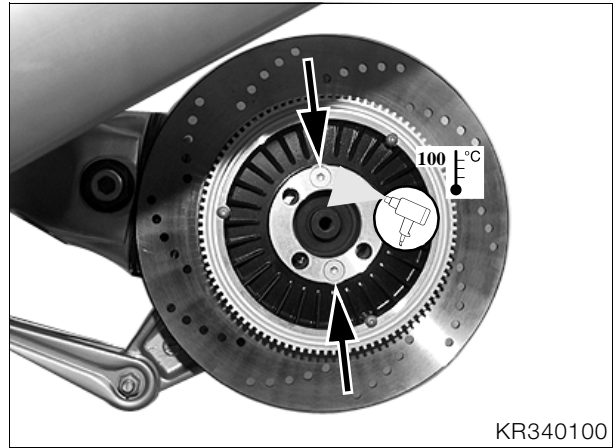
Removing and installing rear brake disc

- Remove rear wheel.
- ➡See Group 36
- Remove the brake calliper.



Note:

Mark the installed position of the brake disc on the rear wheel drive, so that vertical runout of the sensor ring is not altered.



⚠ Caution:

Screws are secured with thread-locking compound.

- Heat the screws (arrows) securing the brake disc to approx. 100 °C (212 °F) to remove and re-remove the brake disc.
- Installation is the reverse of the removal procedure: pay particular attention to the following.

⚠ Caution:

Degrease the brake disc before installing. When installing use new screws. If a new brake disc is installed, the sensor ring must be re-marked.

- Check/adjust ABS sensor gap.

Sensor gap 0.45...0.55 mm (0.018...0.022 in)

🔧 Tightening torques:

Brake disc to rear wheel drive
(clean thread + new screws) 21 Nm
Brake calliper to rear wheel drive 40 Nm



Removing and installing front ABS sensor

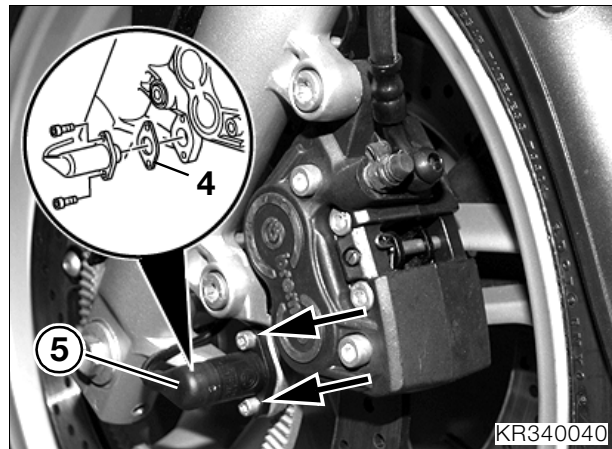
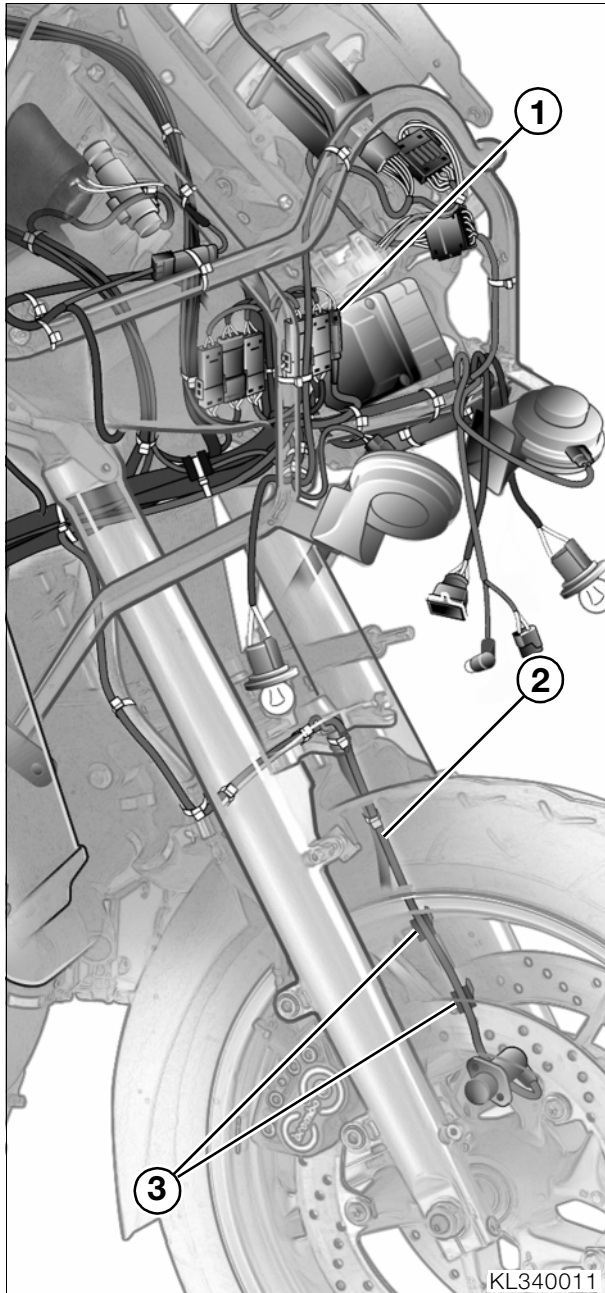
- Remove right side section of fairing.



Caution:

Disconnect ground lead from battery and insulate.

- Remove the left brake calliper.



- Release the fasteners (arrows) for ABS sensor (5).
- Take off ABS sensor (5) with spacing plate (4).
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:

Carefully route the ABS cable and secure in position with cable ties.

- Check/adjust ABS sensor gap.

Sensor gap..... 0.45...0.55 mm (0.018...0.022 in)



Tightening torque:

ABS sensor fasteners..... 4 Nm

Removing front ABS sensor ring

- Remove front left brake disc.



Tightening torque:

Brake disc to front wheel (clean thread + Loctite 243)..... 21 Nm

- Open cable ties securing ABS sensor cable (2).
- Release ABS sensor cable (2) from clips (3) on telescopic fork.
- Disconnect plug (1).



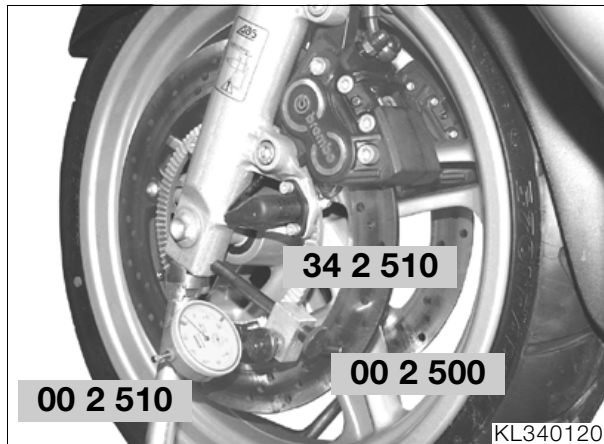
Note:

Clean ABS sensor and bore before removing/installing.

Adjusting front ABS sensor

Marking the ABS sensor ring

- Take load off front wheel and lift clear of ground.



- Remove clamping screw from left fork tube.
- Secure dial gauge holder, **BMW No. 00 2 500**, with dial gauge, **BMW No. 00 2 510**, and measuring shoe, **BMW No. 34 2 510**, to fork slider tube.
- Zero the dial gauge.
- Measure axial runout round the entire circumference of the sensor ring.

Caution:

If replacement parts are fitted, the sensor ring must be re-marked; remove the old mark.

- With a paint pencil, make a permanent mark at the point on the ABS sensor ring at the greatest distance from the ABS sensor.
- Remove dial gauge holder, **BMW No. 00 2 500**, with dial gauge, **BMW No. 00 2 510**, from fork slider tube.
- Tighten the clamping screw in the fork tube.
- Check/adjust ABS sensor gap.

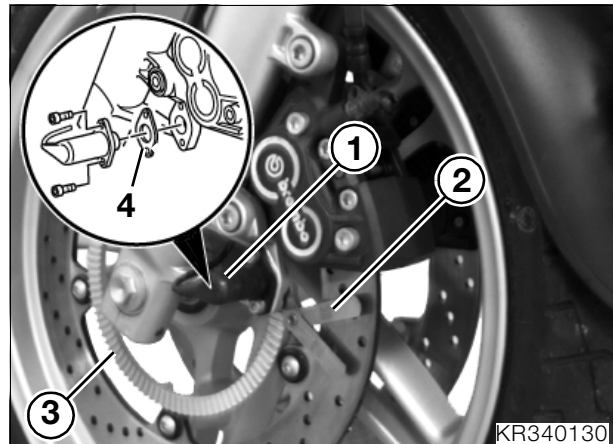
Tightening torque:

Clamp screw in telescopic fork 21 Nm

Checking/adjusting ABS sensor gap

- Take load off front wheel and lift clear of ground.

Checking ABS sensor gap



- Align the marked point on sensor ring (3) with ABS sensor (1).
- Check ABS sensor gap by inserting a feeler gauge (2) between ABS sensor (1) and sensor ring (3).

Adjusting ABS sensor gap

- Slacken ABS sensor (1).

Caution:

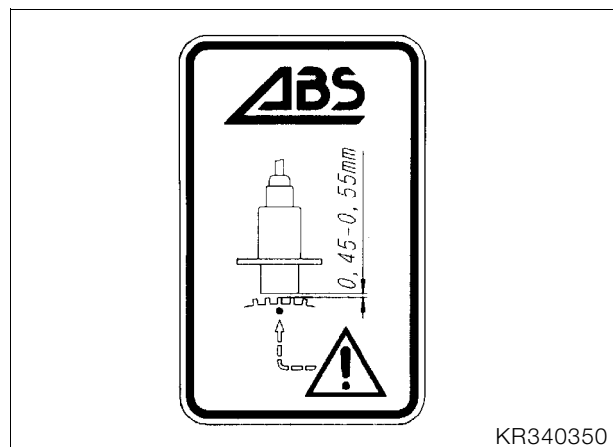
After adjusting, check clearance of the ABS sensor round the entire circumference of the sensor ring.

- Adjust sensor gap with spacing plate (4) and re-check.

ABS sensor gap 0.45...0.55 mm (0.018...0.022 in)

Tightening torque:

ABS sensor fasteners..... 4 Nm

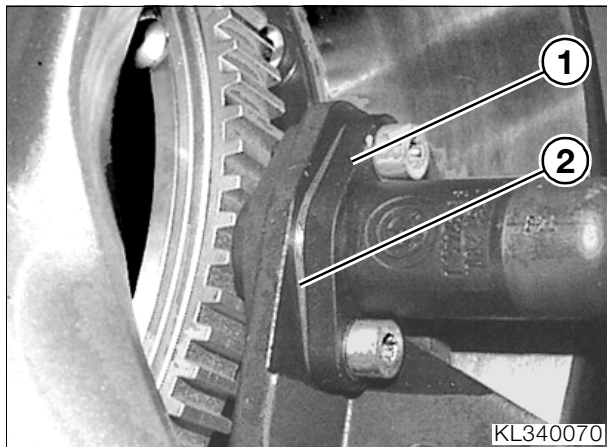


Removing and installing rear ABS sensor

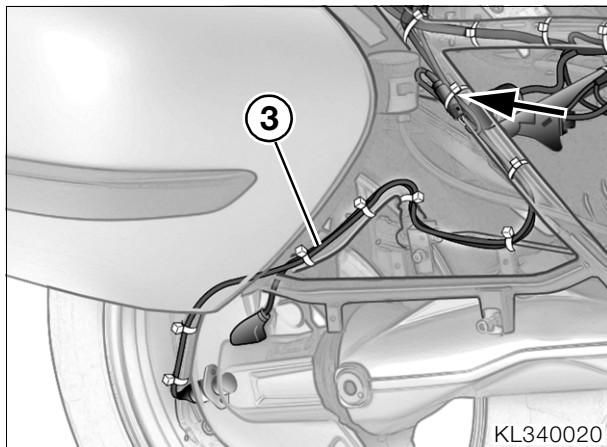


Caution:

Disconnect ground lead from battery and insulate.



- Clean ABS sensor (1) and bore before removing and installing.
- Remove screws securing ABS sensor (1) from brake calliper.
- Remove ABS sensor (1) with spacing plate (2).



- Open cable ties securing ABS sensor cable (3).
- Disconnect plug (arrow).
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:

Carefully route the ABS cable and secure in position with cable ties.

- Check/adjust ABS sensor gap.

ABS

sensor gap 0.45...0.55 mm (0.018...0.022 in)



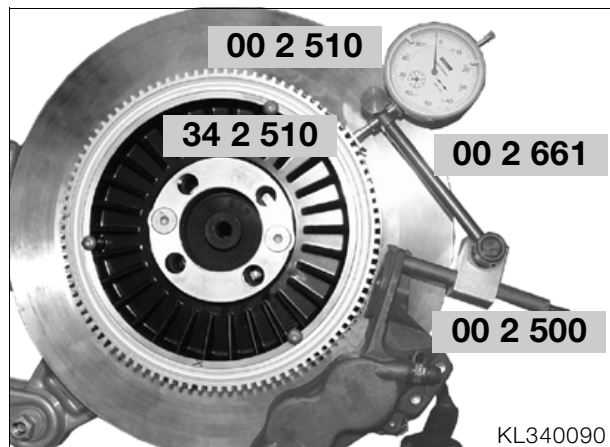
Tightening torque:

ABS sensor mount 4 Nm

Adjusting rear ABS sensor

Marking the ABS sensor ring

- Remove rear wheel.
- Remove the ABS sensor.



- Secure dial gauge holder, **BMW No. 00 2 500**, with dial gauge, **BMW No. 00 2 510**, extension, **BMW No. 00 2 661**, and measuring shoe, **BMW No. 34 2 510**, to tapped bores for ABS sensor fasteners.
- Zero the dial gauge.
- Measure radial runout round the entire circumference of the ABS sensor ring.



Caution:

If replacement parts are fitted, the sensor ring must be re-marked; remove the old mark.

- With a paint pencil, make a permanent mark at the point on the ABS sensor ring at the greatest distance from the ABS sensor.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Check/adjust ABS sensor gap.

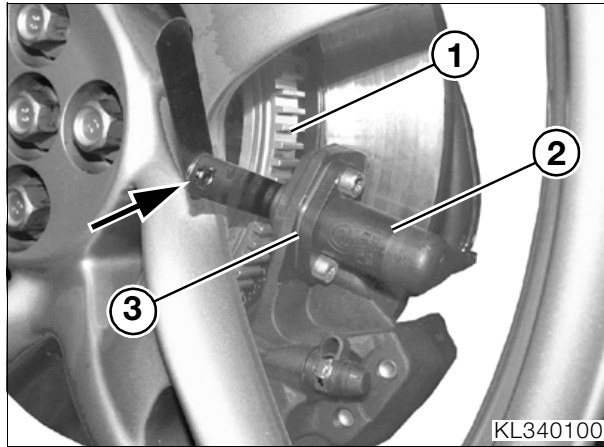


Tightening torque:

ABS sensor 4 Nm

Checking/adjusting ABS sensor gap

Checking ABS sensor gap



- Align the marked point on sensor ring (1) with ABS sensor (2).
- Use ABS feeler gauge (arrow) to check the gap between the ABS sensor and the sensor ring.

Adjusting ABS sensor gap

- Slacken ABS sensor.



Caution:

After adjusting, check clearance of the ABS sensor round the entire circumference of the sensor ring.

- Adjust sensor gap with spacing plate (3) and re-check.

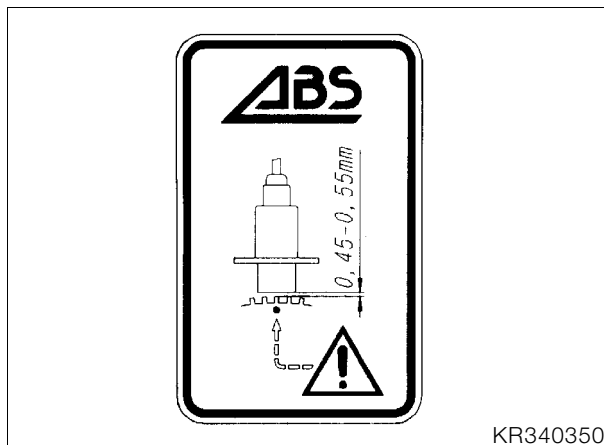
ABS

sensor gap 0.45...0.55 mm (0.018...0.022 in)



Tightening torque:

ABS sensor mount 4 Nm



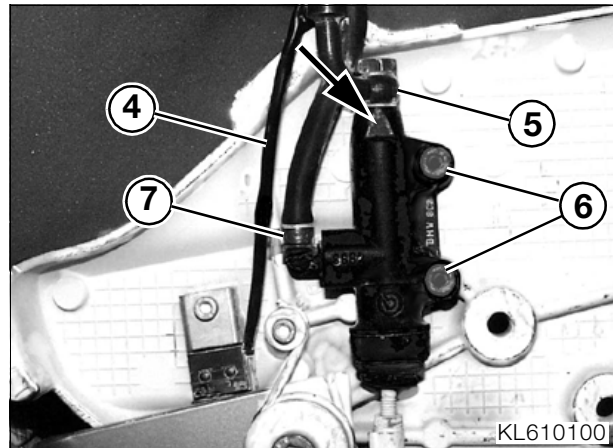
Removing and installing rear brake master cylinder



Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint.

- Drain the brake system.
- Remove right footrest plate.



Note:

Mark installed position of brake hose (5) relative to brake master cylinder.

- Remove screws (6) and remove brake master cylinder.
- Open non-reusable hose clip (7) and disconnect return hose (4).
- Use an open-ended wrench to hold at the flats (arrow) and disconnect brake hose (5).
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Tighten new non-reusable hose clip (7) with pliers, **BMW No. 13 1 500**.
- Check and, if necessary, adjust play at piston rod.



Tightening torques:

Master cylinder to footrest plate 9 Nm
(clean thread + Loctite 243)
Brake hose to brake master cylinder 18 Nm
Footrest plate to frame 21 Nm

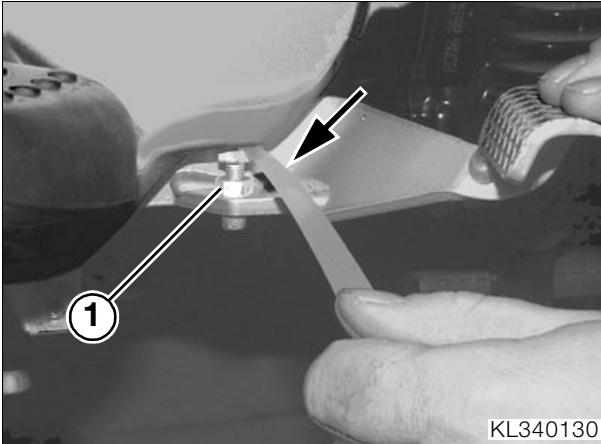
Checking/adjusting play at piston rod



Warning:

All adjustments must be performed by an authorised BMW dealer.

Checking play at piston rod



- Use a feeler gauge (arrow) to check the gap between the brake-light switch plate and adjusting screw (1).

Feeler gauge thickness 0.5 mm (0.02 in)

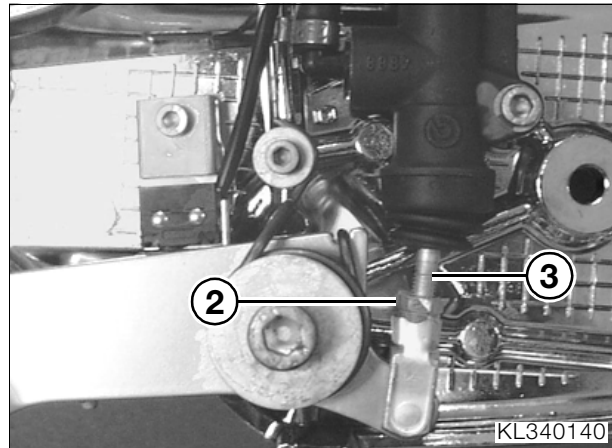
Adjusting play at piston rod



Warning:

First adjust the brake light switch for the foot brake.

- Remove right footrest plate.



- Unscrew locknut (2) at piston rod (3).
- Insert a feeler gauge between the adjusting screw and the brake light switch plate.
- Turn piston rod clockwise until play is perceptible.
- Carefully back off the piston rod until all play is taken up.
- Tighten locknut.
- Check and, if necessary, re-adjust play.

Feeler gauge thickness 0.5 mm (0.02 in)



Tightening torques:

Locknut 9 Nm
Footrest plate to frame 21 Nm

Removing and installing ABS control unit



Warning:

All work on the ABS control unit must be carried out by an authorised BMW workshop.



Caution:

Disconnect the negative battery terminal first, then the positive one.

- Remove the battery.
- ➡See Group 00, Battery
- Drain front and rear brake systems.
- Remove left and right rear footrests.
- ➡See Group 46
- Remove left and right fairing side sections.
- Remove left and right battery covers.



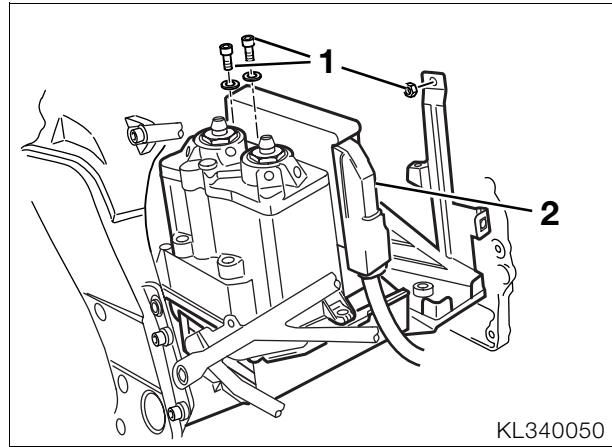
Warning:

Comply with safety precautions when handling or working with fuel.

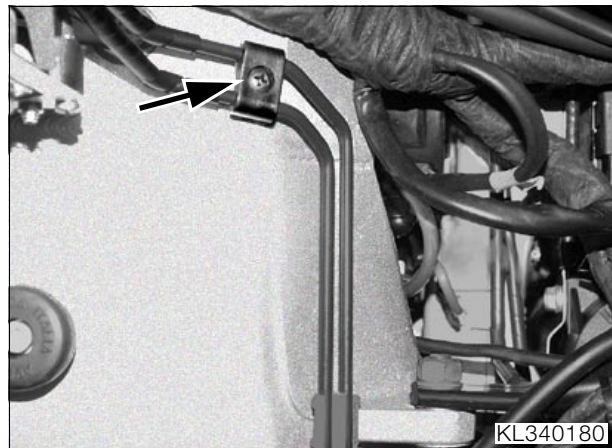
- Remove fuel tank.
- ➡See Group 16



- Remove securing screws (arrows) and remove retaining plate for plug connectors.
- Remove fasteners securing coolant expansion tank.



- Disconnect plug (2) from ABS control unit.
- Remove control unit for reverser.
- ➡See Group 61



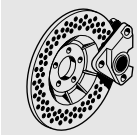
- Remove the holder (arrow) for the front brake lines from the main frame.

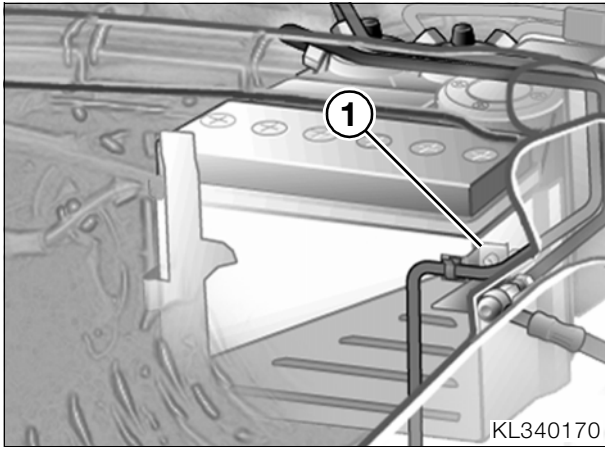


Caution:

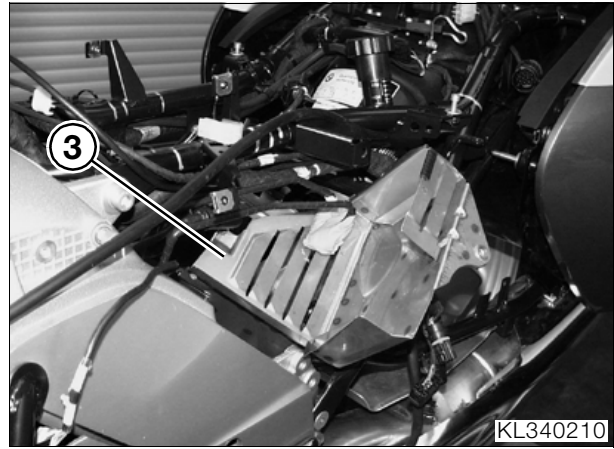
Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint. Wrap cloths around the ends of the pressure lines to prevent residual brake fluid escaping.

- Disconnect brake lines from ABS pressure modulator.
- Remove screws (1) securing the battery carrier to the frame.

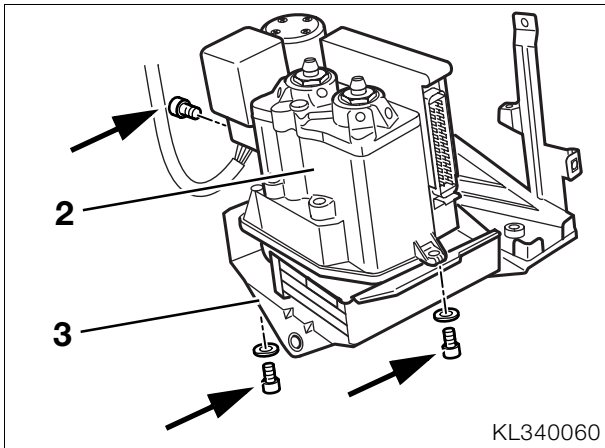




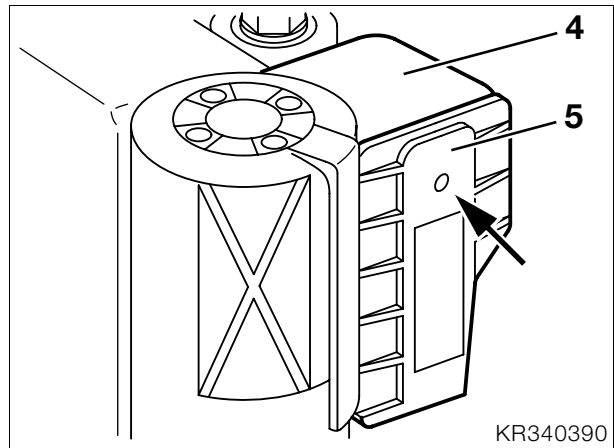
- Remove retaining plate (1) for brake line from the battery carrier.



- Remove battery carrier (3), if necessary.



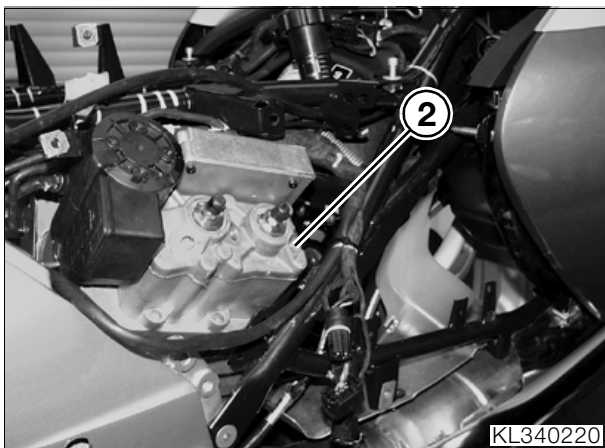
- Slightly raise ABS control unit (2) complete with battery carrier (3) and pull the assembly toward the rear.
- Release the retaining screws (arrows).



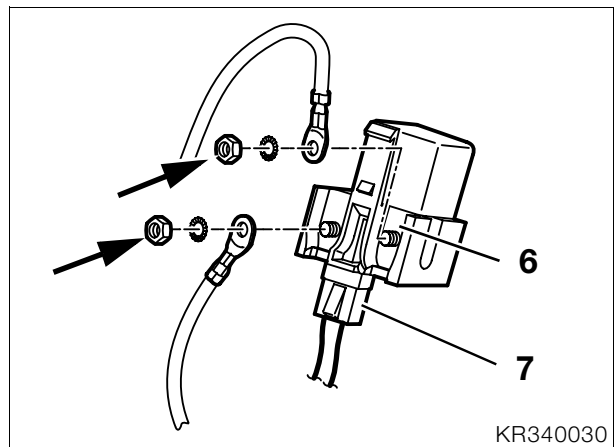
- Using a small screwdriver, press end cover (5) of ABS relay housing (4) in (arrow) and at the same time pull end cover (5) upwards.
- Scrap the old cover (5).

⚠ Caution:

Take care not to scratch the frame while removing the ABS pressure modulator; cover with masking tape as necessary.



- Remove ABS control unit (2).



- Release the fasteners (arrows) for the cables and plug connector (7) at ABS relay base (6).

- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Install a new end cover for the ABS relay housing.
- Route all cables correctly and secure with cable ties.



Note:

The front fastener (long pointed screw) of the left-hand rear footrest plate is also the anchorage point for the battery carrier.



Tightening torques:

ABS control unit to battery carrier M 5	4 Nm
ABS control unit to battery carrier M 6	9 Nm
Battery carrier to frame M 6.....	9 Nm
Retaining plate for brake line to battery carrier.....	4 Nm
Brake lines to frame M 5	4 Nm
Brake line at ABS control unit.....	18 Nm
Bleed screw in brake calliper/ ABS pressure modulator	10 Nm
Grubscrew in filler adapter	10 Nm
Retaining plate for plug connectors to frame.....	9 Nm
Footrest plate to frame/battery carrier	21 Nm
Lifter handle to rear frame	9 Nm
Seat, rear, to rear frame	9 Nm

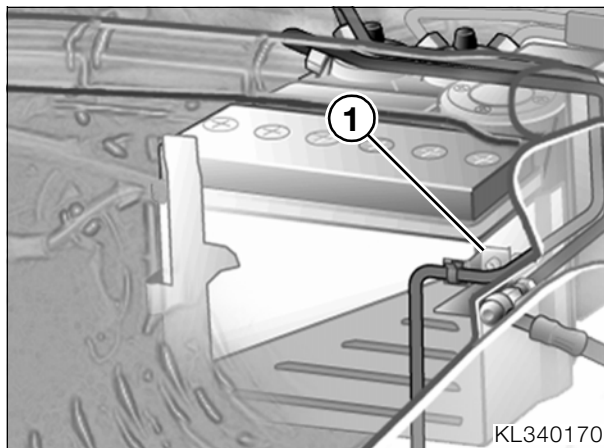
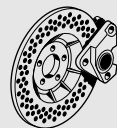
Removing and installing ABS relay



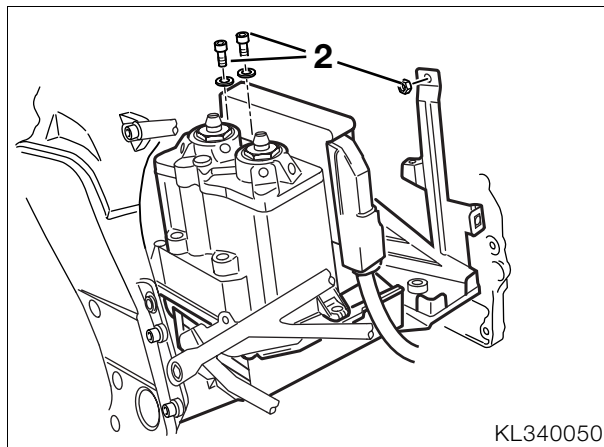
Caution:

Disconnect the negative battery terminal first, then the positive one.

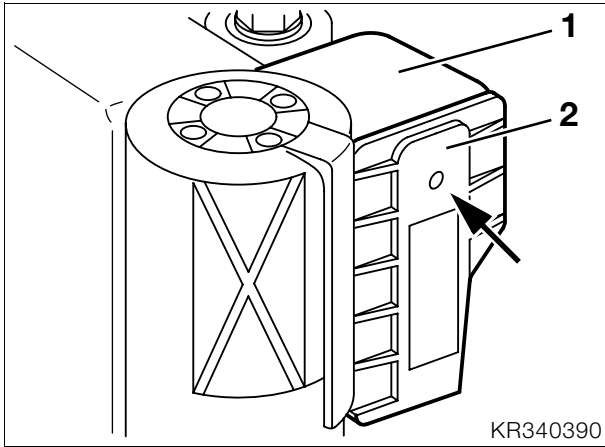
- Remove the battery.
 - ➔See Group 00, Battery
- Remove left and right rear footrests.
 - ➔See Group 46
- Remove left and right fairing side sections.
- Remove left and right battery covers.
 - Remove control unit for reverser.
 - ➔See Group 61



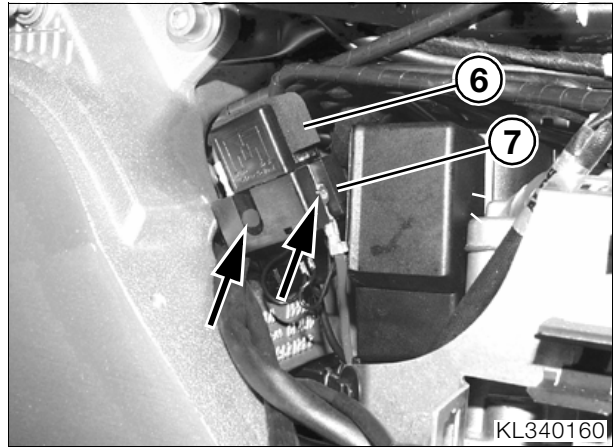
- Remove retaining plate (1) for brake line from the battery carrier.



- Remove screws (2) securing the battery carrier to the frame.



- Using a small screwdriver, press end cover (2) of ABS relay housing (1) in (arrow) and at the same time pull end cover (2) upwards.
- Scrap the old cover (2).

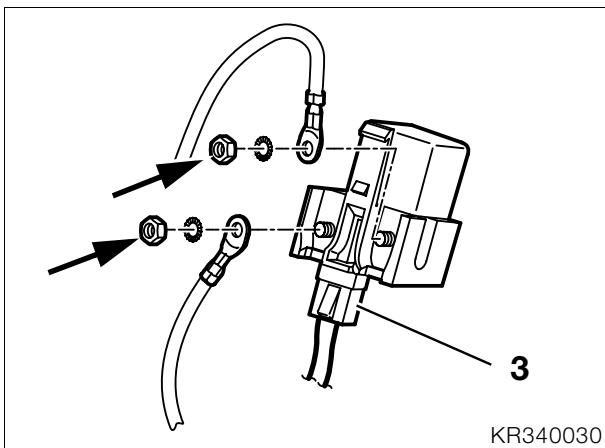


- Pull ABS relay (6) and ABS relay base (7) out of the housing.
- Loosen fasteners (arrows).
- Pull ABS relay (6) up out of ABS relay base (7).
- Installation is the reverse of the removal procedure: pay particular attention to the following.

⚠ Caution:

When inserting ABS relay (6) and ABS relay base (7), make sure that all cables are located in the correct guides.

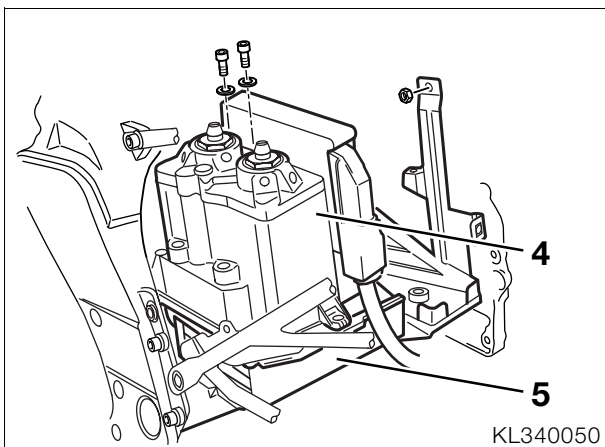
- Install a new end cover for the ABS relay housing.



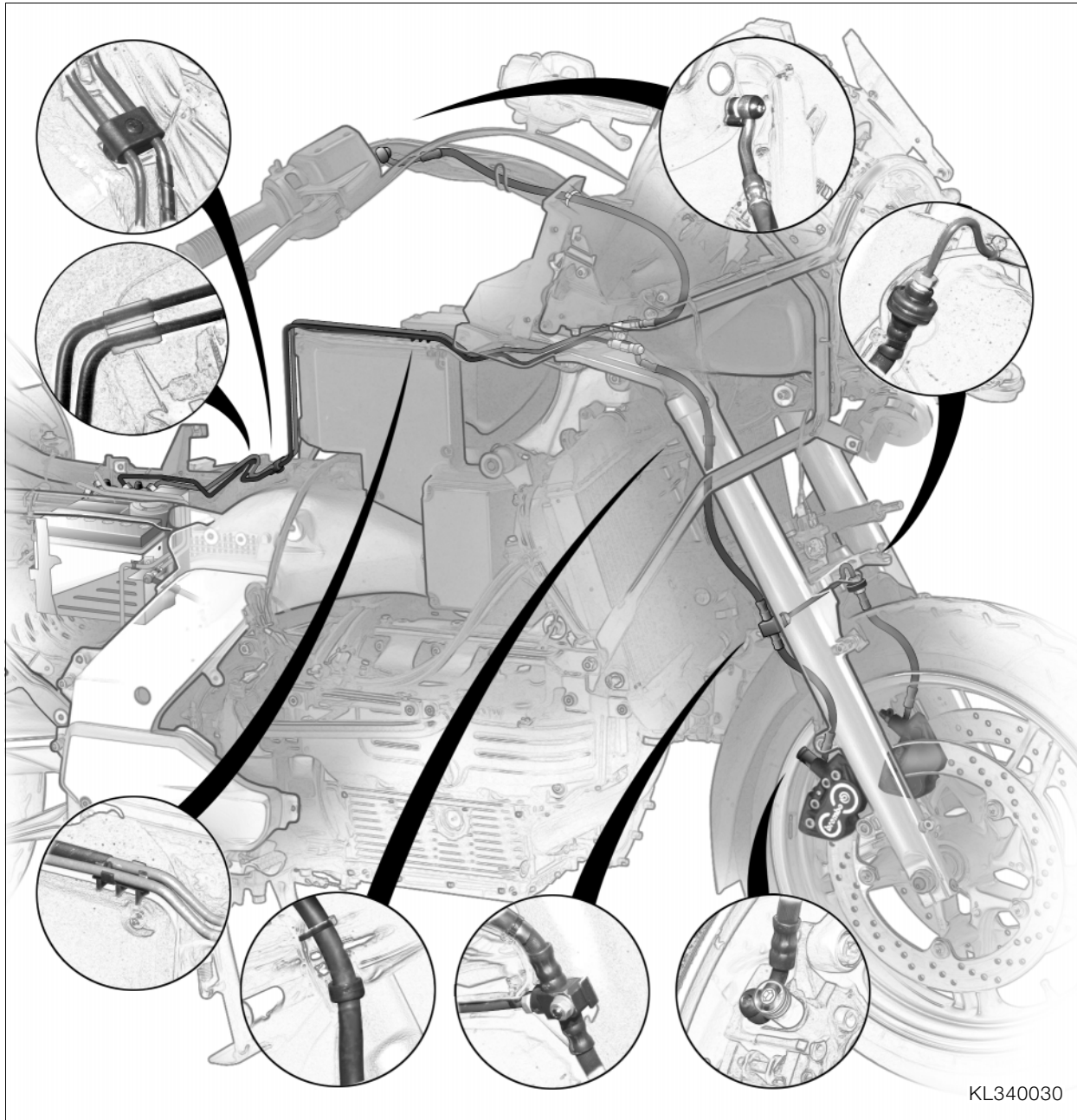
- Release the fasteners (arrows) for the cables and plug connector (3) at ABS relay base.

⚠ Tightening torques:

Battery holder to frame M 6.....	9 Nm
Retaining plate for brake line to battery carrier.....	4 Nm
Retaining plate for plug connectors to frame	9 Nm
Footrest plate to frame/battery carrier	21 Nm
Lifter handle to rear frame	9 Nm
Seat, rear, to rear frame	9 Nm



- Slightly raise ABS control unit (4) complete with battery carrier (5) and pull the assembly toward the rear.



Removing and installing front brake lines/hoses

Removing front brake lines/hoses

Preparatory work

- Remove left and right fairing side sections.
- Remove the left-hand battery cover.



Warning:

Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

- Remove fuel tank.

➡See Group 16

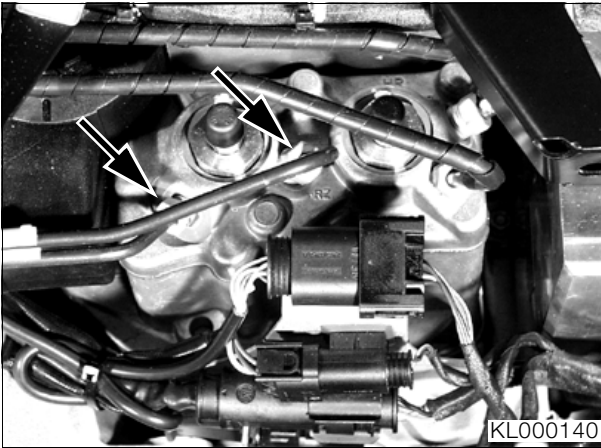


- Remove securing screws (arrows) and remove retaining plate for plug connectors.

⚠ Caution:

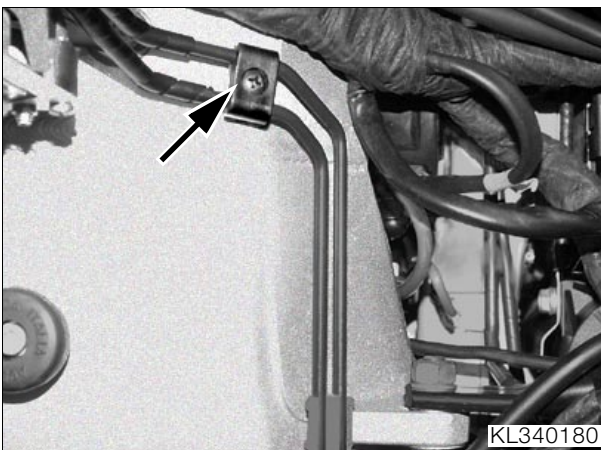
Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint. Wrap cloths around the ends of the pressure lines to prevent residual brake fluid escaping.

- Drain the brake system.
- Open cable ties securing brake hoses, as necessary.

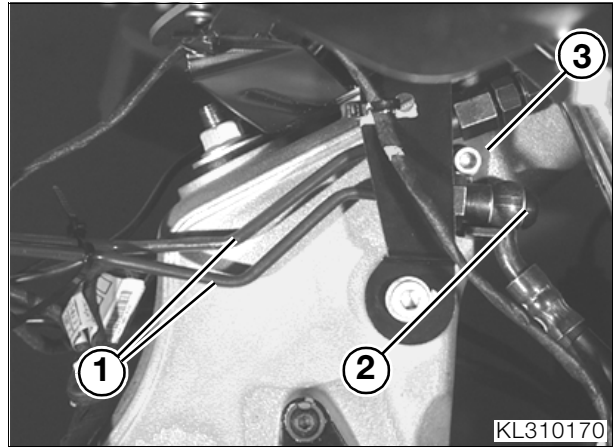


- Disconnect brake lines (arrows) from ABS pressure modulator.

Brake lines under fuel tank



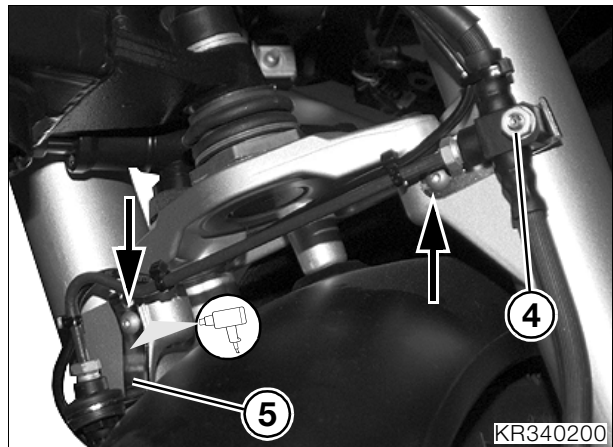
- Remove holder (arrow) for brake lines from main frame.



- Remove retaining plate (3) for brake lines at front of main frame.
- Disconnect brake lines (1) and remove.

Brake line/hose to telescopic fork

- Remove the brake callipers.
- Disconnect the brake hoses from the brake callipers.



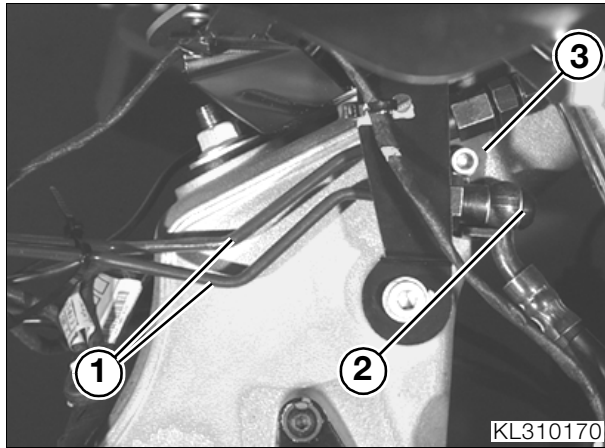
⚠ Caution:

Screws (arrows) for retaining plates are secured with thread-locking compound. Carefully heat the securing screws; take care not to damage the socket heads when removing the screws.

- Remove screw securing retaining plate (5) of left brake line/hose to front fork.
- Remove securing screw (4) from holder for brake distributor.
- Remove retaining plate for brake distributor, if necessary.
- Remove banjo bolt (2) from retaining plate (3) and remove brake line/hose.

Brake hose to handlebar

- Remove left and right handlebar trim.
- ➡See Group 46
- Remove cover of fork bridge.
- Turn the brake fitting until the banjo bolt of the brake fluid reservoir is accessible.
- Disconnect the brake hose from the brake fluid reservoir.



- Disconnect brake lines (1) from retaining plate (3).
- Remove banjo bolt (2).
- Carefully pull brake hose down and remove.
- Remove screw securing retaining plate (3) to main frame and remove retaining plate complete with brake hose.

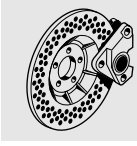
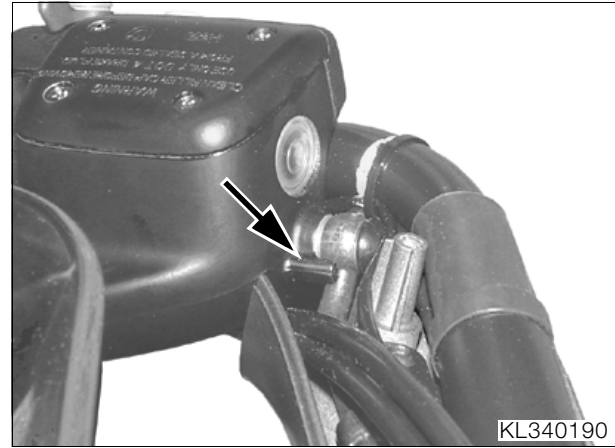
Installing front brake lines/hoses

- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:

Always secure the brake hose with stop plate to the fork slider tube.



Caution:

Replace the sealing rings of the brake line/hose. Secure the brake hose to the handlebar fitting in such a way that it does not rub or become kinked when the handlebar is turned.

- When connecting the brake hose to the handlebar fitting, hold the hose against the stop (arrow).
- Use a cable tie to secure the brake hose to the handlebar at the bottom to ensure clearance for the throttle cables.
- Fill and bleed the brake system.

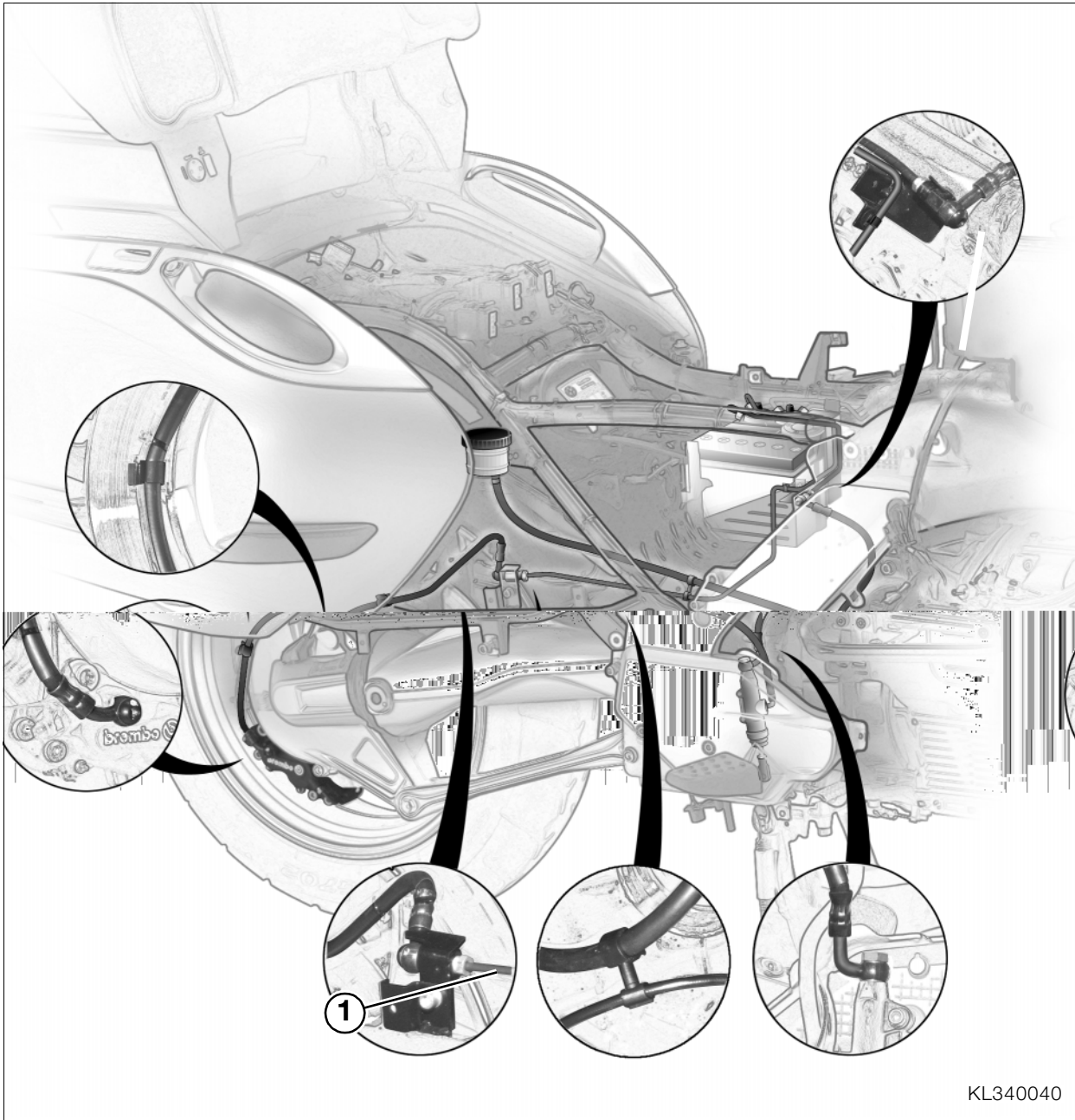
➡See Group 00

Brake fluid gradeDOT 4



Tightening torques:

Brake hose to brake lever fitting	18 Nm
Union, brake hose and brake line	18 Nm
Brake line to ABS pressure modulator	18 Nm
Brake line to frame M 5	4 Nm
Brake line to frame M 6	9 Nm
Brake distributor to retaining plate	9 Nm
Retainer plate to slider tube	4 Nm
(clean thread + Loctite 243)	
Brake calliper to fork slider tube	40 Nm
Bleed screw	10 Nm
Grubscrew in filler adapter	10 Nm



KL340040

Removing and installing rear brake lines/hoses

Removing brake lines/hoses

Preparatory work

- Remove left and right fairing side sections.
- ➡See Group 46
- Remove left and right battery covers.

Caution:

Do not allow brake fluid to come into contact with painted parts of the motorcycle, because brake fluid destroys paint. Wrap cloths around the ends of the pressure lines to prevent residual brake fluid escaping.

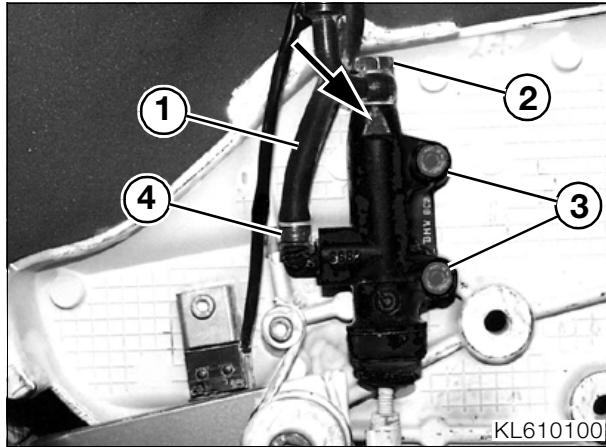
- Drain the brake system.

Brake hose to brake calliper

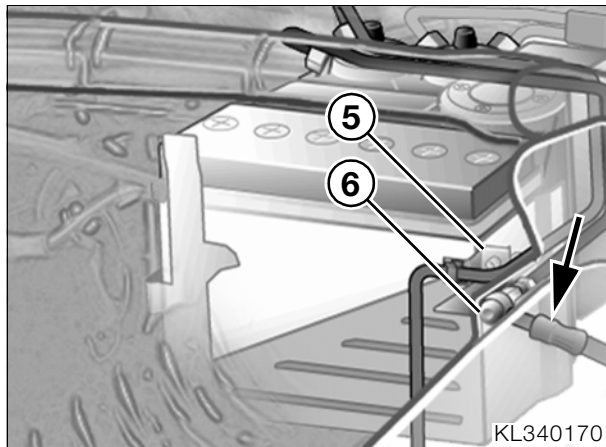
- Open the cable ties.
- Disconnect the brake hose from the brake calliper.
- Disconnect the brake hose at union (1).
- Remove brake hose.

Brake hose to brake master cylinder

- Remove right engine spoiler.
- Remove the front right footrest plate.



- Remove screws (3) and remove brake master cylinder.
- Use an open-ended wrench to hold at the flats (arrow) and open fastener (2) for brake hose.



- Remove retaining plate (5) for brake line from the battery carrier.
- Remove banjo bolt (6) and remove brake hose (arrow).

Brake fluid reservoir with return hose

- Remove the front right footrest plate.
- Open non-reusable hose clip (4) and disconnect return hose (1).
- Remove brake fluid reservoir with return hose.

Brake line to brake calliper



Caution:

Disconnect the negative battery terminal first, then the positive one.

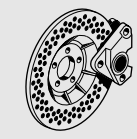
- Remove the battery.



Warning:

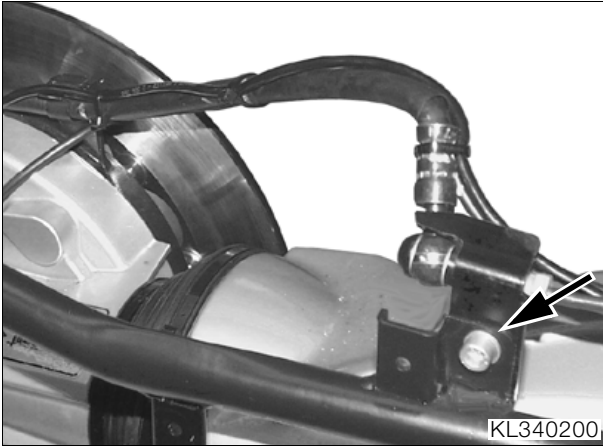
Comply with safety precautions when handling or working with fuel; note that the fuel lines are pressurised.

- Remove fuel tank.
 - ➔ See Group 16
- Remove the rear suspension strut.
 - ➔ See Group 33
- Remove retaining plate/union (5) for brake line from the battery carrier.

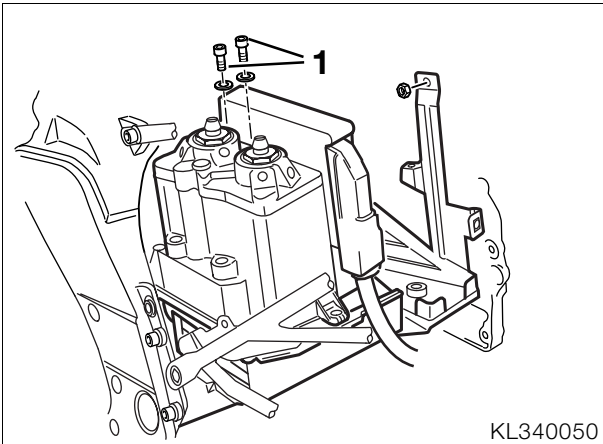


- Disconnect plugs from ABS pressure modulator and open cable ties (arrow).

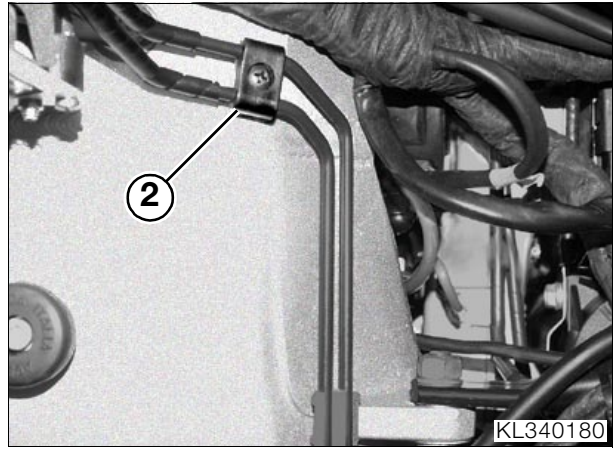
- Disconnect brake lines from ABS pressure modulator.
- Open cable ties securing wiring harness to rear frame.
- If applicable, disconnect plug for seat heating on rear frame.
- Remove positive and negative terminals from frame.



- Disconnect brake hose to brake calliper at retaining plate/union.
- Remove securing screw (arrow) securing retaining plate/union to rear frame.



- Remove screws (1) securing the battery carrier to the main frame.



- Remove the holder (2) for the front brake lines from the main frame.



- Secure rear frame to workshop crane, **BMW No. 46 5 640**.
- Remove fasteners securing rear frame to main frame.



Caution:

When raising the rear frame, make sure that no lines are damaged.

- Slightly raise rear frame and pull toward rear.
- Remove brake lines.

Installing brake lines/hoses

- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Apply **Loctite 243** to threads of lower fasteners securing rear frame to main frame.
- Carefully re-route all lines in their original positions and secure with cable ties.



Caution:

Renew sealing rings at brake line/hose.
Always secure brake hose with stop plate.

- Always replace non-reusable hose clips and close with pliers, **BMW No. 13 1 500**.
- Check play at brake master cylinder, adjust if necessary.

Brake fluid gradeDOT 4



Tightening torques:

Rear frame to main frame, top	41 Nm
Rear frame to main frame, bottom	41 Nm
(clean thread + Loctite 243)	
Battery carrier to frame M 6.....	9 Nm
Retaining plate for brake line to battery carrier	4 Nm
Brake line to frame M 5	4 Nm
Union, brake hose and brake line.....	18 Nm
Brake line to ABS pressure modulator.....	18 Nm
Brake hose to brake calliper	18 Nm
Brake line to master cylinder	18 Nm
Master cylinder to footrest plate	9 Nm
(clean thread + Loctite 243)	
Bleed screw in brake calliper/ ABS pressure modulator	10 Nm
Fuel tank to frame, M 8	21 Nm
Fuel tank to frame, M 6	9 Nm
Lifter handle to rear frame	9 Nm
Saddle, rear, to rear frame	9 Nm
Suspension strut to swinging arm	50 Nm
Suspension strut to frame	43 Nm
Handwheel for adjusting spring strut to frame	21 Nm
Footrest plate to frame	21 Nm

Checking brake pads for wear/ replacing brake pads

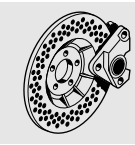
See Group 00

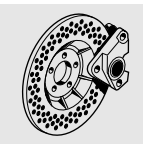
Checking brake fluid level

See Group 00

Replacing brake fluid and bleeding brake system

See Group 00





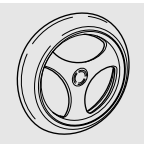
36 Wheels and tyres

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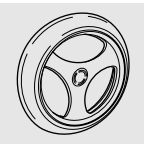
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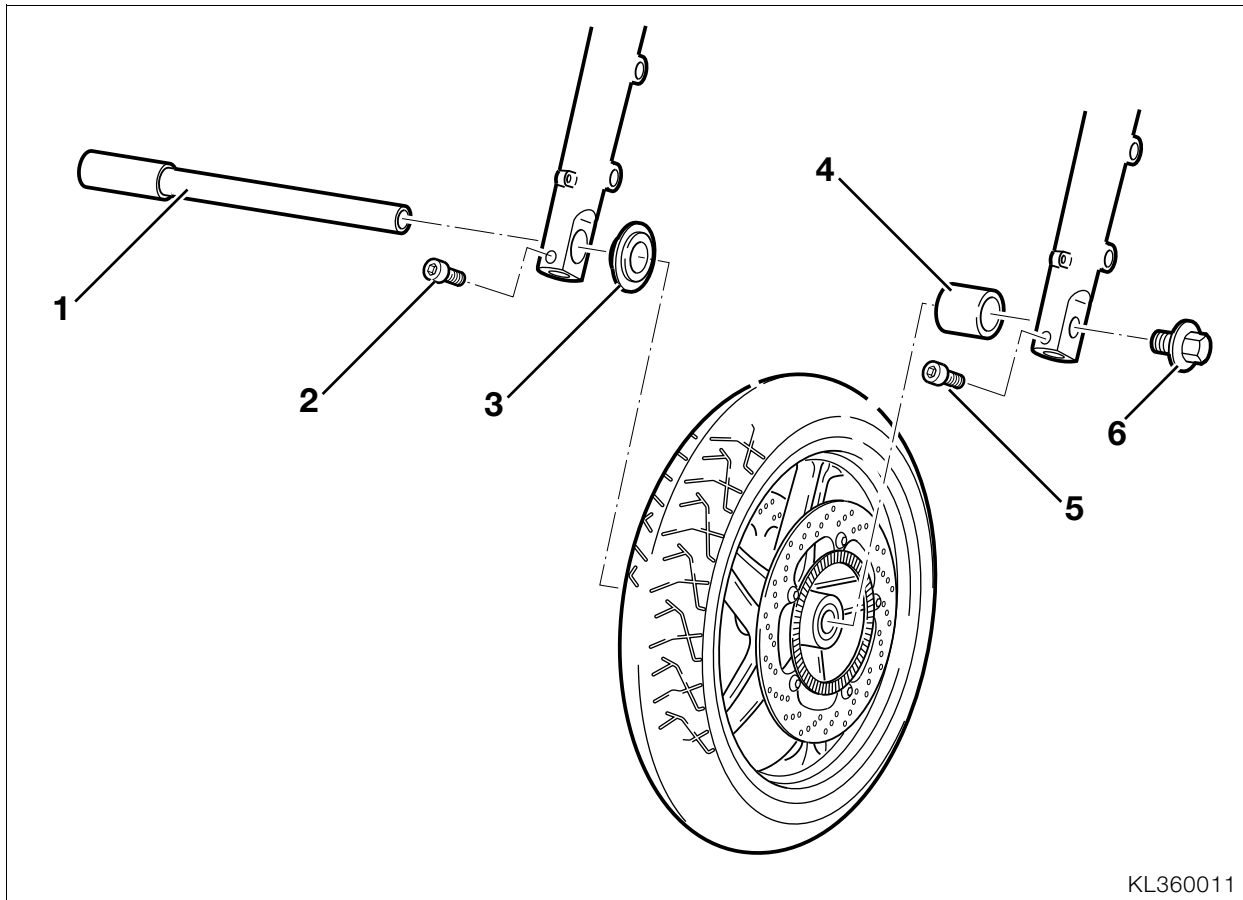




Technical data			K 1200 LT
Rim size	Front Rear		3.50"x17" MT H 2 5.00"x17" MT H 2
Vertical runout	Front Rear	mm (in) mm (in)	0.5 (0.02) 0.3 (0.01)
Lateral runout	Front Rear	mm (in) mm (in)	0.5 (0.02) 0.3 (0.01)
Tyre size	Front Rear	mm (in) mm (in)	120/70 R17 58 V tubeless 160/70 R17 79 V tubeless
Tyre pressures (tyres cold)			
Solo/two-up	Front	bar (psi)	2.5 (36.3)
	Rear	bar (psi)	2.9 (42.0)
Two-up with luggage	Front	bar (psi)	2.5 (36.3)
	Rear	bar (psi)	3.2 (46.4)
Wheel bearing lubrication			Brand-name anti-friction bearing grease, working temperature range -30...+140 °C (-22 °F...+284 °F), drip point 150...230 °C (302 °F...446 °F), high corrosion protection, good resistance to water and oxidation, e.g. Shell Retinax EP2







KL360011

Removing and installing front wheel

- Remove front section of front mudguard.
 ➔See Group 46



Caution:

Avoid scratching the wheel rim; if necessary mask off the brake caliper. Do not tilt the brake caliper.



Note:

Do not actuate the handbrake lever with brake calipers removed or front wheel removed.

- Support the motorcycle under its engine so that the front wheel is clear of the ground, but the motorcycle is not unstable.
- Remove left and right brake calipers.
- Remove hex screw (6).
- Slacken pinch bolts (2, 5) in telescopic forks.
- Remove quick-release axle (1), noting bearing cover (3) and spacer bushing (4).
- Remove front wheel.

- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Grease the quick-release axle (1) and bearing cover (3) lightly with **Shell Retinax EP2**.



Note:

Begin by tightening the quick-release axle (1). Press down on the forks and release them; repeat this action several times and then tighten the pinch bolts (2, 5).

- Check/adjust ABS sensor gap.
 ➔See Group 34

ABS sensor

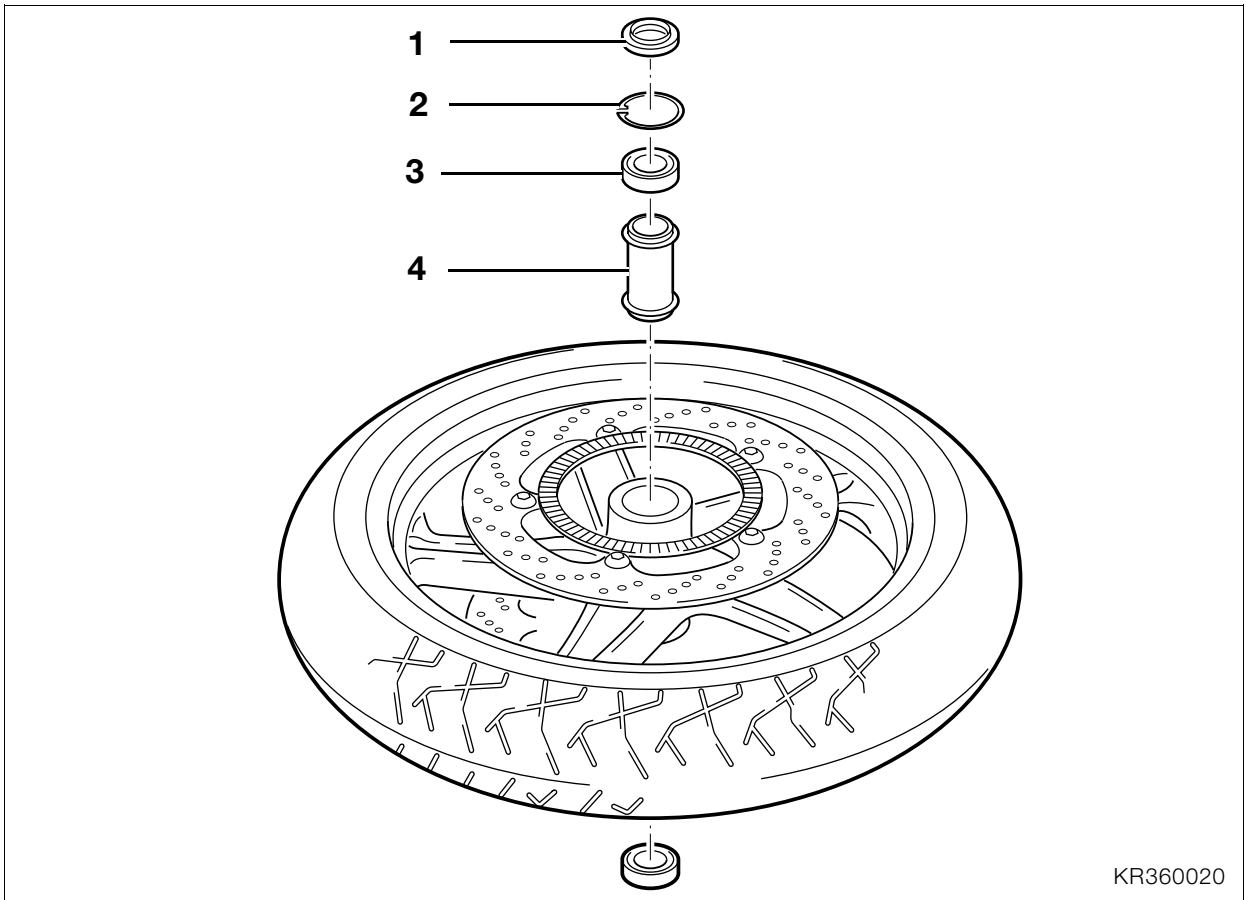
gap, front 0.45...0.55 mm (0.018...0.022 in)



Tightening torques:

Quick-release axle 30 Nm
 Quick-release axle pinch bolts 21 Nm
 Brake caliper to fork slider tube..... 40 Nm





KR360020

Removing and installing wheel bearings

- Place the front wheel on two wooden battens (make sure the brake disc is clear of the ground and the battens).

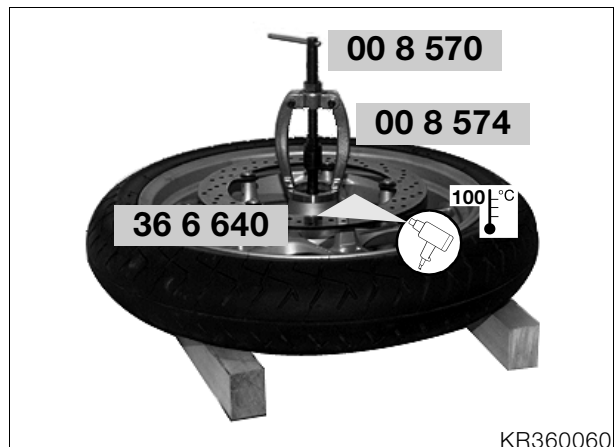
Removing left/right wheel bearings



Note:

There is no circlip at the right wheel bearing.

- Lever out shaft seal (1).
- Remove circlip (2) with circlip pliers.



KR360060

- Place support ring, **BMW No. 36 6 640**, on wheel hub.



Note:

Use temperature measuring device, **BMW No. 00 1 900**, to check heat rise.

- Heat bearing seat to 100 °C (212 °F).
- Pull out wheel bearing (3) with puller, **BMW No. 00 8 570**, and internal puller 21/3, **BMW No. 00 8 574**.
- Remove spacer sleeve (4).

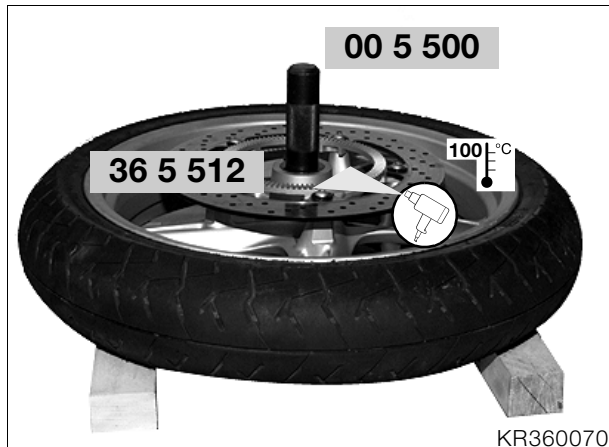
Installing right/left wheel bearing



Caution:

When installing, always start with the left side.

Installing left wheel bearing



- Chill the wheel bearing in a refrigerator or icebox, for example.
- Heat bearing seat to 100 °C (212 °F).
- Using handle for drift, **BMW No. 00 5 500**, and drift, **BMW No. 36 5 512**, press in the wheel bearing until it is correctly seated.



Note:

The convex face of the snap ring is toward the wheel bearing.

- Use circlip pliers to install the snap ring.
- Lightly coat the shaft sealing ring with **Shell Retinax EP2** and using handle for drift, **BMW No. 00 5 500**, and drift, **BMW No. 36 5 512**, press in the sealing ring until flush with wheel hub.

Installing right wheel bearing

- Install the spacer bushing.



Caution:

When pressing in the right wheel bearing, make sure that the left wheel bearing does not lift off its seat.

- Chill the wheel bearing.
- Heat bearing seat to 100 °C (212 °F).
- Using handle for drift, **BMW No. 00 5 500**, and drift, **BMW No. 36 5 512**, press in the wheel bearing until it is seated on the inner ring of the spacer bushing.



Removing/installing rear wheel

Removing rear wheel

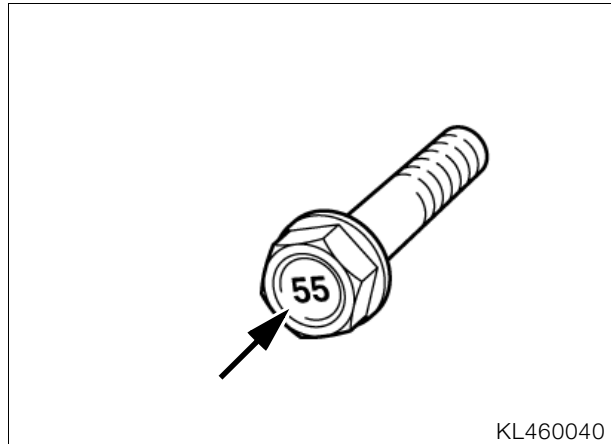
- Select first gear.
- Remove number plate carrier.



- Unscrew wheel studs (arrow).
- Remove rear wheel with spacing washer to the rear.

Installing rear wheel

- The contact faces on the spacing washer, the rear wheel drive and the wheel hub must be free from grease and clean.



Caution:

Use only wheel studs marked 55 (arrow) to indicate length.

- Place back wheel with spacer in position against rear-wheel drive and tighten all wheel studs hand-tight.
 - Working in diagonally opposite sequence, tighten the outer wheel studs to 50 Nm.
 - Fully tighten the stud in the centre.
 - Fully tighten the outer wheel studs in diagonally opposite sequence.
 - Check/adjust ABS sensor gap.
- ➡See Group 34

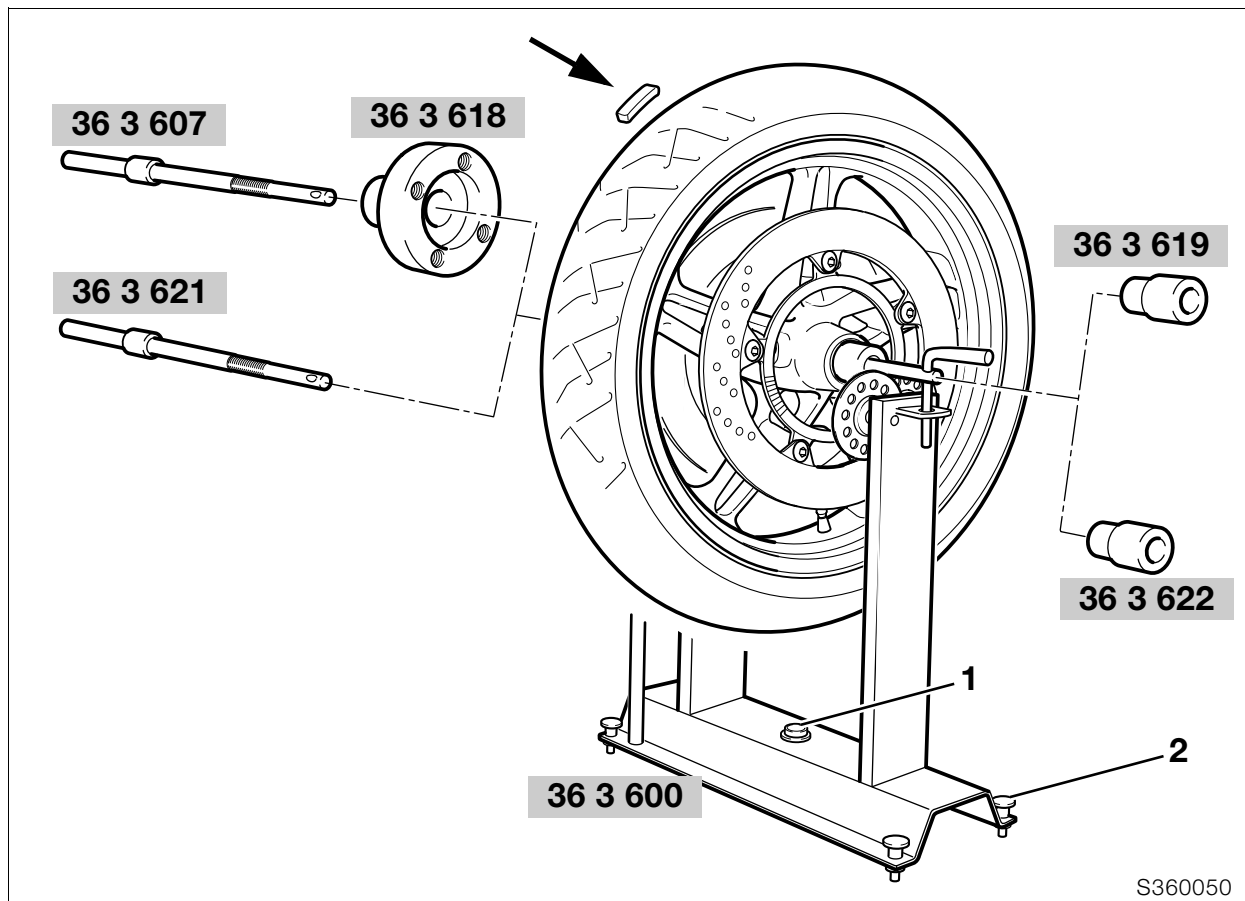
ABS sensor

gap, rear 0.45...0.55 mm (0.018...0.022 in)



Tightening torques:

Wheel studs
 Initial tightening 50 Nm
 Final torque 105 Nm



Static balancing of front and rear wheels

Static balancing of front wheel

- Level balancer, **BMW No. 36 3 600**, using knurled-head screws (2) and spirit level (1).
- Insert the balancing shaft, **BMW No. 36 3 621**, through the front wheel.
- Hand-tighten the balancing shaft with knurled nut, **BMW No. 36 3 622**.
- Place front wheel on balancer, **BMW No. 36 3 600**.
- Rotate the front wheel and allow it to come to a halt.
- Clean the attachment points for the adhesive weights.



Caution:

The maximum balancing weight is 60 g (2.1 oz.)!

- Affix the adhesive weights (arrows) uniformly spaced on both sides of the rim opposite the wheel's heaviest point.
- Repeat the balancing procedure as a check.

Static balancing of rear wheel



Note:

The rear wheel can also be balanced dynamically.

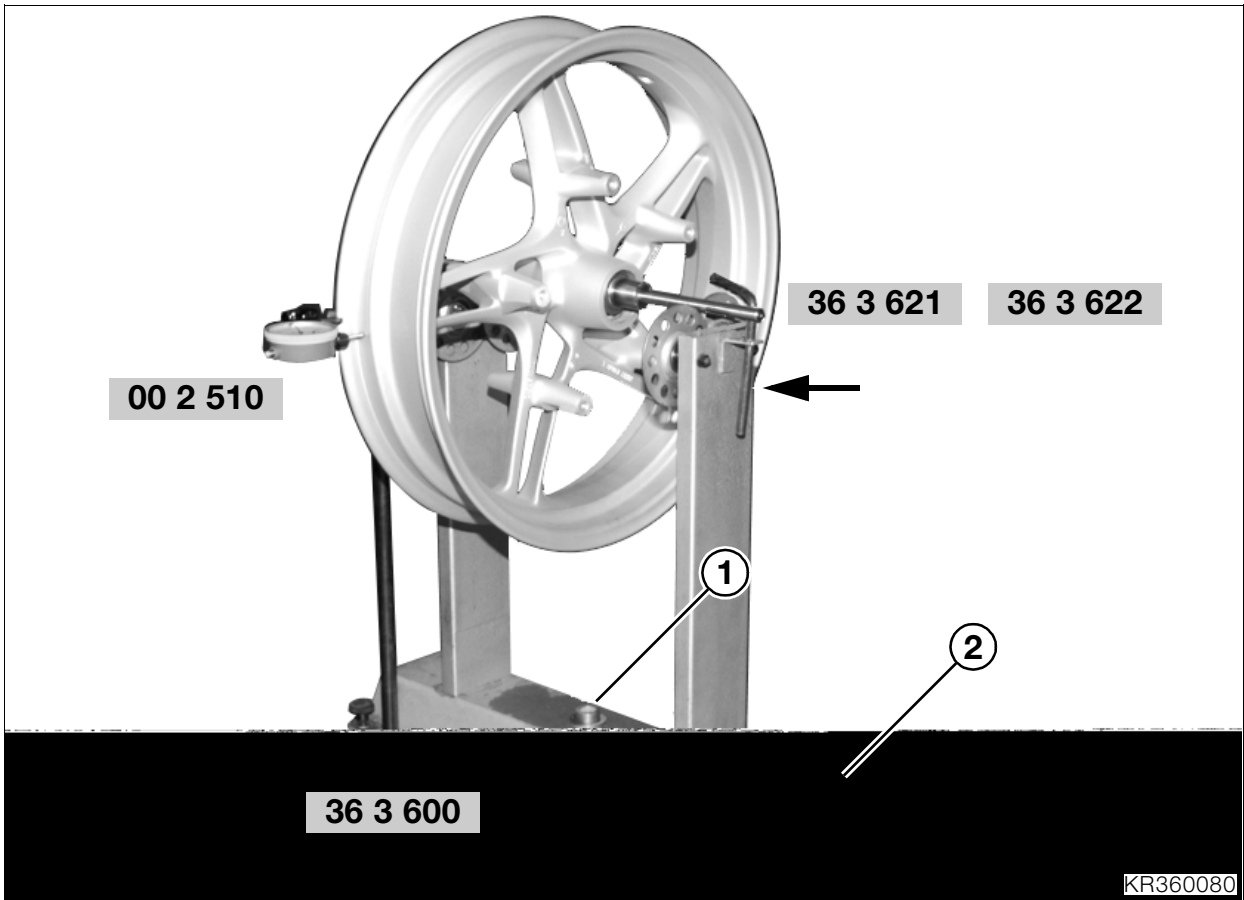
- Level balancer, **BMW No. 36 3 600**, using knurled-head screws (2) and spirit level (1).
- Attach mounting fixture, **BMW No. 36 3 618**, to the centering-collar side of the rear wheel.
- Pass the balancing shaft, **BMW No. 36 3 607**, through the rear wheel.
- Hand-tighten the balancing shaft with knurled nut, **BMW No. 36 3 619**.
- Place the rear wheel on the balancer, **BMW No. 36 3 600**.
- Rotate the rear wheel and allow it to come to a halt.
- Clean the attachment points for the adhesive weights.



Caution:

The maximum balancing weight is 60 g (2.1 oz.)!

- Affix the adhesive weights (arrows) uniformly spaced on both sides of the rim opposite the wheel's heaviest point.
- Repeat the balancing procedure as a check.



Checking front/rear wheel rim for run-out

Checking front wheel rim for run-out

- Remove tyre.
- Level balancer, **BMW No. 36 3 600**, using knurled-head screws (2) and spirit level (1).
- Pass the balancing shaft, **BMW No. 36 3 621**, through the front wheel.
- Hand-tighten the balancing shaft with knurled nut, **BMW No. 36 3 622**.
- Place front wheel on balancer, **BMW No. 36 3 600**.
- Lock the balancing shaft at the balancing stand with the pin (arrow) to prevent it from turning.
- Install dial gauge, **BMW No. 00 2 510**, in the dial gauge holder on the balancer and adjust it to suit the task.



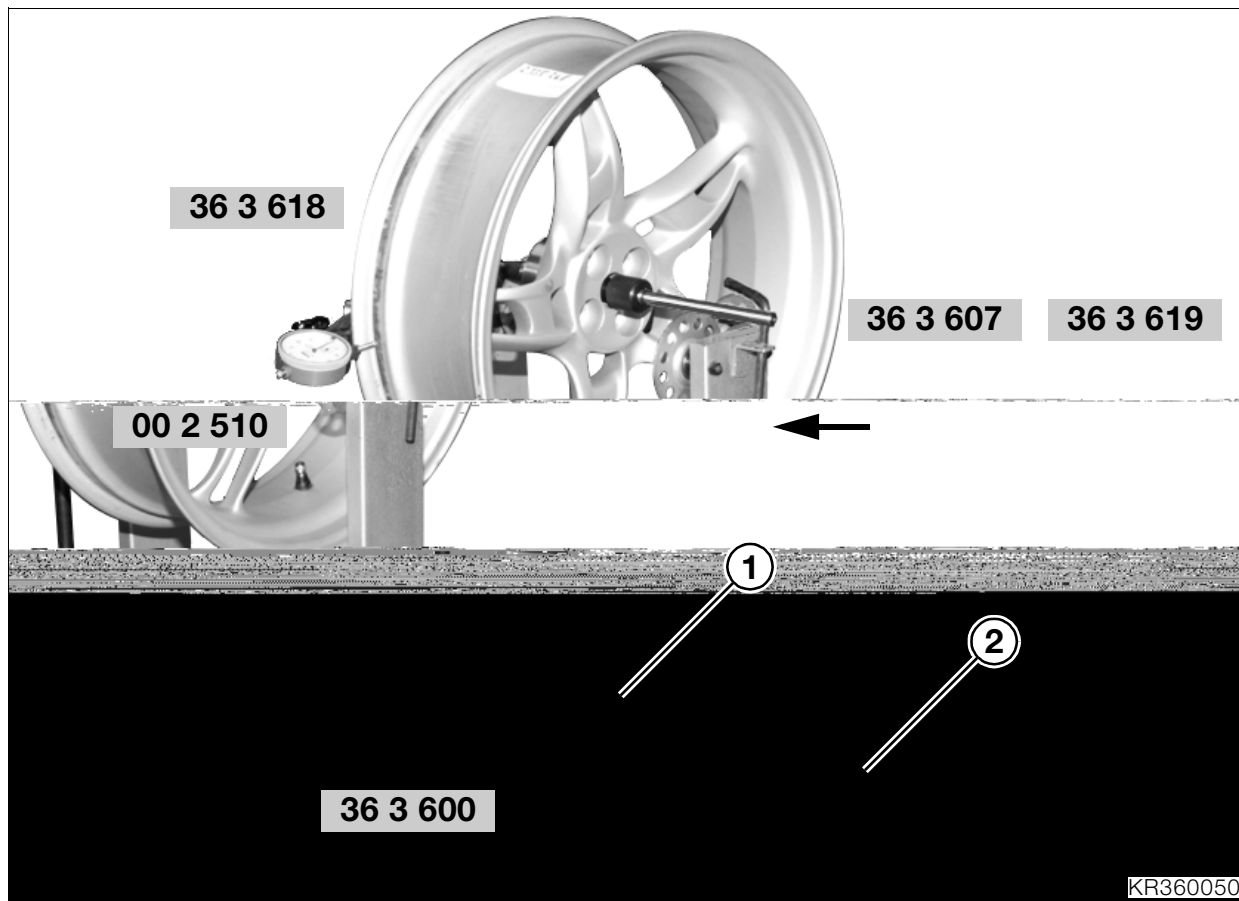
Note:

Bring the stylus of the dial gauge, **BMW No. 00 2 510**, into contact with the machined inner surface of the wheel rim only.

- Measure radial run-out and lateral run-out.

Maximum wheel rim run-out:

Radial run-out 0.5 mm (0.02 in)
Lateral run-out 0.5 mm (0.02 in)



Checking rear wheel rim for run-out

- Remove tyre.
- Level balancer, **BMW No. 36 3 600**, using knurled-head screws (2) and spirit level (1).
- Secure the mounting device, **BMW No. 36 3 618**, to the centering-collar side of the rear wheel.
- Pass the balancing shaft, **BMW No. 36 3 607**, through the rear wheel.
- Hand-tighten the balancing shaft with knurled nut, **BMW No. 36 3 619**.
- Place the rear wheel on the balancing stand, **BMW No. 36 3 600**.
- Lock the balancing shaft at the balancing stand with the pin (arrow) to prevent it from turning.
- Install dial gauge, **BMW No. 00 2 510**, in the dial gauge holder on the balancer and adjust it to suit the task.



Note:

Bring the stylus of the dial gauge, **BMW No. 00 2 510**, into contact with the machined inner surface of the wheel rim only.

- Measure radial run-out and lateral run-out.

Maximum wheel rim run-out:

Radial run-out 0.3 mm (0.01 in)
 Lateral run-out 0.3 mm (0.01 in)

51 Equipment

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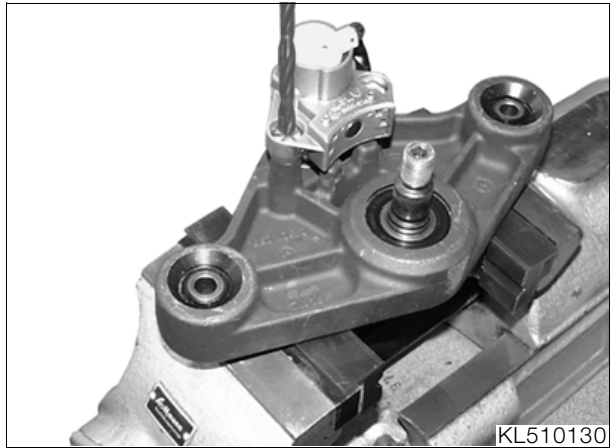
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Removing and installing ignition switch/steering lock

- Remove fork bridge.
- ➔See Group 31



- Clamp the fork bridge.
- Using a 4 mm (0.16 in) drill bit, drill approx. 5 mm (0.20 in) deep into the non-removable screws.
- Using an 8 mm (0.31 in) drill bit, drill away the heads of the non-removable screws.
- Remove ignition switch/steering lock.
- Unscrew the threaded pins with a stud remover.
- Use socket for ignition switch/steering lock, **BMW No. 51 0 531**, to tighten non-removable screws.

 **Tightening torque:**
Non-removable screw 21 Nm

Removing and installing lock barrel

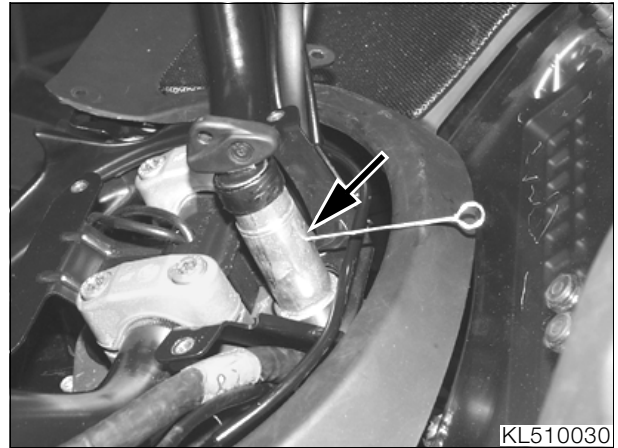
Removing the lock barrel



Note:

The lock barrel can also be removed when the fork bridge is installed.

- Remove left and right fairing side sections.
- ➔See Group 46
- Remove left and right handlebar trim sections.
- Remove tank cover.
- Remove cover of fork bridge.
- Turn the ignition key to the ON position.



- Press in the safety catch by inserting a suitable tool through the opening (arrow), e.g. a piece of wire.
- Pull the lock barrel out with the ignition key.

Removing lock barrel if ignition key has broken off



Caution:

When drilling without removing the fork bridge, catch the metal chips.

- Using a 4-5 mm (0.16-0.20 in) drill bit, open up the entire length of the lock barrel.
- Repeat with drill bits of larger diameter until the lock barrel can be removed.

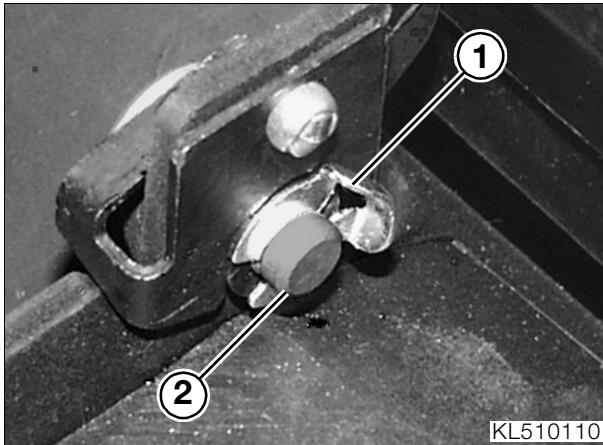
Installing lock barrel

- Grease the new lock barrel with **Shell Retinax EP2**.
- Install lock barrel with spring and key in ON position.
- Press the lock barrel down with the key until the locking pin engages.
- Lightly grease and close the opening for the locking pin with **Shell Retinax EP2**.

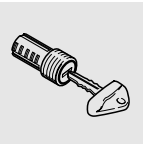
Disassembling/assembling fuel tank lock

Removing and installing flap for tank cap

- Remove tank cover.



- Remove locking pins (1) on left and right.
- Remove studs (2) on left and right.
- Remove flap for tank cap.
- Installation is the reverse of the removal procedure.



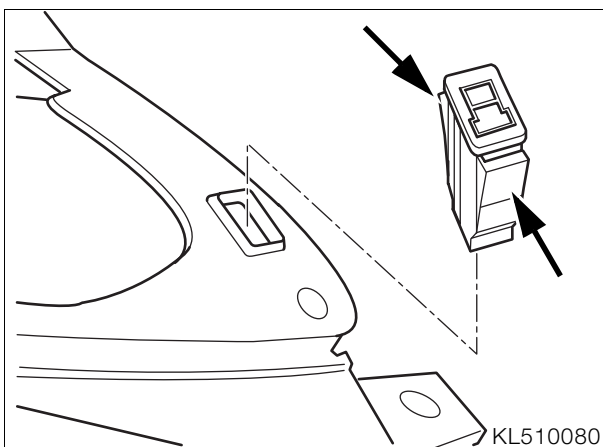
Removing and installing snap lock for tank cap flap

- Open flap for tank cap.



Note:

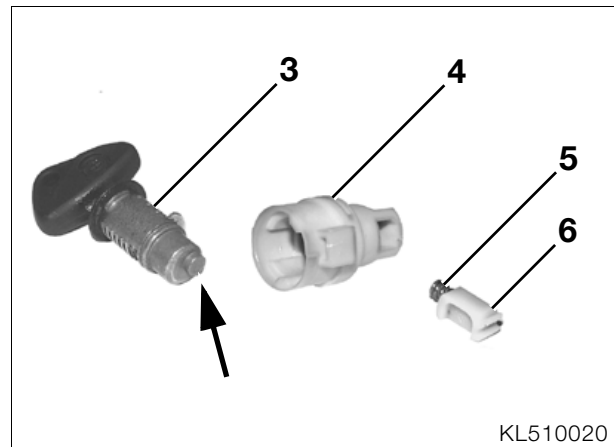
Note position of snap lock in tank cover.



- Using cranked long-nosed pliers, compress side springs (arrows) and lift out snap lock.
- Installation is the reverse of the removal procedure.

Removing and installing fuel tank lock barrel

- Remove fuel cap.
- Slightly straighten the 4 lugs in the underside of the grip one after the other and remove the barrel from the grip.

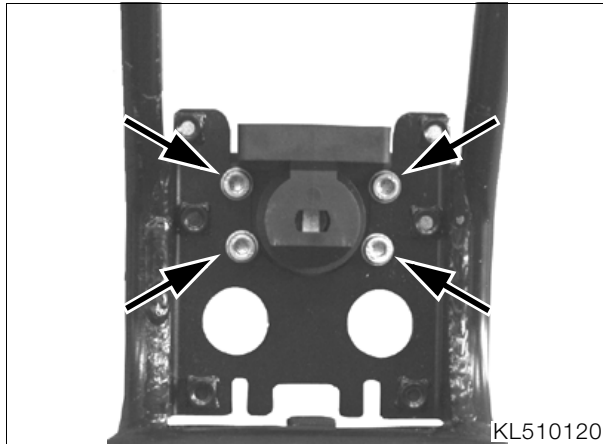


- Remove lock barrel (3) together with housing (4).
- Insert key and turn to OPEN position.
- Use a length of wire or similar to press in the locking pin.
- Use the ignition key to remove lock barrel (3) from housing (4).
- Grease lock barrel (3) with **Retinax EP 2**.
- Insert locking pin (6) groove upward into housing (2), together with spring (5).
- Introduce lock barrel (3) into housing (4), stub (arrow) must engage groove in locking pin (6).
- From this point on, installation is the reverse of the removal procedure.

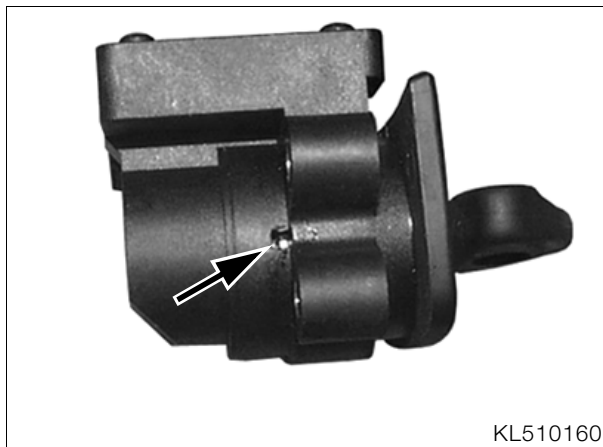
Removing and installing lock barrel of fuel tank cover

– Remove front seat with bridge.

➡See Group 52

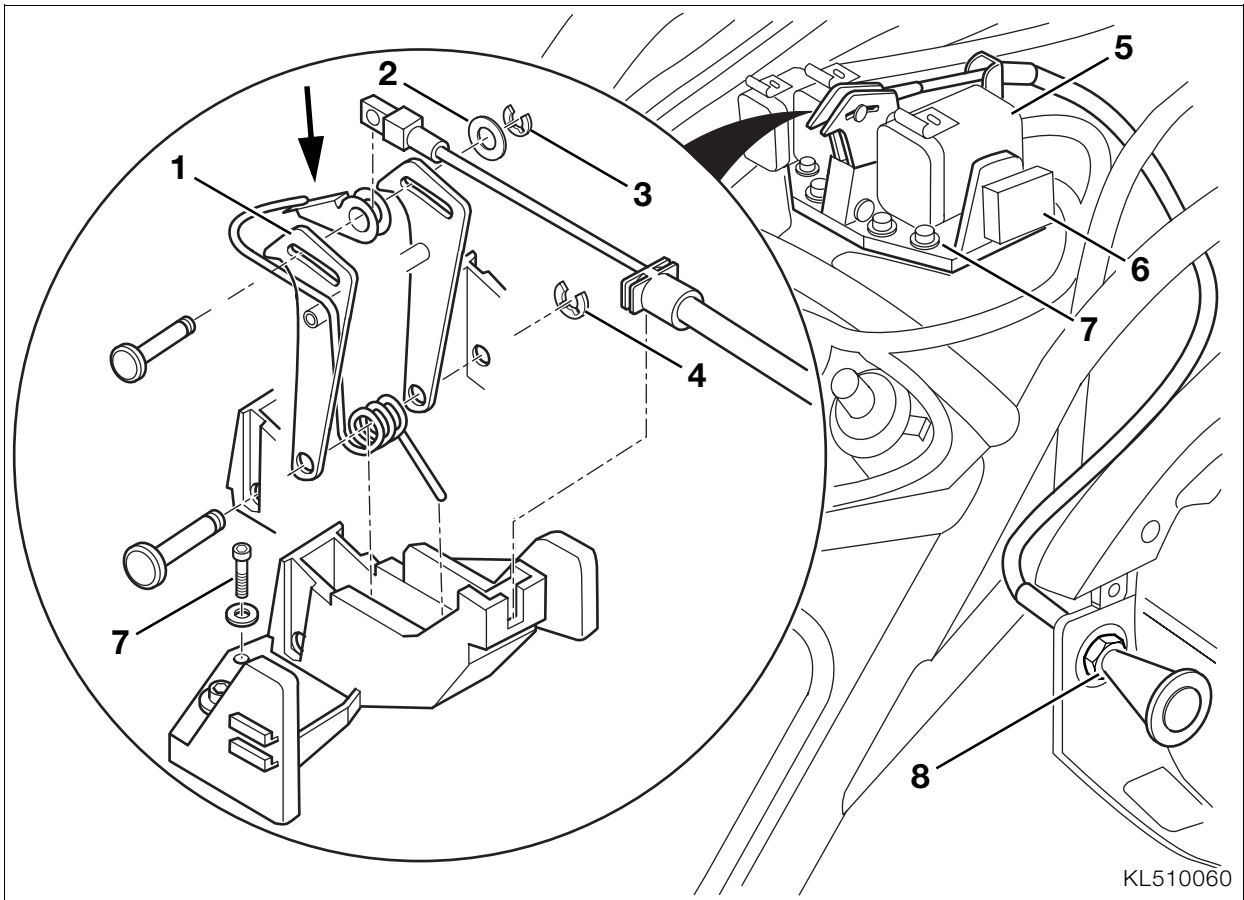


- Remove screws (arrows) and remove the lock.



- Insert key and turn to OPEN position.
- Insert a length of wire or similar through bore (arrow) and press in the locking pin.
- Use the ignition key to remove lock barrel.
- Grease lock barrel with **Retinax EP 2**.
- Installation is the reverse of the removal procedure.





Removing and installing locking system for front seat

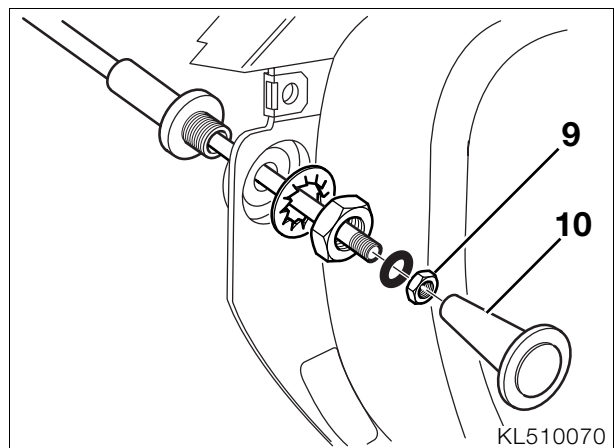
- Remove left trim panel and battery cover.
 ➡See Group 46
- Remove rear seat.
 ➡See Group 52

Removing locking system

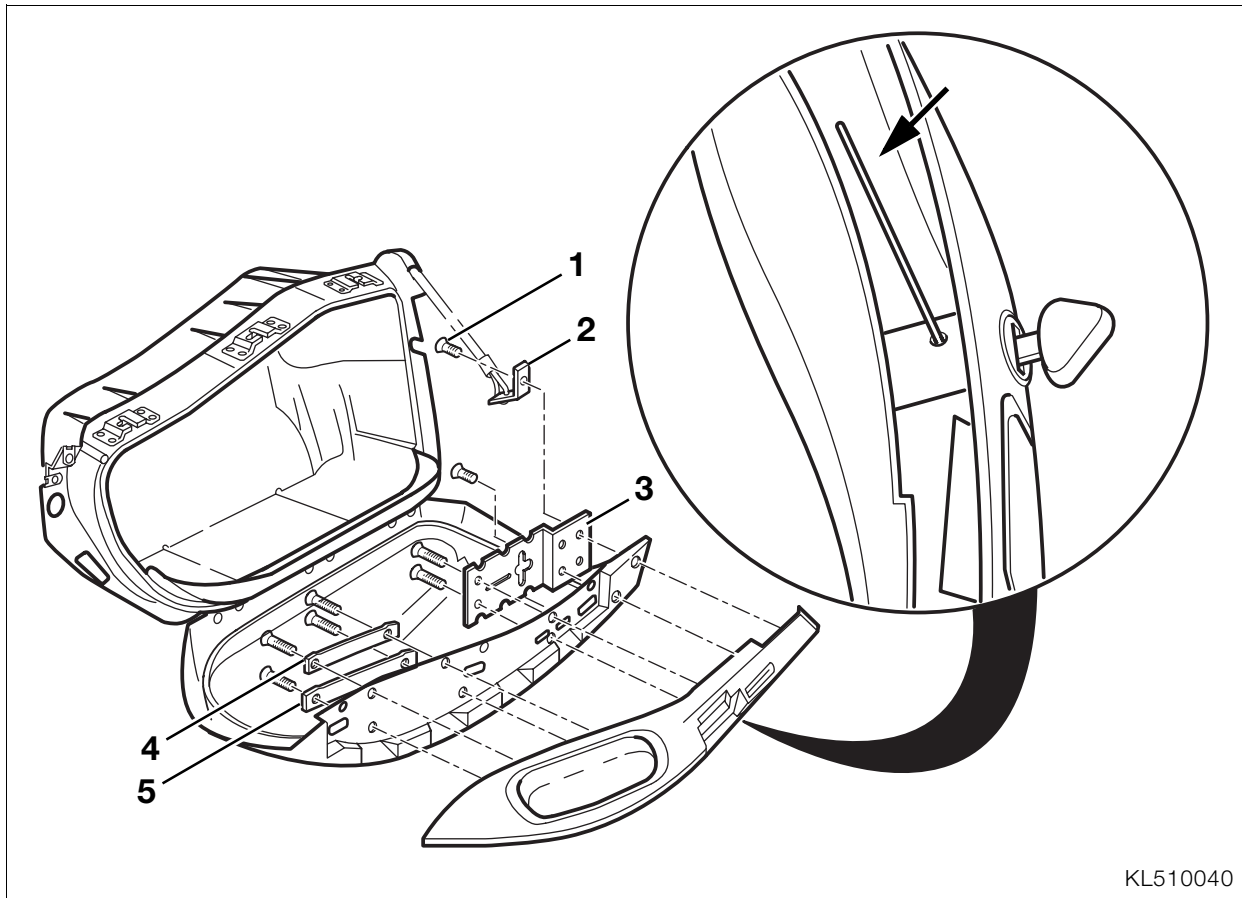
- Unclip fuse box (5) and pull forward to remove.
- **[Seat heating]** Unclip plug (6).
- Remove screws (7) and remove lock hook complete with holder.
- Disassemble release handle (8) and remove locking system.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Tighten nut (9) to lock grip (10).
- Route Bowden cable so as to avoid tight bends.

Removing and installing Bowden release cable

- Open the left-hand side case.
- Remove release grip (8).
- Remove circlip (3) and washer (2) and disengage Bowden cable.



- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Tighten nut (9) to lock grip (10).
- Route Bowden cable so as to avoid tight bends.
- Tension spring before engaging Bowden cable, make sure that it is seated correctly relative to the metal lug (arrow).



KL510040



Removing and installing lock barrel of side case

- Open the side case.



Note:

Note positions of retaining plates (4, 5).

- Remove retaining plates (4, 5).

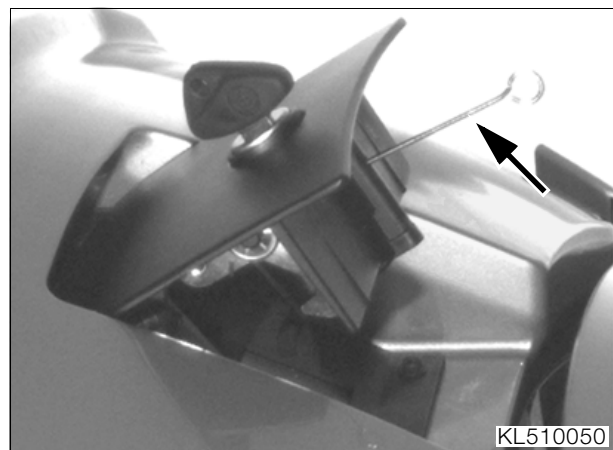


Warning:

The strap roller is spring-loaded: risk of injury if metal fastener (2) is suddenly released.

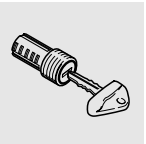
- Remove screw (1) securing strap to flap of side case.
- Remove cover plate (3).
- Remove handle complete with lock.
- Insert key and turn to OPEN position.
- Insert a length of wire or similar (arrow) and press in the locking pin.
- Use the ignition key to remove lock barrel.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Prior to installation, grease the lock barrel with **Retinax EP 2**.

Removing and installing lock barrel of top case



KL510050

- Insert key and turn to OPEN position.
- Insert a length of wire or similar (arrow) and press in the locking pin.
- Use the ignition key to remove lock barrel.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Prior to installation, grease the lock barrel with **Retinax EP 2**.



52 Seat

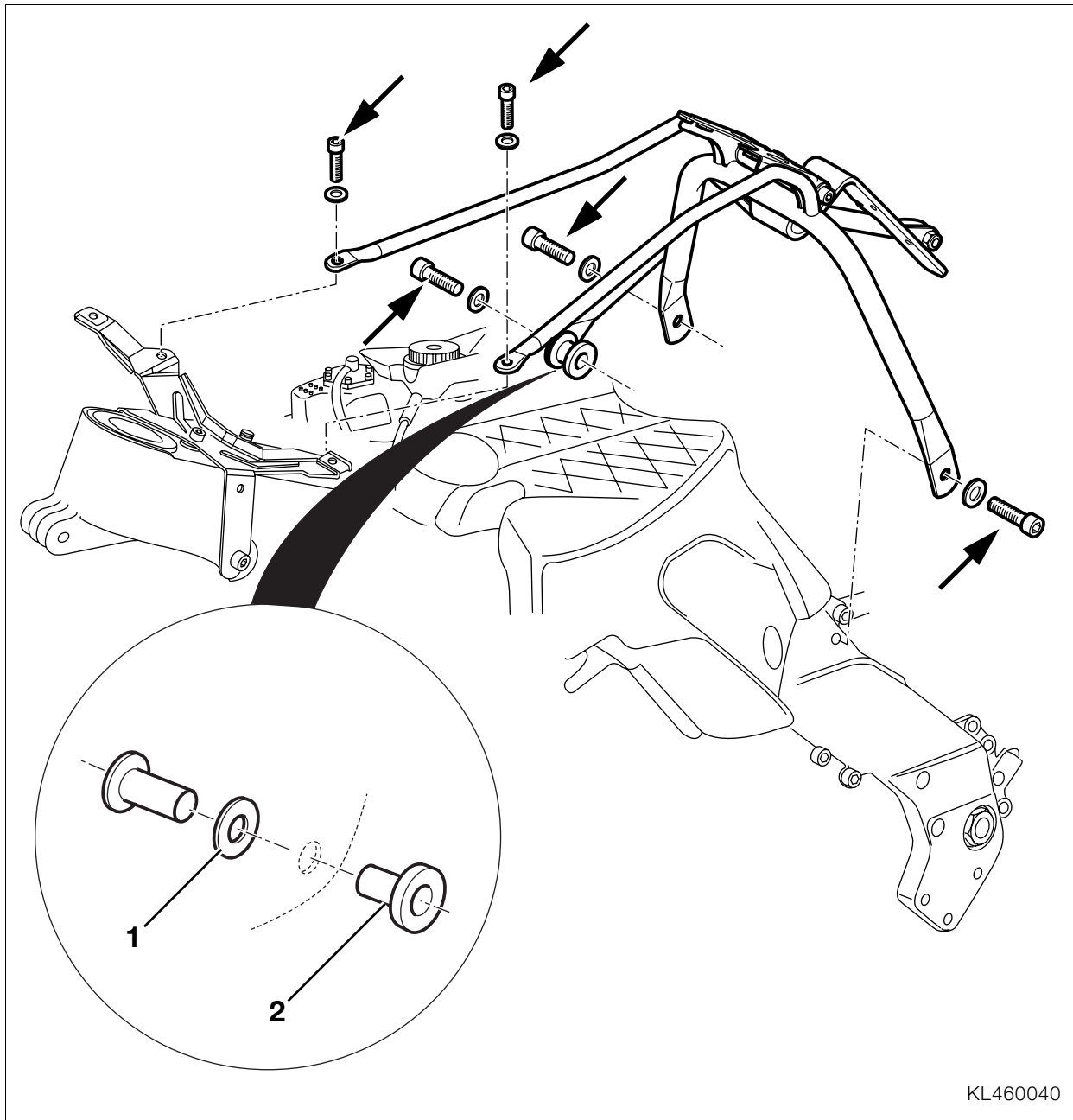
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Disassembling/assembling front seat	4
Removing and installing front seat	4
Removing and installing gas-filled strut	4







KL460040

Removing and installing seat

Removing and installing front seat with bridge

- Remove left and right fairing side sections.
- Remove tank cover.
- **[Seat heating]** Disconnect plug for seat heating.
- Remove 5 screws (arrows) and remove seat and bridge.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Note rubber washer (1) and grommet (2).

Tightening torques:

Bridge, seat to frame M 6..... 9 Nm
 Bridge, seat to frame M 8..... 21 Nm

Removing and installing rear seat

- Lift the seat at the front.
- Remove 2 screws and remove seat.
- **[Seat heating]** Disconnect plug for seat heating.
- Installation is the reverse of the removal procedure.

Tightening torques:

Seat to rear frame 9 Nm

Removing and installing rear seat backrest

- Open the top case.
- Remove 4 screws and remove backrest.
- Installation is the reverse of the removal procedure.

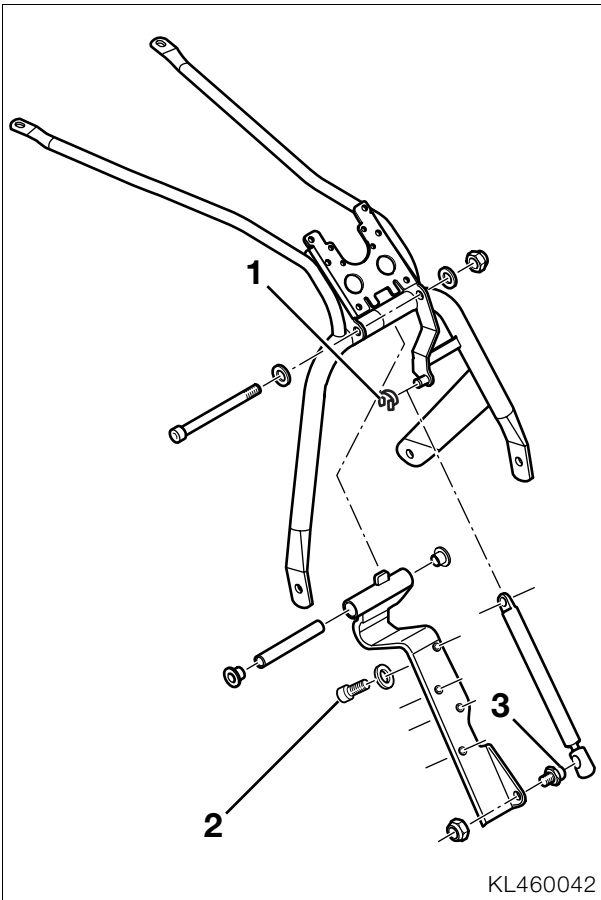
Tightening torques:

Seat backrest to top case 5 Nm

Disassembling/assembling front seat

Removing and installing front seat

- Open hinged seat.



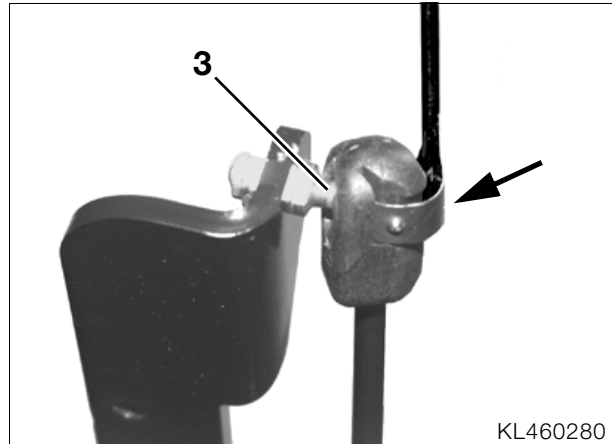
- Remove screws (2) and remove seat.
- Installation is the reverse of the removal procedure.

Tightening torques:

Seat to retaining plate 5 Nm

Removing and installing gas-filled strut

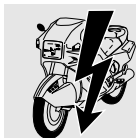
- Remove front seat.
- Remove retainer (1) and disengage gas-filled strut.



- Using a screwdriver, slightly raise clip (arrow) and disengage gas-filled strut from ball joint (3).
- Installation is the reverse of the removal procedure.

61 General electrical equipment

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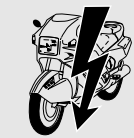
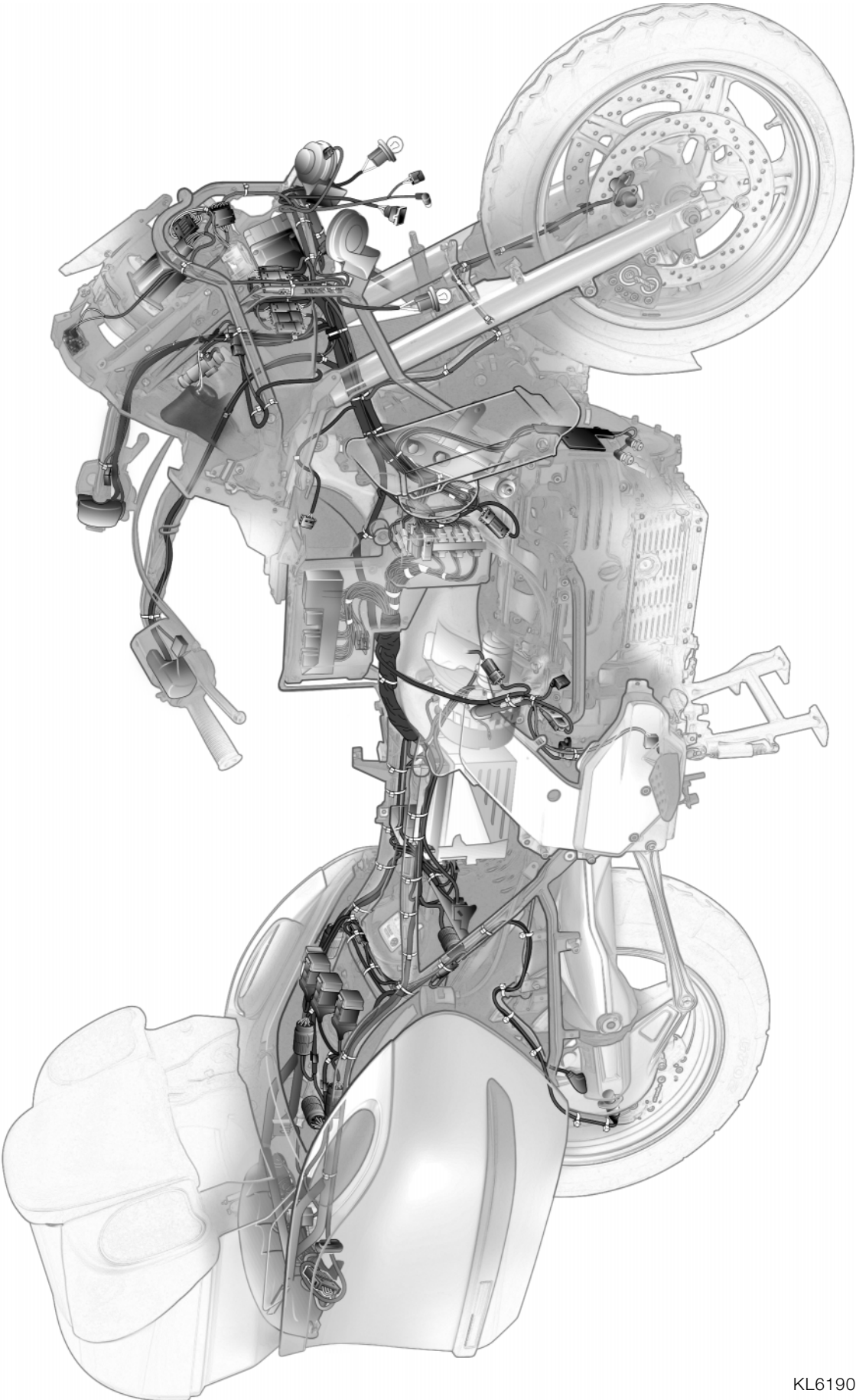
Technical Data	K 1200 LT
Circuit voltage	V 12
Battery	A/h 19
Power sockets (standard equipment)	2





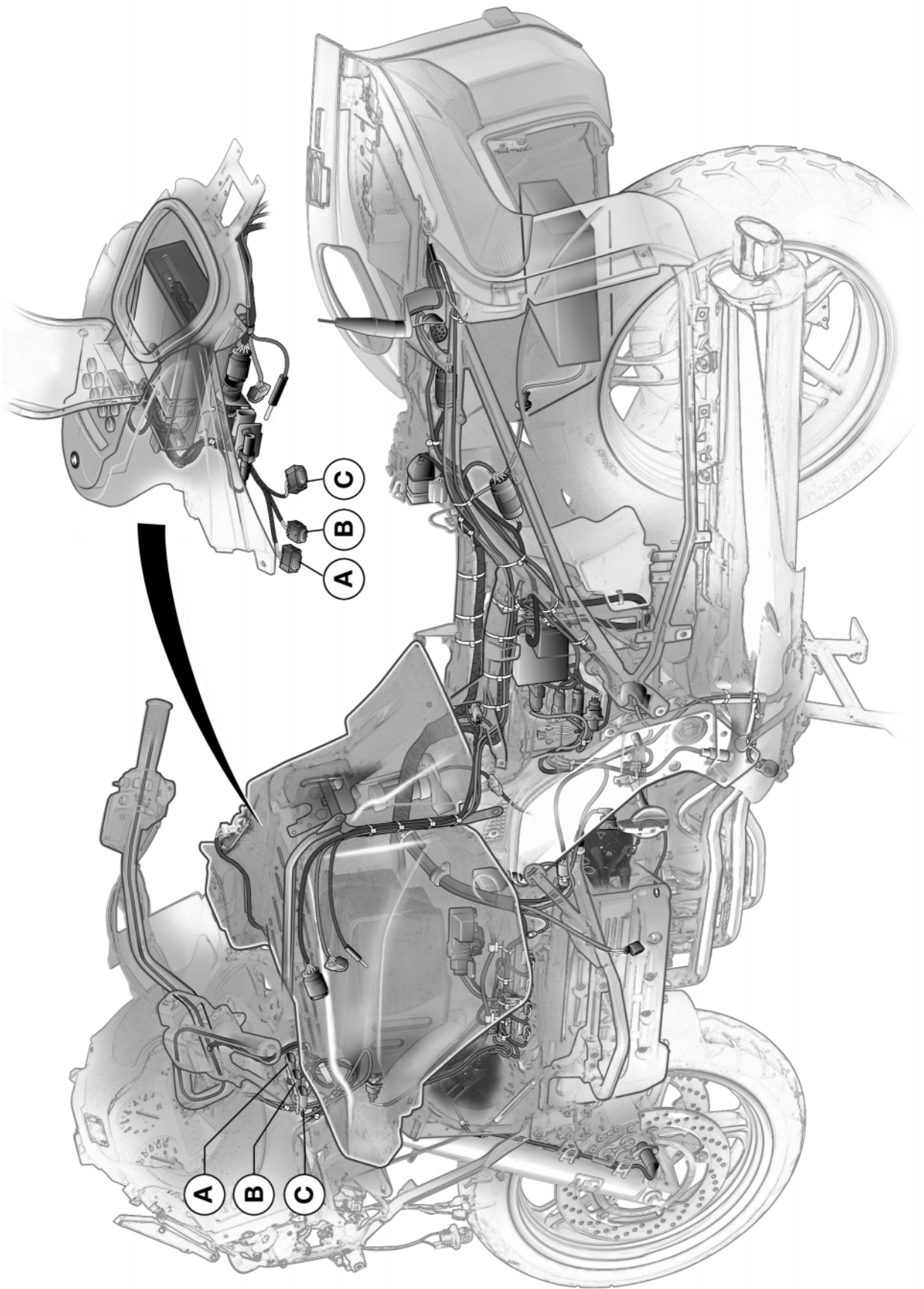
Wiring harness

View from right



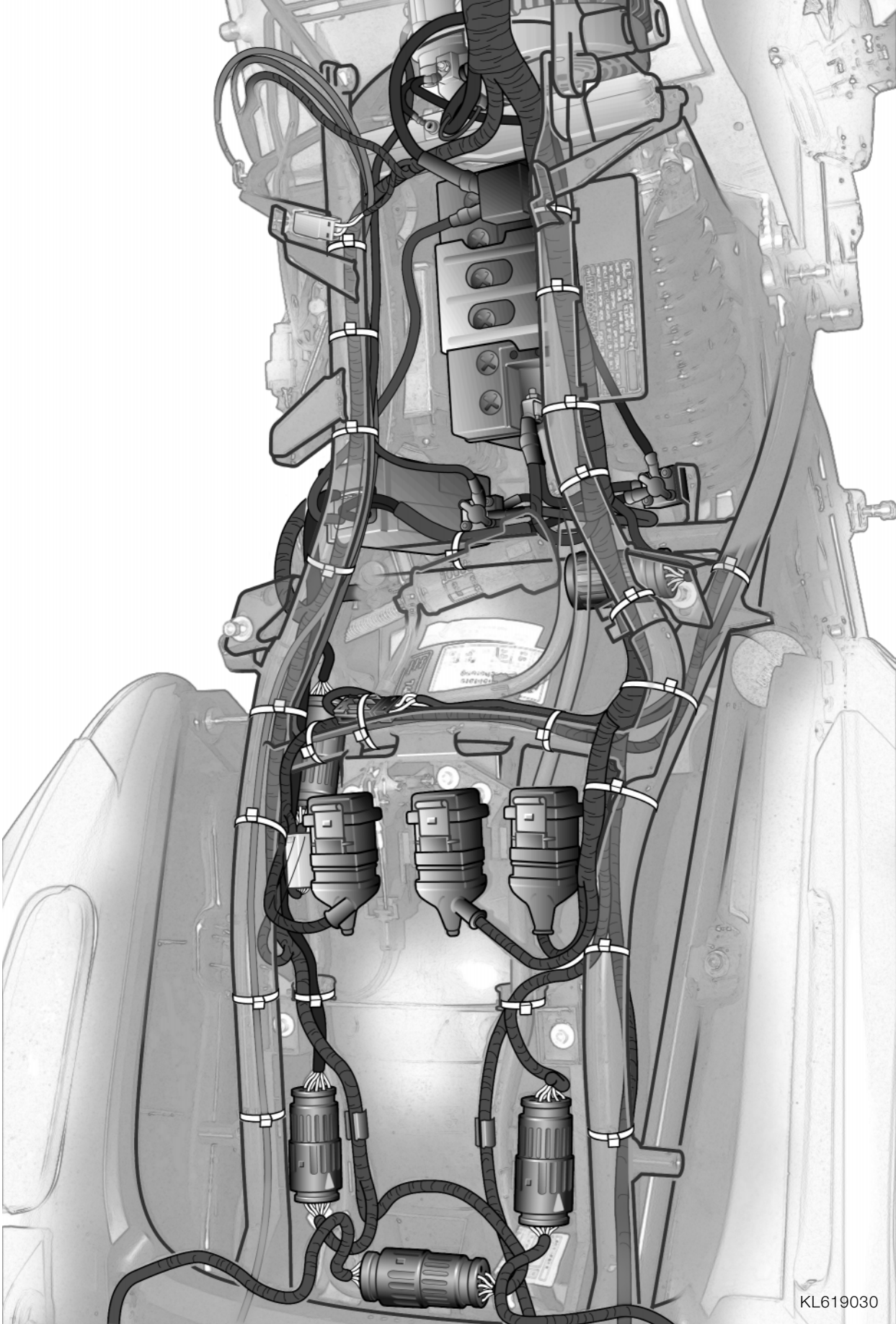
KL619010

View from left



KL619020

Rear frame wiring harness

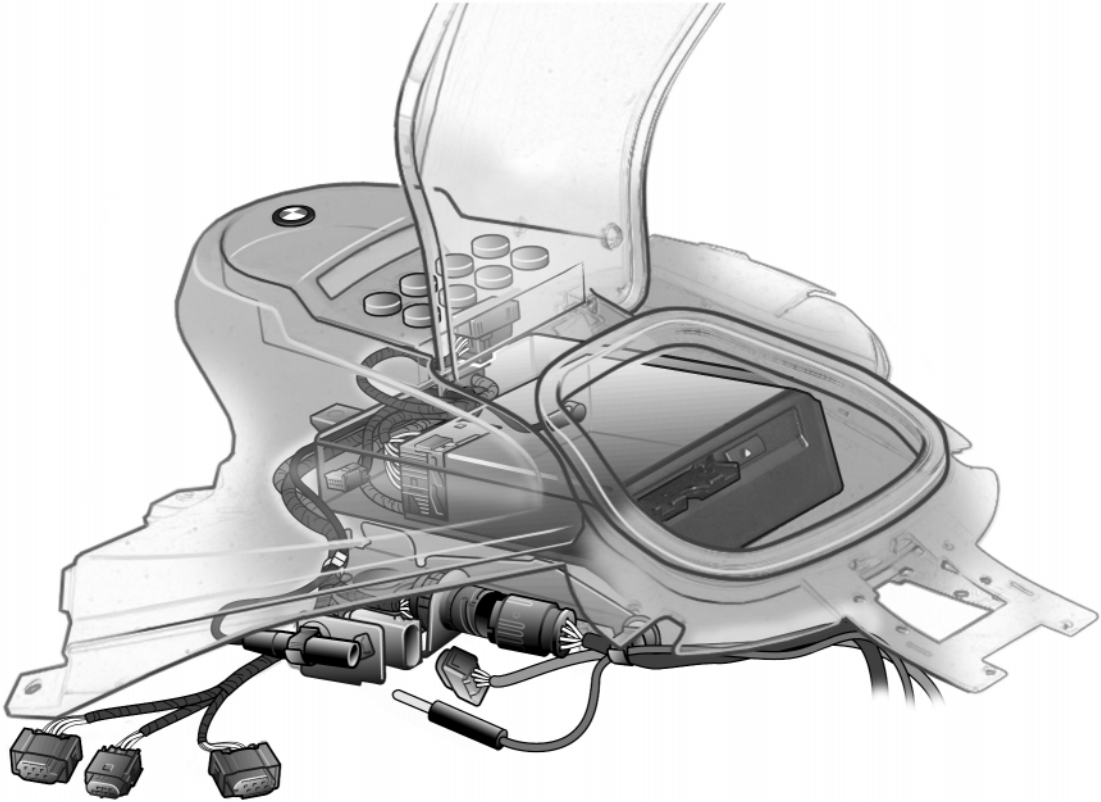


KL619030

Top case wiring

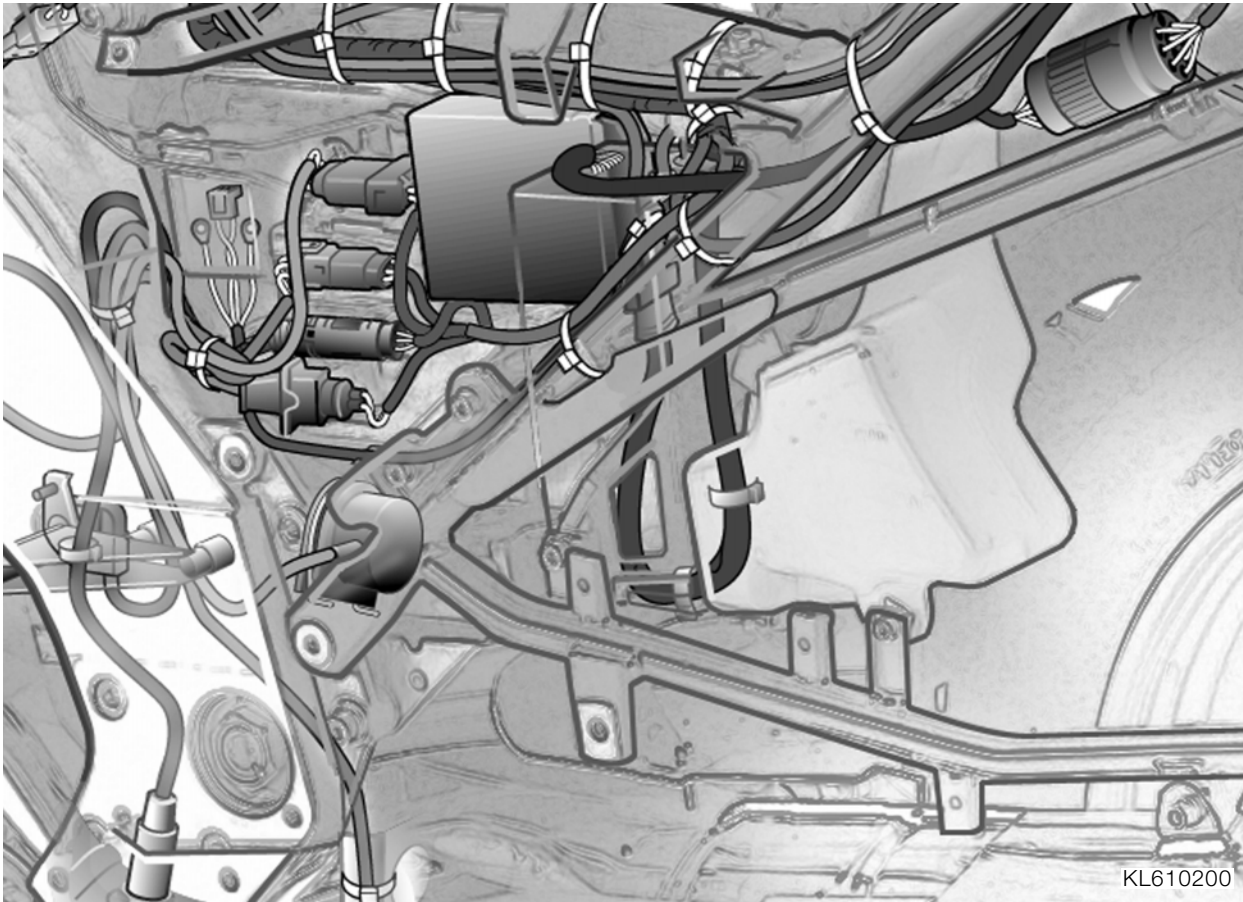


Tank cover with radio/cassette player

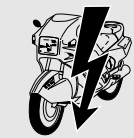


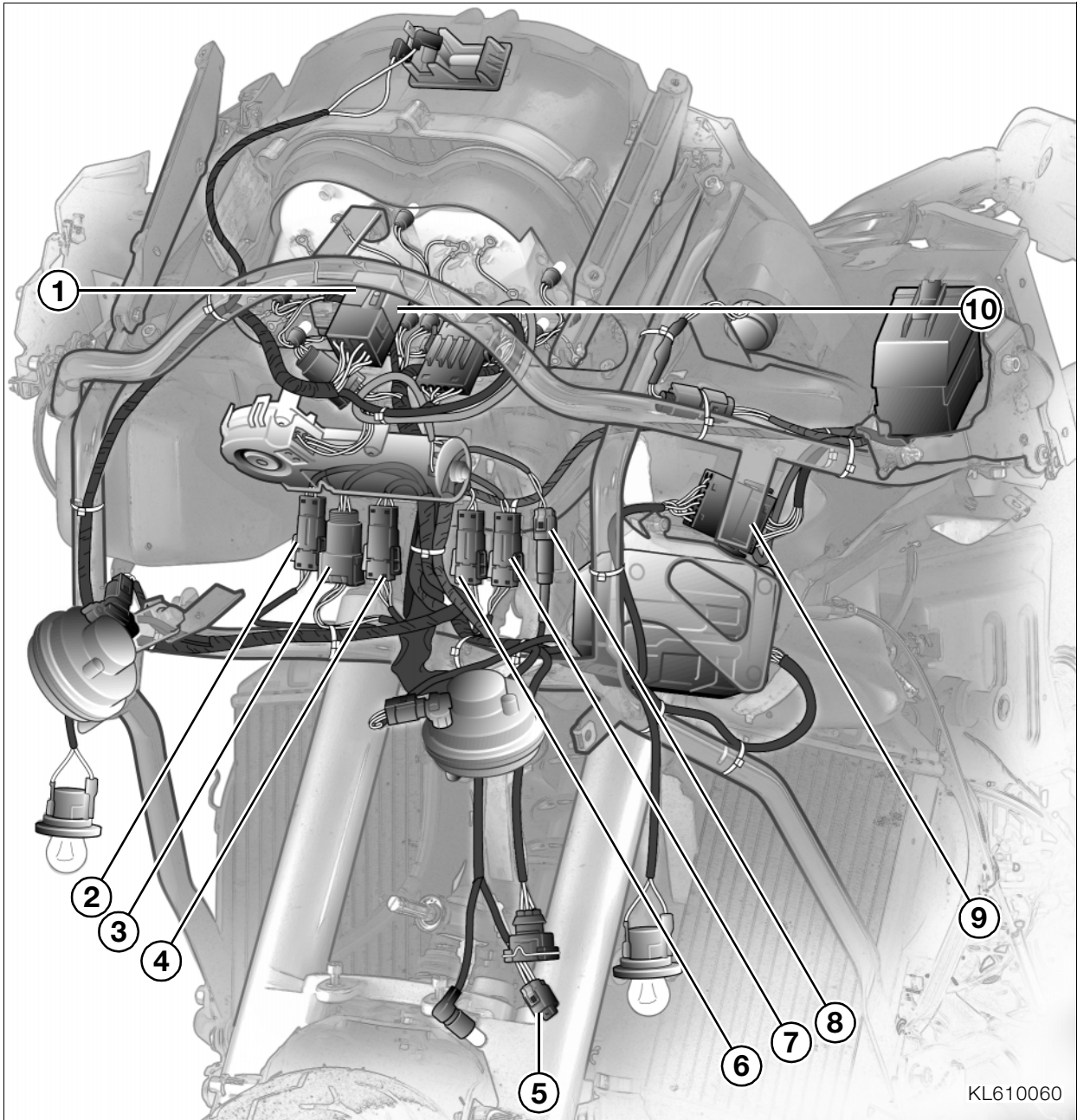
KL610040

Connectors beside ABS control unit



KL610200

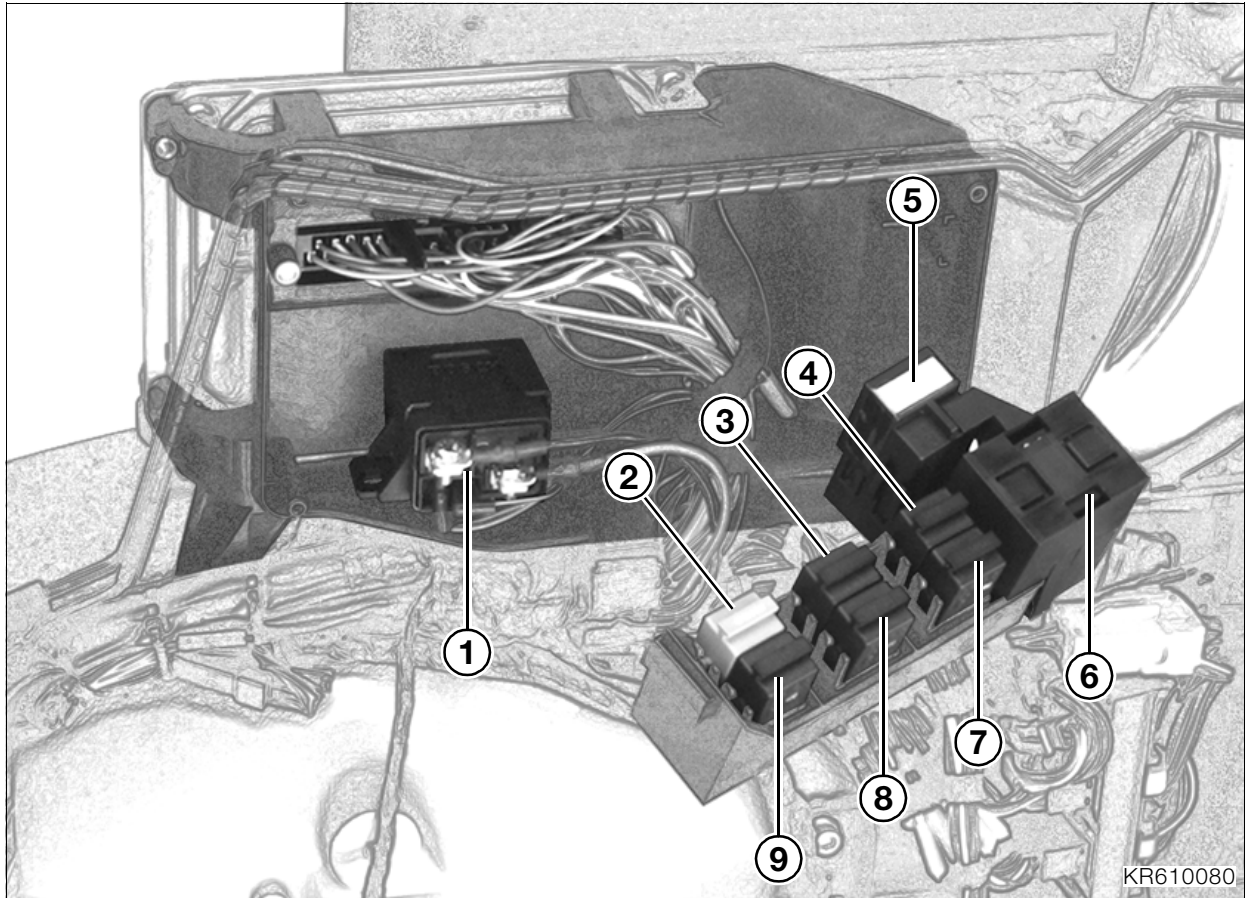




KL610060

Connectors on fairing bracket

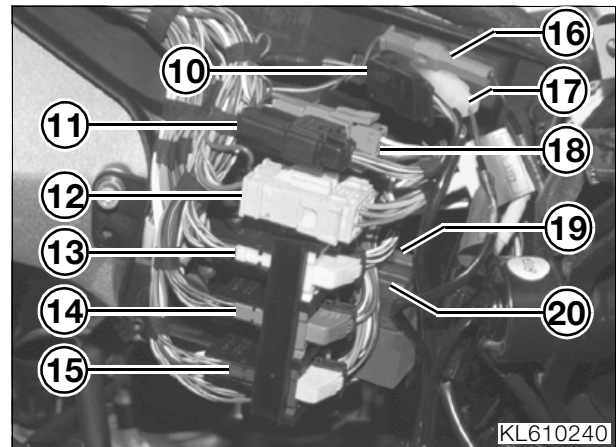
- 1 Relay for lowering adjustable windscreen
- 2 Brake-light switch, front brake
- 3 Switch for cruise control system
- 4 Switch for heated grips
- 5 Temperature sensor
- 6 Clutch switch for cruise control system
- 7 Clutch switch for starter motor
- 8 ABS sensor for front brake
- 9 On-board computer
- 10 Relay for raising adjustable windscreen



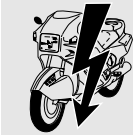
Relay positions in electronics box

- 1 Starter relay
- 2 ABS warning relay
- 3 Relief relay
- 4 Fuel pump relay
- 5 Control unit for fuel warning light
- 6 Flasher unit
- 7 Motronic relay
- 8 Horn relay
- 9 Fan relay

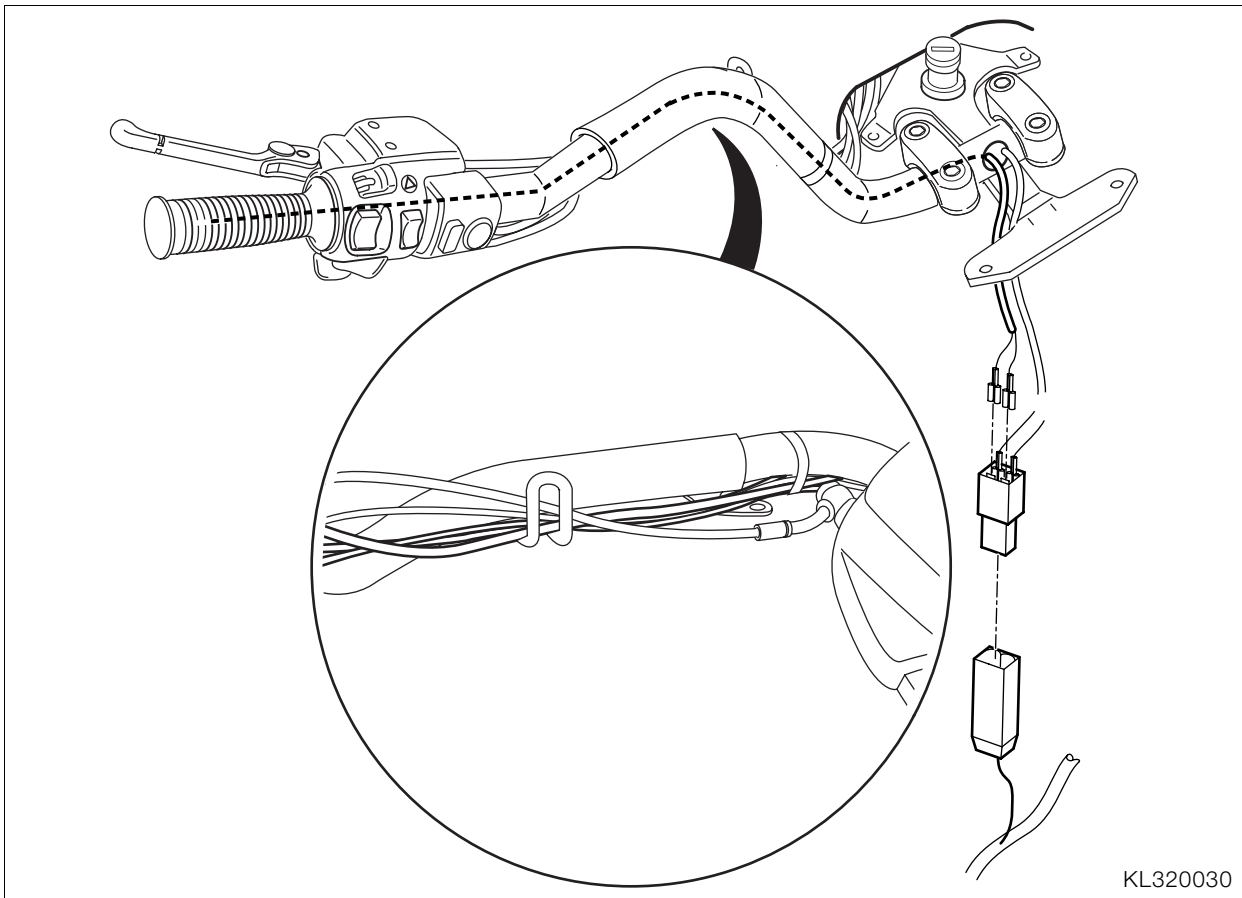
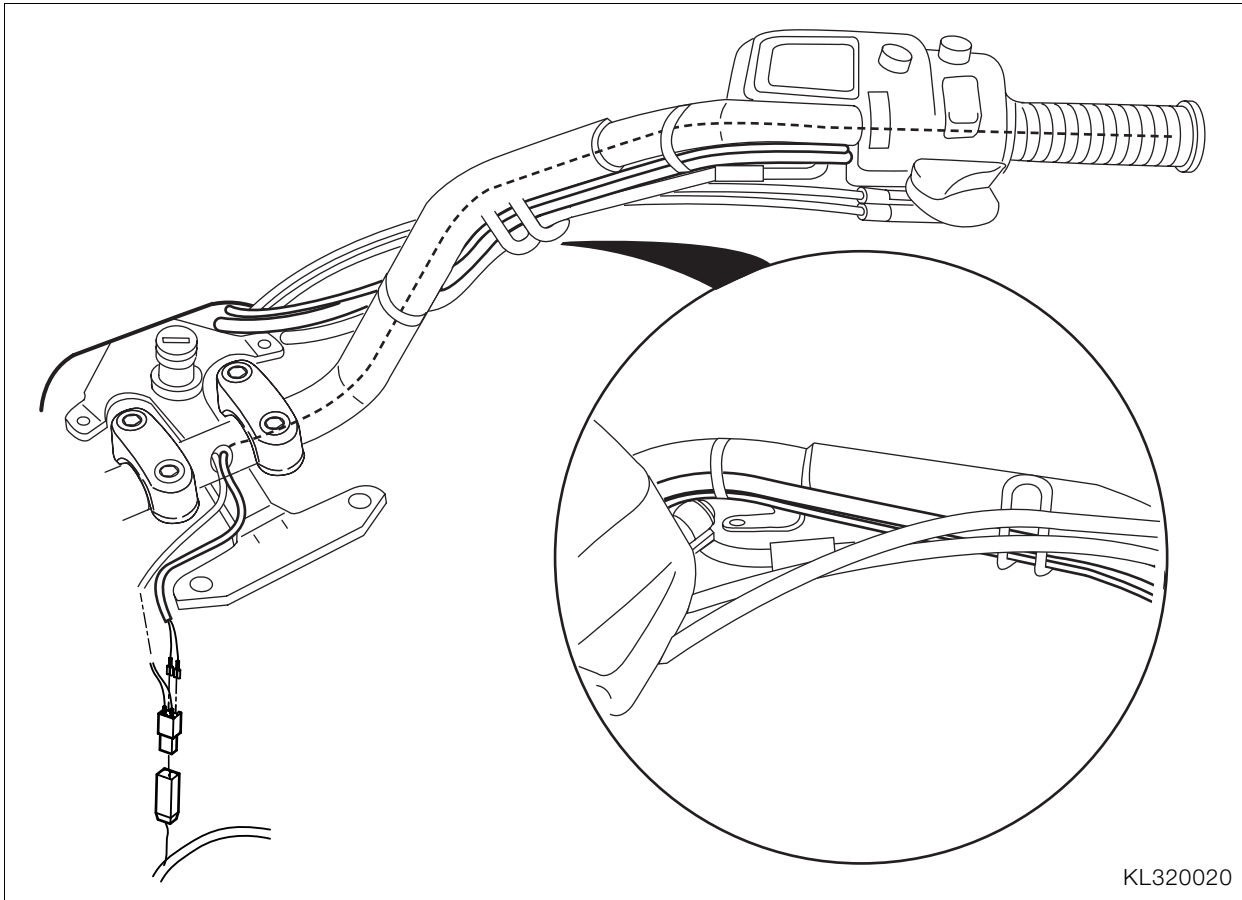
Connectors, electronics box

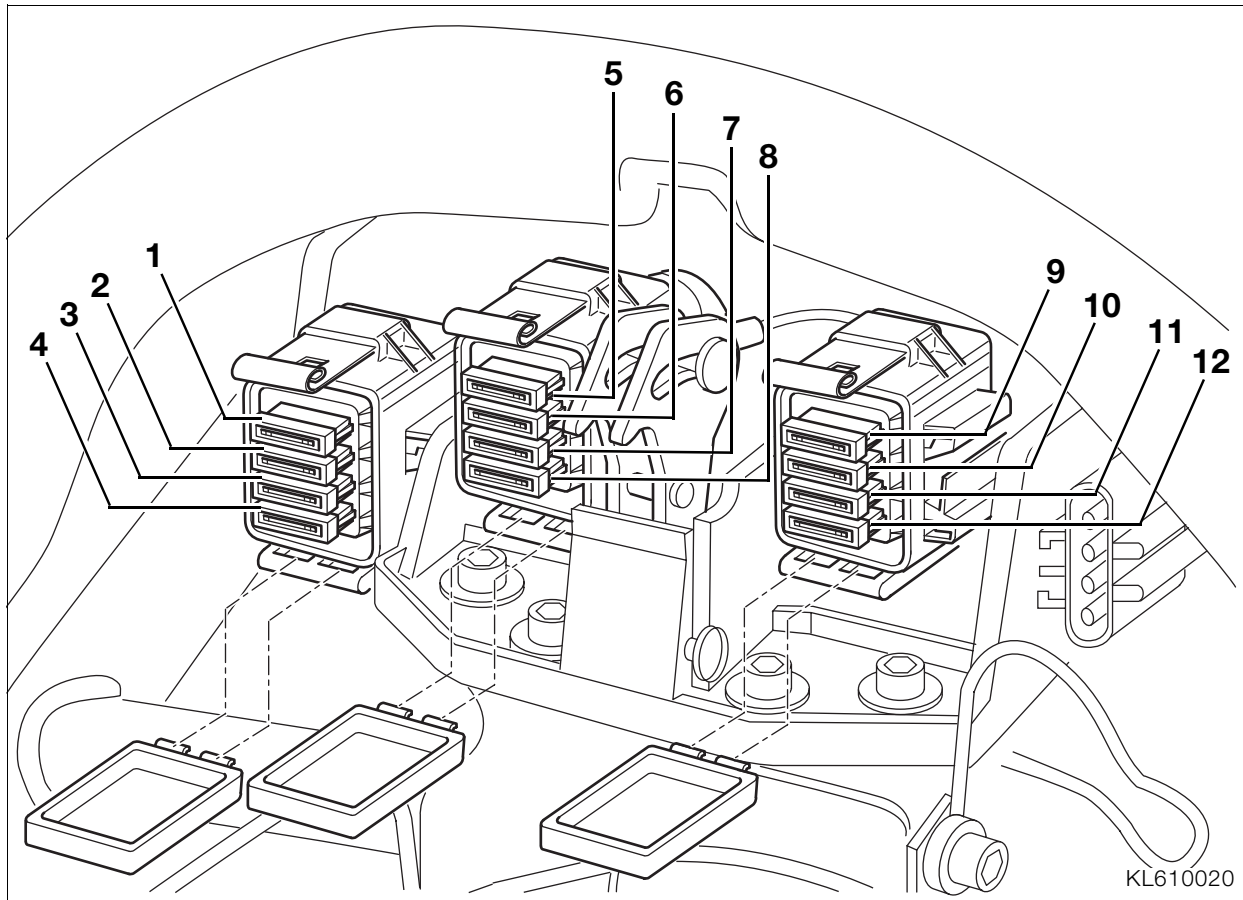


- 10 Hall-effect sensor
- 11 Multi-function switch, right
- 12 Ignition light switch
- 13 Instrument cluster
- 14 Instrument cluster 2
- 15 Multi-function switch, left
- 16 Water pump temperature sensor
- 17 Oil pressure switch
- 18 Multi-function switch, right, 2
- 19 Brake light relay
- 20 Emergency OFF relay



Handlebar wiring





Replacing fuses

Motorcycle fuses

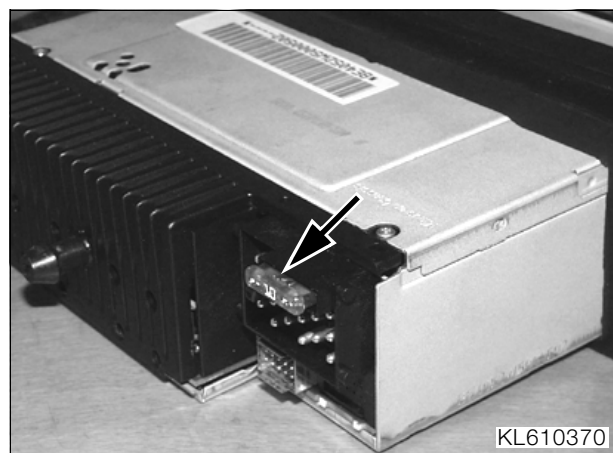
- Lift the seat at the front.
- Open the cover of the fuse box.
- Replace the defective fuse.

Fuses

- 1 Brake-light switch, fuel warning light, fan relay, instrument cluster, switch for adjustable windscreen 4 A
- 2 Parking lights, front and rear 4 A
- 3 Horn, brake light, anti-theft alarm, if fitted 15 A
- 4 Motronic, fuel pump, diagnosis 15 A
- 5 Instrument cluster, on-board computer 4 A
- 6 Heated handlebar grips 4 A
- 7 Adjustable windscreen, power sockets 1 and 2 15 A
- 8 Radio, map-reading light, interior light for top case, power socket for top case 15 A
- 9 Fan, right 4 A
- 10 Fan, left 4 A
- 11 Seat heating front/rear 15 A
- 12 Cruise control system 15 A

Fuse for radio/cassette player

- Remove radio/cassette player.
- ➔See Group 65



- Use a screwdriver to unlatch the connector and replace the fuse (arrow).



Removing and installing electronics box



Caution:

Disconnect ground lead from battery and insulate.

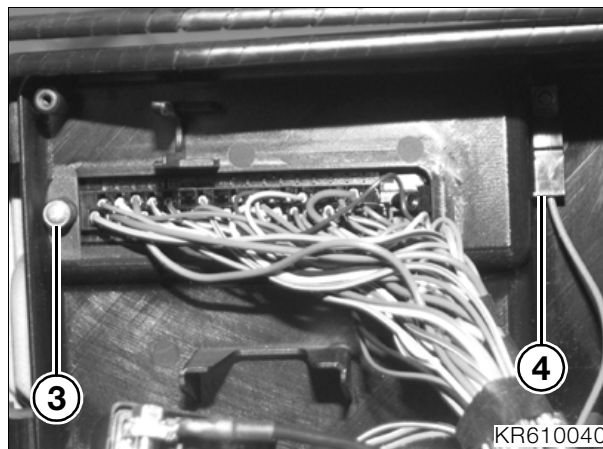
- Remove left and right fairing side sections.



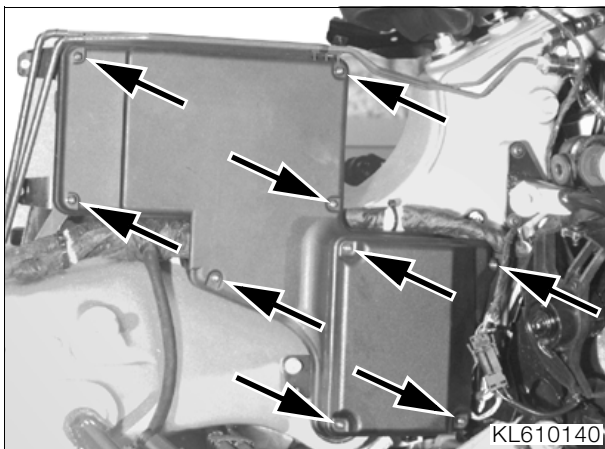
Warning:

Comply with safety precautions when handling or working with fuel.

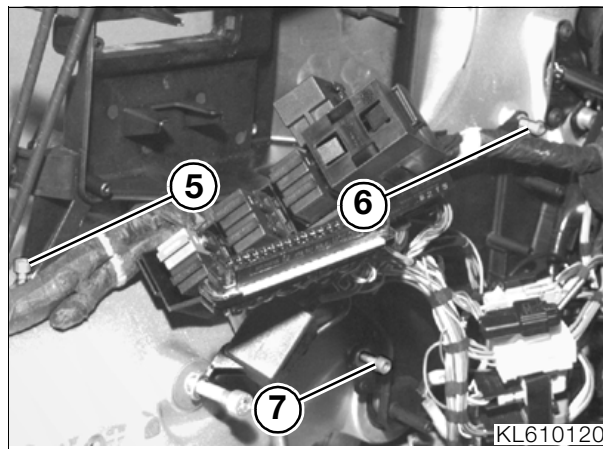
- Remove fuel tank.
 - ➔See Group 16
- Remove Motronic control unit.
 - ➔See Group 13
- Remove the right-hand air intake pipe.
- Remove the air output from the right-hand radiator.
- Press the right radiator forward out of its holder.



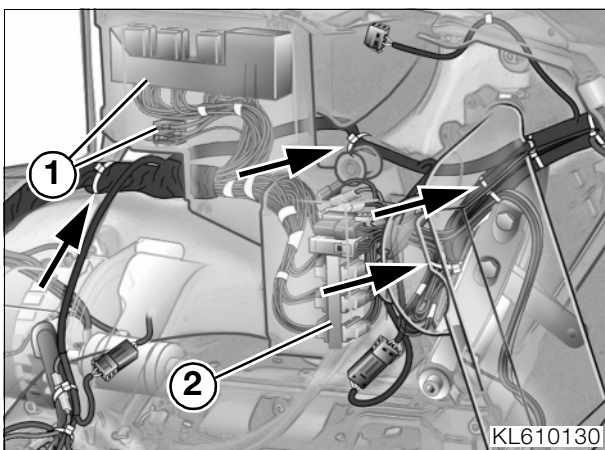
- Disconnect ground cable (4).
- Remove screw (3) securing connector strip for Motronic control unit.
- Remove the seal at the rear and push the connector strip inwards.



- Release the nine fasteners (arrows). Take off both covers.



- Remove screws (5, 6, 7).
- Remove brake lines from holder on housing.
- Removing housing.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



- Pull out relay holder (1) and plug holder (2).
- Open the cable ties (arrows).



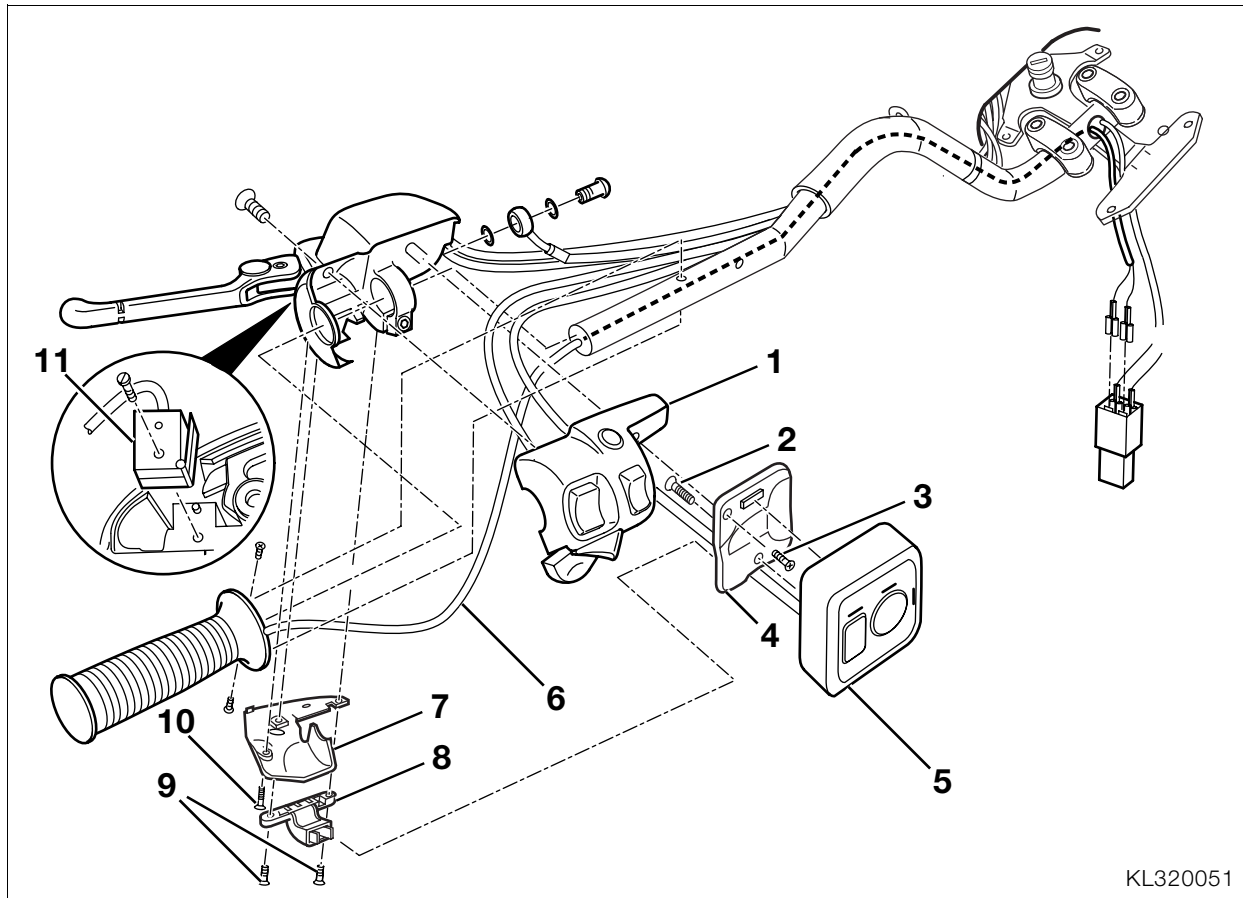
Caution:

Make sure that the seal in the cover of the electronics box is correctly seated.



Tightening torques:

Electronics box to main frame 9 Nm



KL320051

Disassembling left multi-function switch

Preparatory work



Caution:

Disconnect ground lead from battery and insulate.

- Remove left-hand handlebar trim.
- ➔See Group 46
- Remove left and right fairing side sections.
- Remove cover of fork bridge.
- Open cable ties on handlebar.
- Release fastener (2) and swing radio control unit (5) clear.
- Release fasteners (9) and remove holder (8).
- Release fastener (3) and remove radio control unit (5) with rear panel (4).
- Release fastener (10) and remove lower cover (7).

Removing and installing radio control unit

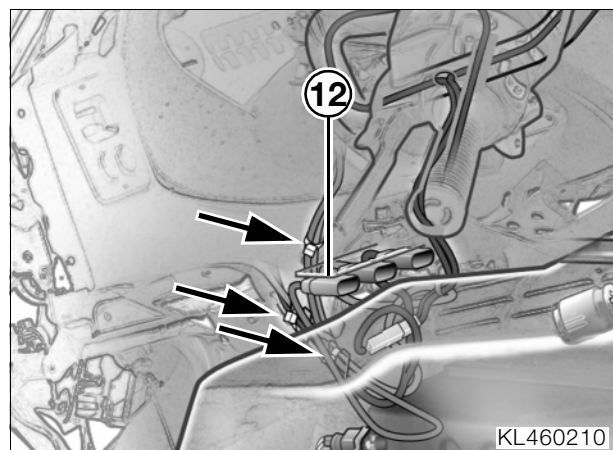


Warning:

Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
- ➔See Group 16
- Remove air outlet duct for left radiator.

- Press radiator out of holder.



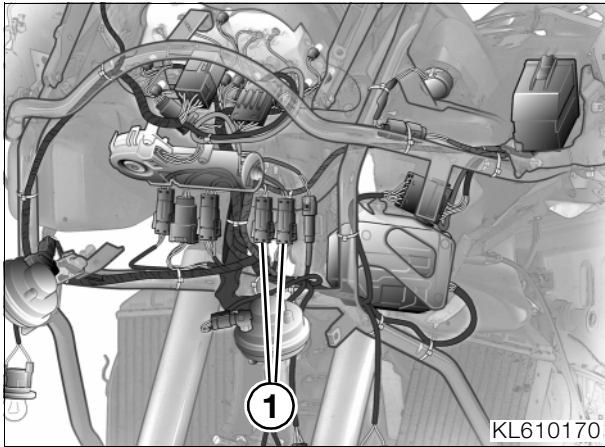
KL460210

- Open the cable ties (arrows).
- Disconnect plug (12) at retaining plate.
- Pull cable through toward handlebar and remove radio control unit.
- Installation is the reverse of the removal procedure.

Removing and installing clutch switch

- Remove multi-function switch (1).
- Release clutch switch (11).





- Disconnect plugs (1) at fairing bracket.
- Open the cable ties.
- Pull cable through toward handlebar and remove switch.
- Installation is the reverse of the removal procedure.

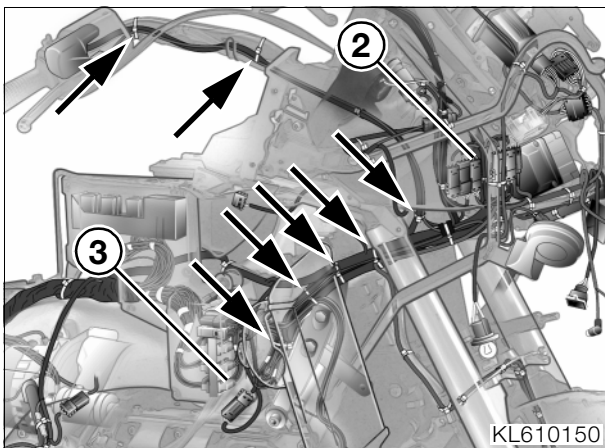
Removing left multi-function switch



Warning:

Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
- Remove the intake air pipe.
- Remove the air output from the right-hand radiator.
- Press the right-hand radiator out of its holder.
- Release fastener securing multi-function switch to handlebar fitting and remove multi-function switch.
- Release fastener securing clutch switch to handlebar fitting.
- Remove bottom cover of electronics box.



- Open the cable ties (arrows).
- Disconnect plugs (2, 3).
- Pull cables through toward handlebar and remove the multi-function switch.
- Installation is the reverse of the removal procedure.

Disassembling right multi-function switch



Caution:

Disconnect ground lead from battery and insulate.

- Remove left and right fairing side sections.
 ↳ See Group 46
- Remove right-hand handlebar trim.
- Remove cover of fork bridge.

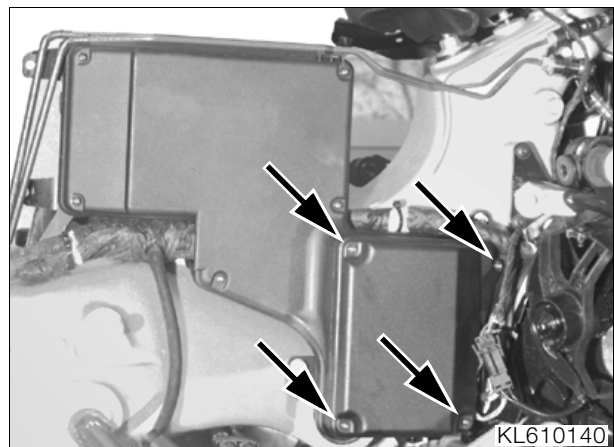
Removing and installing right multi-function switch



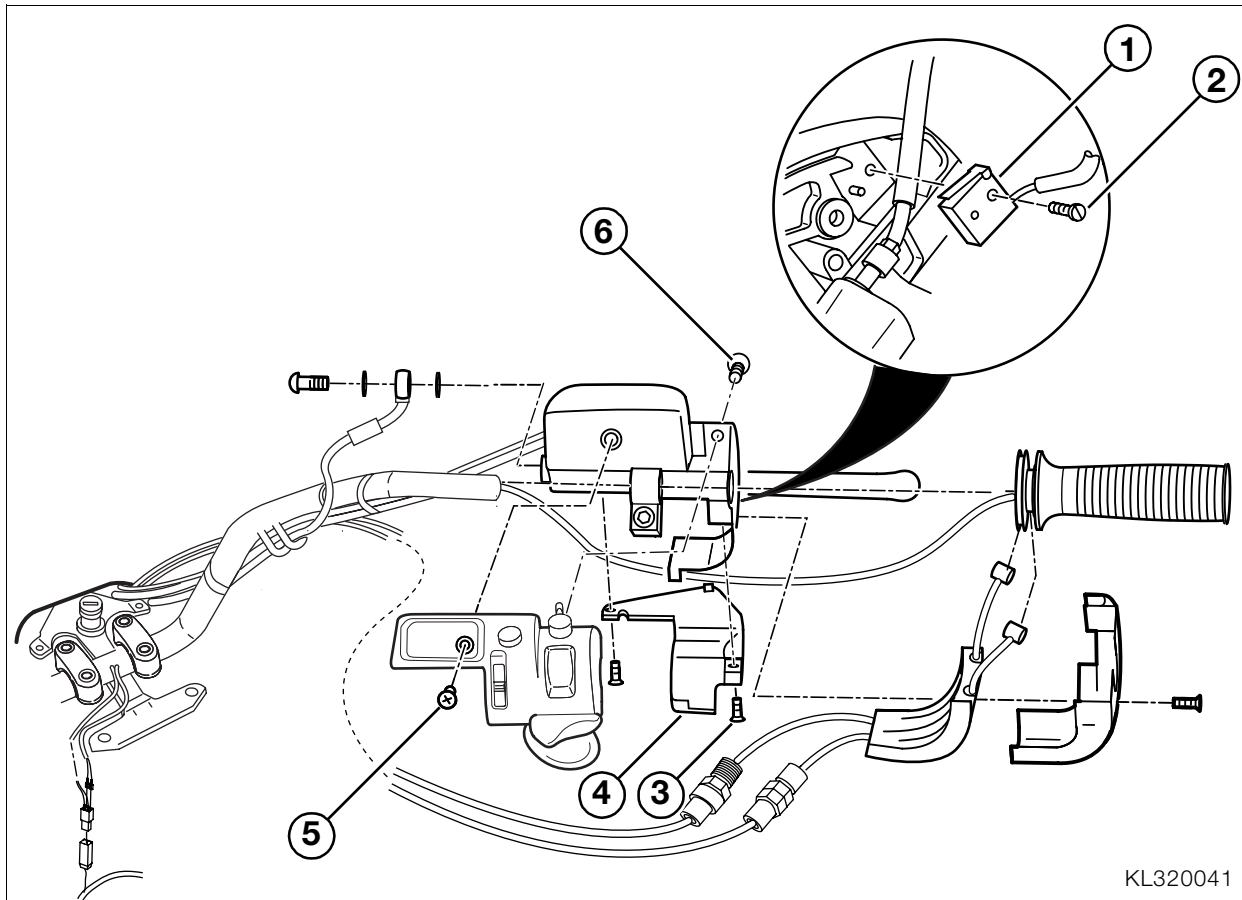
Warning:

Comply with safety precautions when handling or working with fuel.

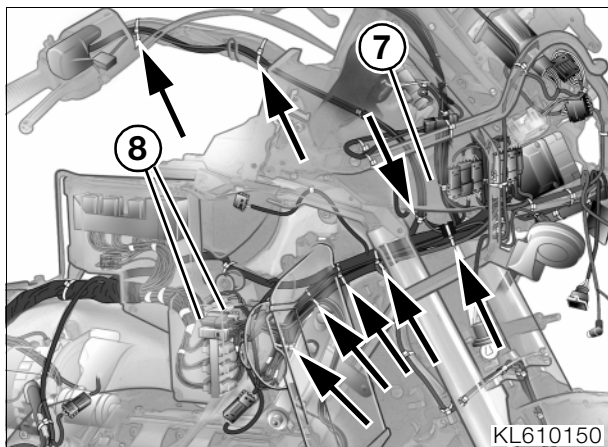
- Remove fuel tank.
- Remove the intake air pipe.
- Remove the air output from the right-hand radiator.
- Press radiator out of holder.



- Release the fasteners (arrows) and remove the bottom cover of the electronics box.



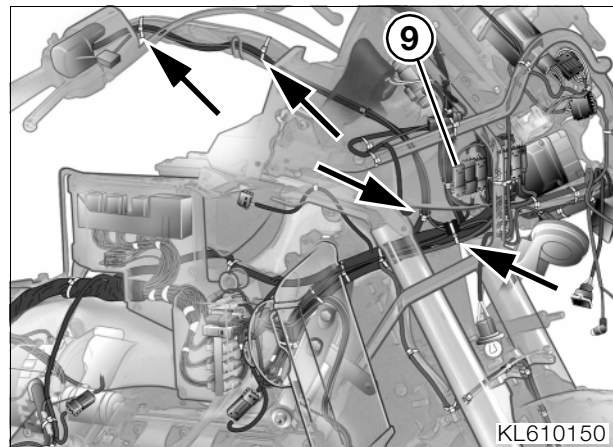
KL320041



KL610150

- Open the cable ties (arrows).
- Disconnect plugs (8) in electronics box.
- Disconnect plug (7) at fairing bracket.
- Pull cable through toward handlebar.
- Release fasteners (3) and take off lower cover (4).
- Release fasteners (5, 6) and remove multi-function switch.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Make sure that the seal in the cover of the electronics box is correctly seated.

Removing brake light switch



KL610150

- Open the cable ties (arrows).
- Disconnect plug (9) and pull cable through toward handlebar.
- Release fasteners (3) and take off lower cover (4).
- Release fastener (2) and remove brake-light switch (1).
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Make sure that the seal in the cover of the electronics box is correctly seated.



Removing and installing control unit for reverser

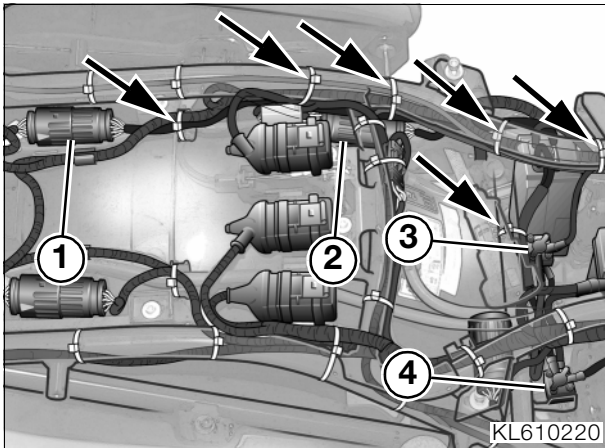
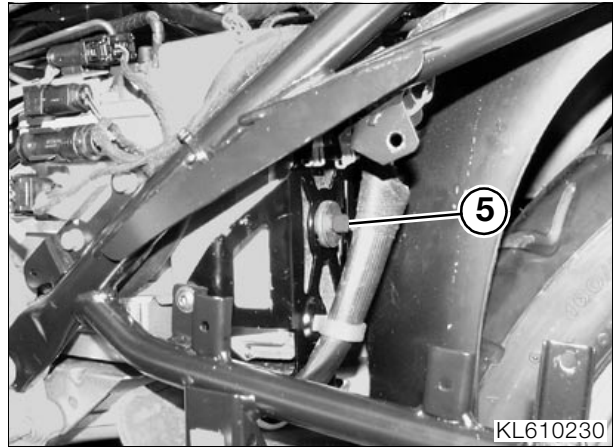
- Remove left side section of fairing.
- ➡See Group 46
- Remove the rear left footrest plate.
- Remove the left-hand battery cover.
- Remove rear seat.



Caution:

To avoid short-circuits: Disconnect **negative** battery lead (-) first, then **positive** (+) lead.

- Remove the battery.



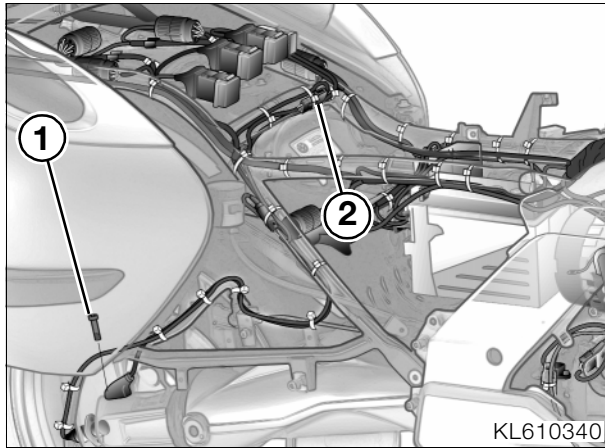
- Release the fastener (5).
- Remove control unit.
- Installation is the reverse of the removal procedure.

- Open the cable ties (arrows).
- Disconnect plugs (1, 2).
- Disconnect cables at terminals for starter motor (3) and ground (4) on the frame.
- Disconnect cables of control unit at terminals for starter motor and ground.
- Disconnect plug at ABS control unit.
- Remove fasteners securing coolant expansion tank.
- Pull cables through toward control unit.



Removing and installing inductive sensor for speedometer

- Remove right side section of fairing and battery cover.
- ➡See Group 46
- Remove rear seat.



- Release the fastener (1).
- Disconnect plug (2).
- Open the cable ties.
- Remove inductive sensor for speedometer with cable.



Caution:

When installing, make sure that the O-ring is in good condition.

- Installation is the reverse of the removal procedure.

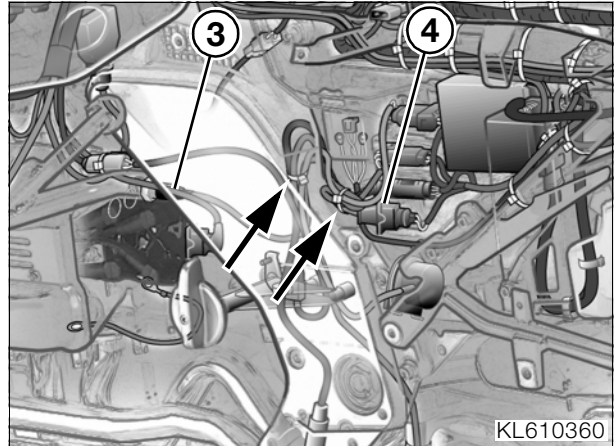


Tightening torques:

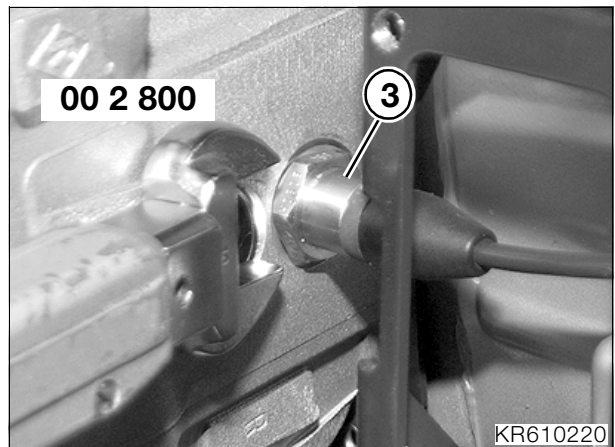
Inductive sensor to rear wheel drive 4 Nm

Removing and installing water temperature sensor

- Remove left side section of fairing and battery cover.
- ➡See Group 46
- Remove left-hand and centre sections of engine spoiler.
- Drain coolant.
- ➡See Group 17
- Remove the ignition coil.
- ➡See Group 12



- Disconnect plug (4).
- Open cable ties (arrows) and pull cable through toward cylinder head.
- Remove temperature sensor (3) with washer.
- Installation is the reverse of the removal procedure: pay particular attention to the following:



- Install temperature sensor (3) with special wrench, **BMW No. 00 2 800**.



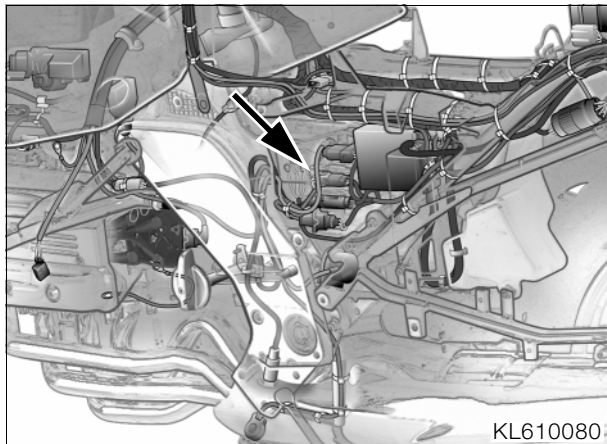
Tightening torques:

Temperature sensor to cylinder head 30 Nm
Skirt bracket to frame 21 Nm

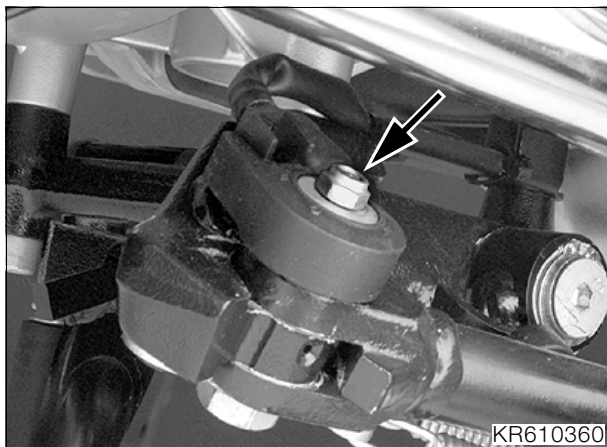



Replacing side stand switch

Removing and installing side stand switch




- Disconnect plug (arrow).
- Open the cable ties.





 **Caution:**
Screw is secured with thread-locking compound.

- Release the fastener (arrow).
- Remove side stand switch with cable.

- Installation is the reverse of the removal procedure: pay particular attention to the following.

 **Caution:**
Install screw and nut with **Loctite 243**.

 **Note:**
When installing, note the correct positions of the cable straps.

 **Tightening torques:**
Side stand switch fastener 7 Nm
(clean thread + Loctite 243)

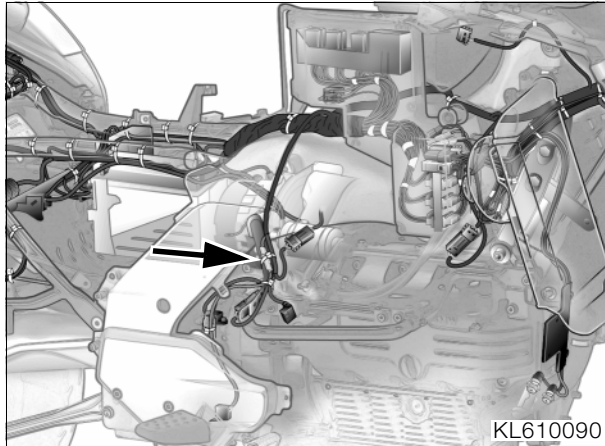
Check operation of side stand switch

- Switch off the engine.
- Place motorcycle on its centre stand.
- Select a gear and switch on the ignition.
 - Temperature gauge warning lamp lights up.
- Extend the side stand, observing the temperature gauge warning lamp.
 - Temperature gauge warning lamp goes out (engine control unit switches off).

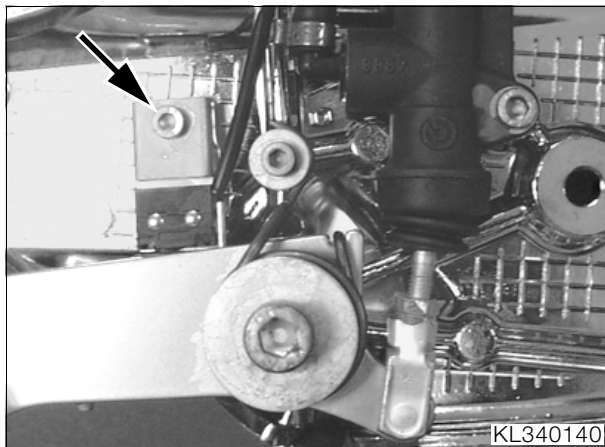
Replacing and adjusting foot brake light switch

Removing and installing brake light switch

- Remove right engine spoiler.
- ➔ See Group 46.
- Remove the right footrest plate



- Open the cable ties.
- Disconnect plug (arrow).



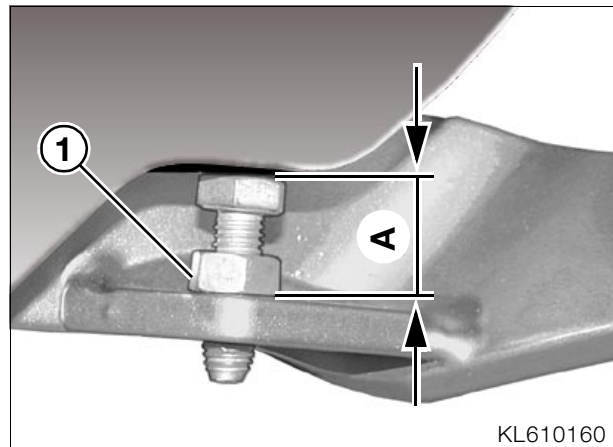
- Release the fastener (arrow).
- Remove retaining plate and brake light switch with cable.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Route cables correctly and secure with cable ties.
- Check foot brake light switch; adjust if necessary



Tightening torques:

Brake light switch to footrest plate 5 Nm
(clean thread + Loctite 243)
Footrest plate to frame 21 Nm

Adjusting brake light switch



- Slacken locknut (1).
- Set stop of foot-brake lever to distance "A".
- Tighten the locknut.
- Check operation of brake-light switch.



Warning:

Check piston rod play.

Setting:

Distance "A" 14 mm (0.55 in)



Tightening torque:

Stop, footbrake lever 7 Nm



Removing and installing ignition switch/steering lock cable

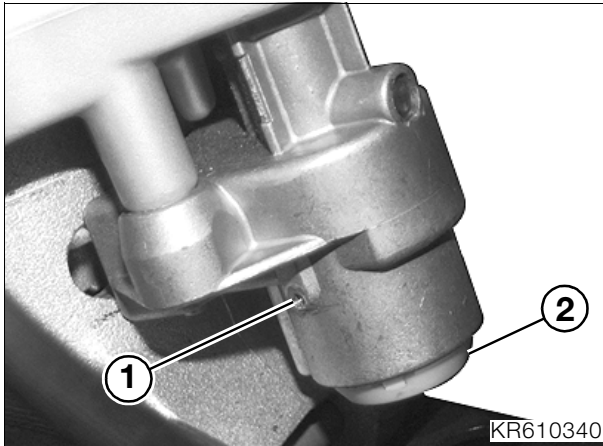
- Remove left and right fairing side sections.



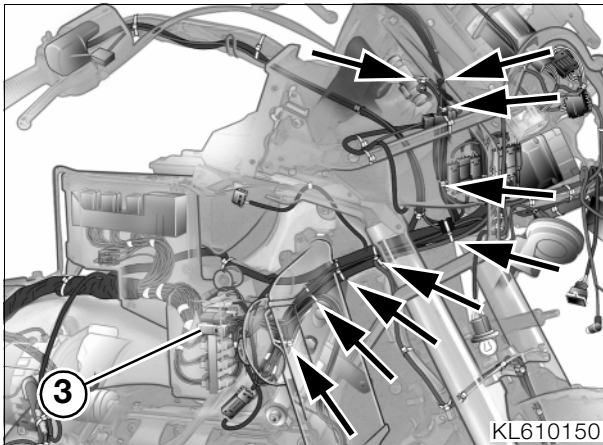
Warning:

Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.



- Carefully remove the sealing lacquer from the tapped bore for grubscrew (1).
- Remove the grubscrew.
- Pull housing of ignition light switch (2) with cable down to remove.

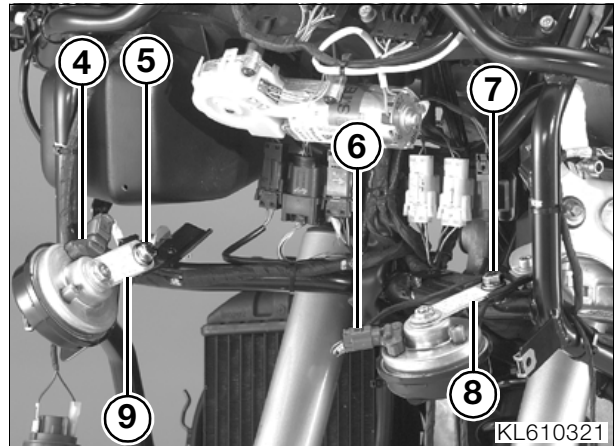


- Open the cable ties (arrows).
- Open the lid of the electronics box.
- Disconnect plug (3).
- Remove ignition light switch housing.

- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Seal the tapped bore for the grubscrew with sealing lacquer.
- Carefully route the cable and secure in position with cable ties.
- Make sure that the seal in the cover of the electronics box is correctly seated.

Removing and installing fanfare horn

- Remove left and right fairing side sections.
- ➔ See Group 46
- Remove upper section of fairing.



- Disconnect plug (4, 6).



Note:

Do not slacken the fastener securing the fanfare horn to the retaining plate (8, 9).

- Release fasteners (5, 7) and remove fanfare horn complete with retaining plates (8, 9).
- Installation is the reverse of the removal procedure.

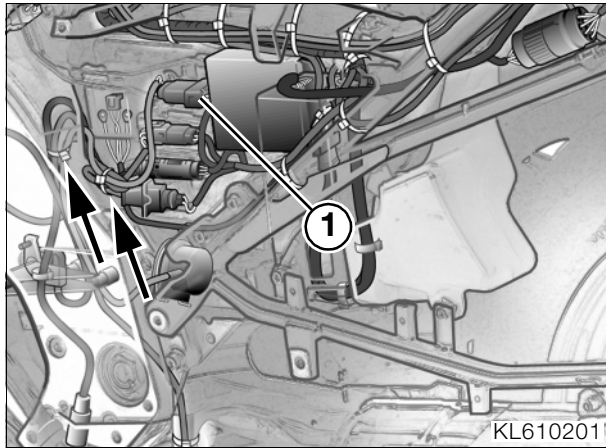


Tightening torque:

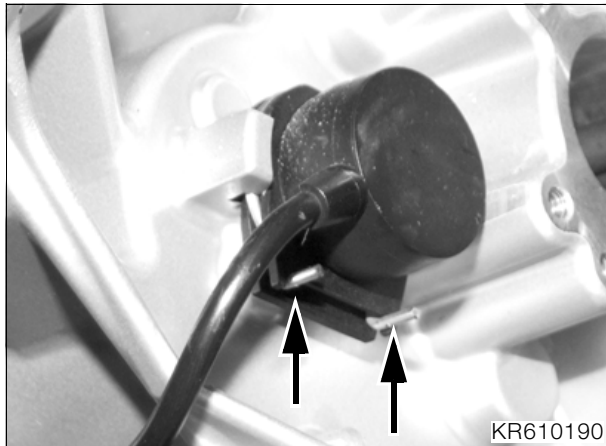
Retaining plate for fanfare horn
to fairing bracket 21 Nm

Removing and installing switch for gear indicator

- Remove left side section of fairing.
 ➡See Group 46
- Remove the left-hand battery cover.
- Remove cross-tube.



- Disconnect plug (1).
- Open cable ties (arrows) and pull cable down to remove.



Caution:

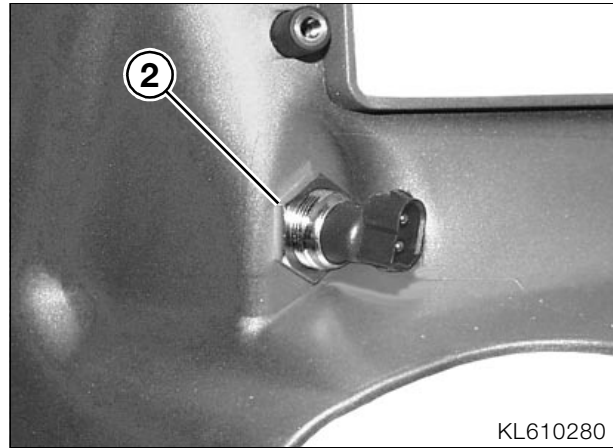
The spring retainer could damage the switch housing if it jumps out: slowly relieve the tension on the retainer.

- Compress the ends of the spring retainer (arrows) and pull the gear indicator out toward the rear.
- Installation is the reverse of the removal procedure.

Removing and installing power socket

Socket on engine spoiler

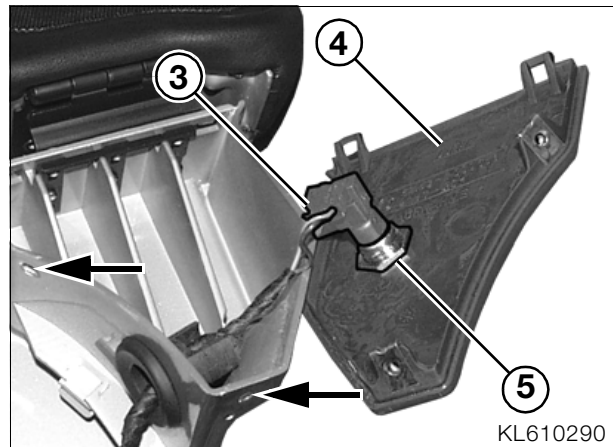
- Remove left-hand side of engine spoiler.
 ➡See Group 46



- Release the fastener (2) and take off the power socket.
- Installation is the reverse of the removal procedure.

Socket in top case

- Remove the top case.
 ➡See Group 46



- Release 2 fasteners (arrows) and remove cover (4).
- Disconnect plug (3).
- Release the fastener (5) and take off the power socket.
- Installation is the reverse of the removal procedure.



Tightening torques:

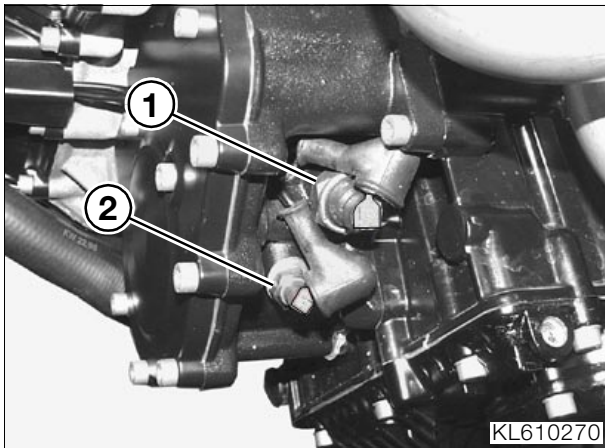
Top case to rear frame 9 Nm



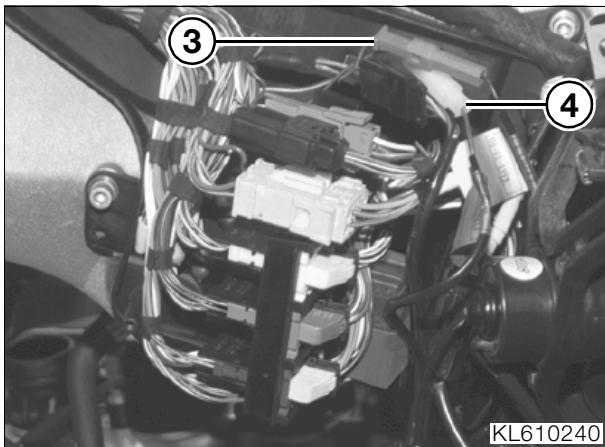
Removing and installing cable for oil pressure switch / cable for water pump temperature sensor

- Remove the cover from the Hall-effect transmitter.
- ➔See Group 12
- Open the lid of the electronics box.

Removing cables



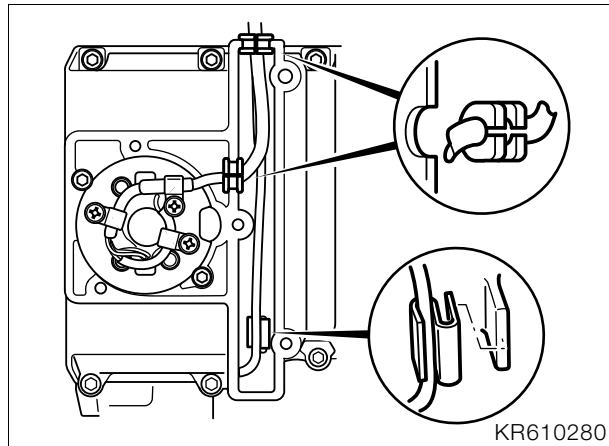
- Remove protective cap and plug from oil-pressure switch (1) / temperature sensor for water pump (2).
- Carefully withdraw the cable from the bore in the pump housing.



- Disconnect plug for oil-pressure switch (4) / temperature sensor for water pump (3) in the electronics box.
- Open the cable ties.
- Remove cable.

Installing cables

- Introduce the cable into the bore in the pump housing.



- Route the cable at the Hall-effect transmitter as illustrated.
- From this point on, installation is the reverse of the removal procedure.

Tightening torques:
 Cover of Hall-effect transmitter..... 9 Nm

Removing and installing battery

See Group 00, Battery

Removing and installing battery carrier

See Group 34, Removing ABS control unit

Removing and installing front and rear ABS sensors

See Group 34

62 Instruments

Contents	Page
Technical Data	3
Wiring colours	5
Removing and installing instrument panel	6
Replacing telltale/warning lights	7
Telltale/warning lights	7
Disassembling instrument cluster	8
Removing speedometer, rev. counter, temperature gauge, and fuel gauge	8
Removing clock	8
Removing and installing wiring harness	9

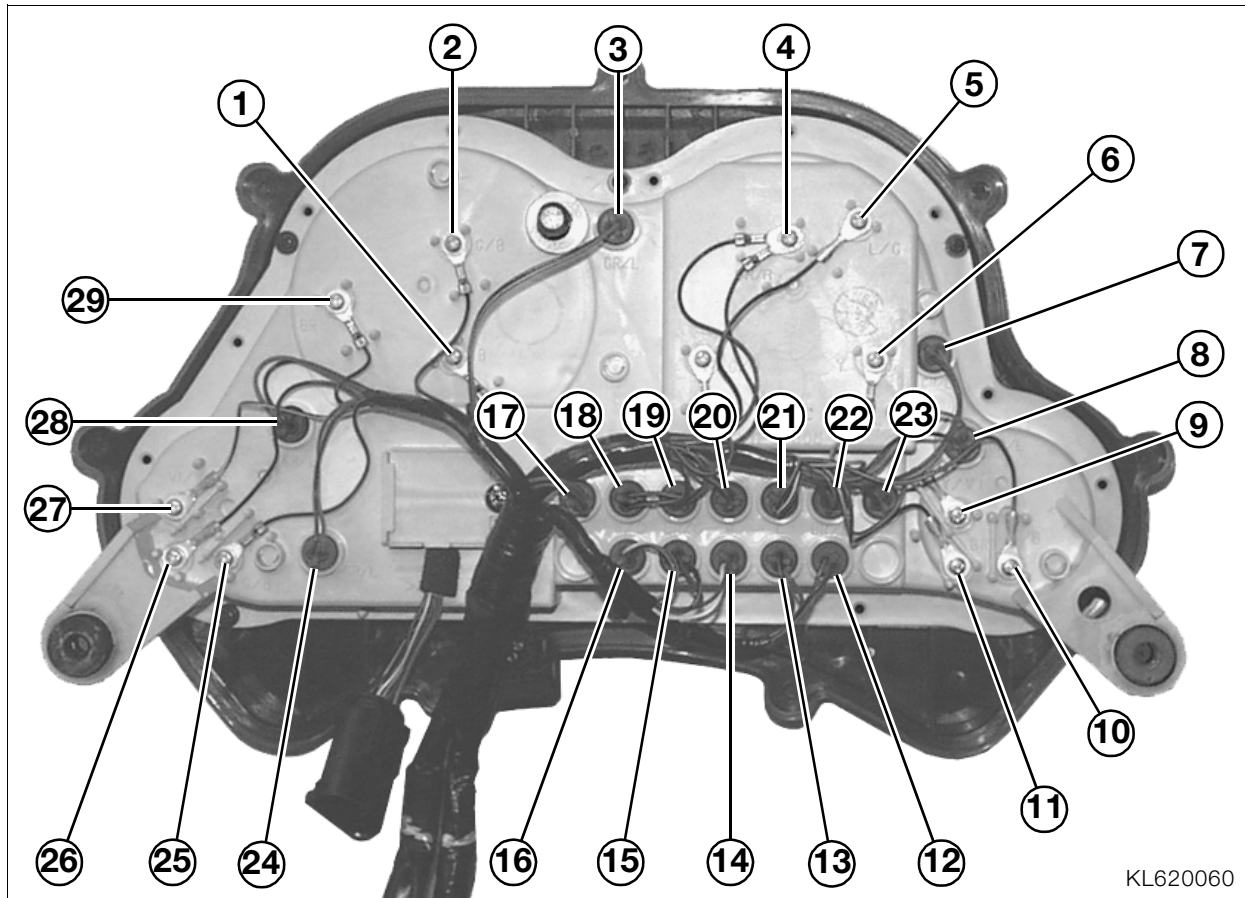




Technical Data	K 1200 LT
Instrument cluster (standard)	Speedometer, rev. counter, fuel gauge, clock, gear indicator, water-temperature gauge
Turn indicator repeaters	12 V 1.7 W DIN 72 601
Other telltale lights, instrument lighting	12 V 1.7 W DIN 72 601





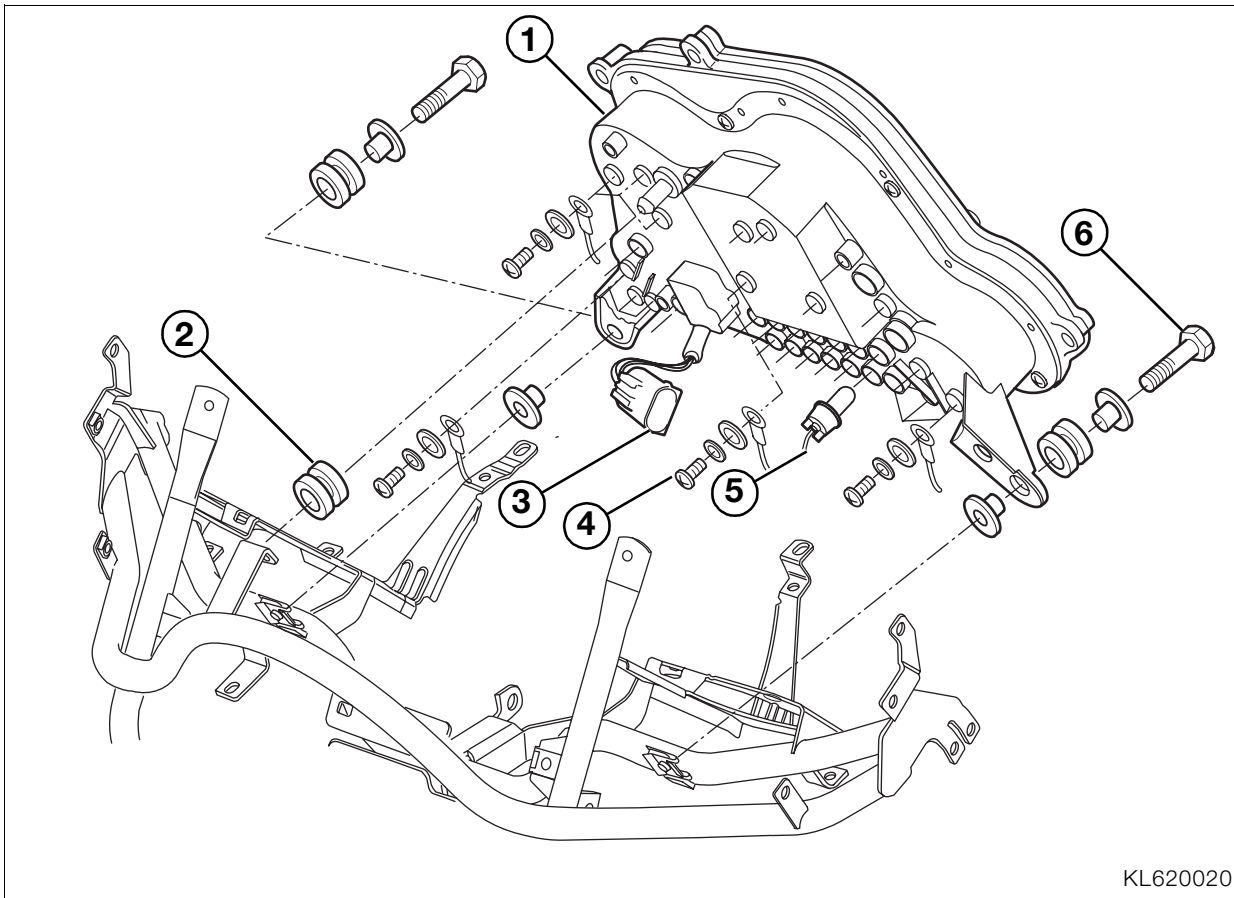


KL620060

Wiring colours

- 1 black
- 2 green/black
- 3 grey//blue, brown/blue
- 4 brown, brown/red
- 5 blue/green
- 6 yellow
- 7 grey/blue, brown/blue
- 8 grey/blue, brown/blue
- 9 yellow/violet
- 10 green/black
- 11 brown
- 12 brown/black, green/black
- 13 green/black, blue
- 14 brown/blue, white
- 15 green/black, brown/green
- 16 white/green, green/black
- 17 blue/black, brown/blue
- 18 green/black, brown/yellow
- 19 violet/yellow, green/black
- 20 green/black, brown/violet
- 21 black/white, black/green
- 22 brown/blue, green/yellow
- 23 brown/blue, blue/red
- 24 brown/blue, grey/blue
- 25 green/black
- 26 brown
- 27 violet/white
- 28 grey/blue, brown/blue
- 29 brown





KL620020

Removing and installing instrument panel

- Remove left and right fairing side sections.
 ➔See Group 46
- Remove left and right handlebar trim.
- Remove cover of fork bridge.
- Remove upper section of fairing.
- Remove instrument cover.
- Release fasteners (6).
- Disconnect plug (3) for the clock.
- Pull the instrument cluster out of holder (2).
- Remove the telltale lights (5).



Note:

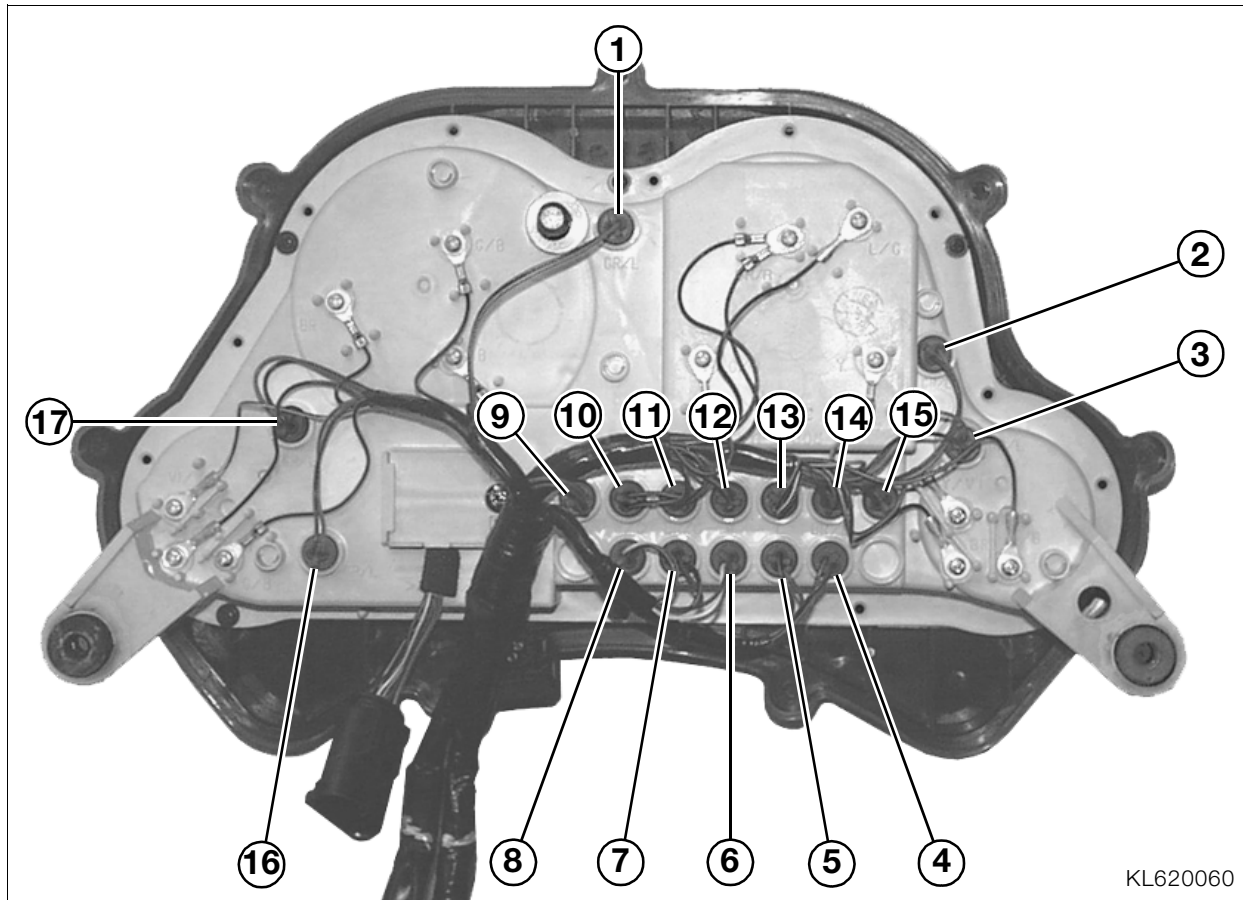
Fasteners (4) hold the instruments in the housing (1): the screws are of different lengths and have different coatings. Make sure they are re-installed in their original positions.

- Release fasteners (4), remove the contacts and loosely reinstall fasteners (4).
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Install the contacts and telltale/warning lights in the instrument cluster in accordance with the cable colours.



Tightening torques:

Instrument cluster to fairing holder 6 Nm



KL620060

Replacing telltale/warning lights



Note:

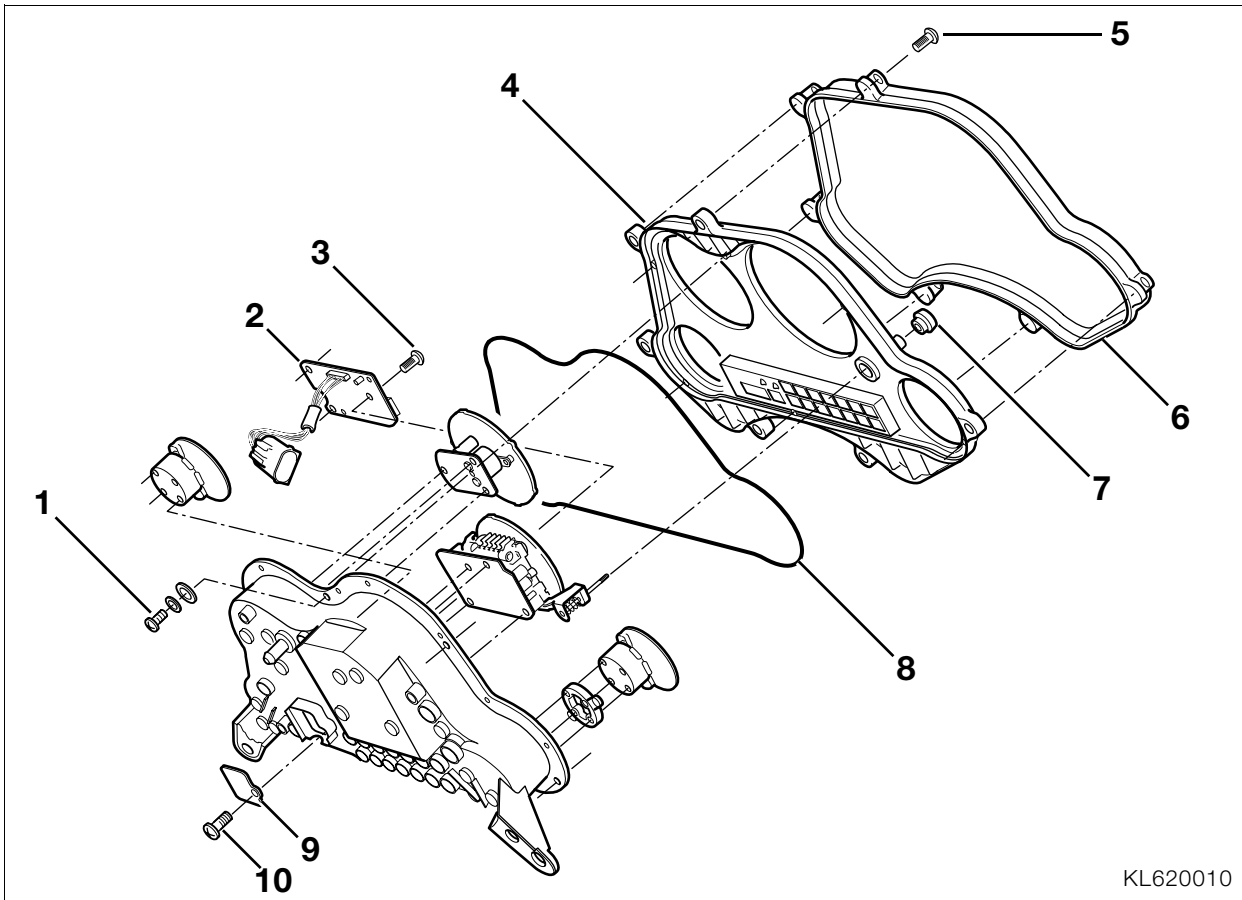
If necessary, pull gently on the cables to release the telltale/warning lights.

- Remove instrument cover.
- ➔ See Group 46
- Pull out the appropriate holder with telltale/warning light.
- Renew the telltale/warning light.
- Press the telltale/warning light holder as far as possible into the instrument cluster.
- Installation is the reverse of the removal procedure.

Telltale/warning lights

- 1 Light for speedometer, rev. counter
- 2 Light for speedometer
- 3 Fuel gauge light
- 4 Overheat warning light
- 5 Battery charge warning light
- 6 High beam telltale
- 7 Engine oil pressure warning light
- 8 Fuel level warning light
- 9 Right flashing turn indicator repeater
- 10 Indicator light for reverser
- 11 SET telltale light
- 12 Neutral indicator light
- 13 ABS warning light, red
- 14 ABS warning light, red
- 15 Left flashing turn indicator repeater
- 16 Light for clock
- 17 Light for rev. counter, coolant temperature gauge





KL620010

Disassembling instrument cluster

- Remove instrument panel.
- Release fasteners (1) and remove bezel (4) with lens (6).

Removing speedometer, rev. counter, temperature gauge, and fuel gauge



Note:

Note that fasteners are of different lengths and have different coatings. Make sure they are reinstalled in their original positions.

- Release fasteners for contacts at rear of housing and remove the appropriate instrument.

Removing clock

- Release fastener (10) and remove cover (9).
- Release fasteners (3) and remove clock (2).
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:

Make sure that the O-ring seal (8) is correctly seated.

Removing and installing wiring harness

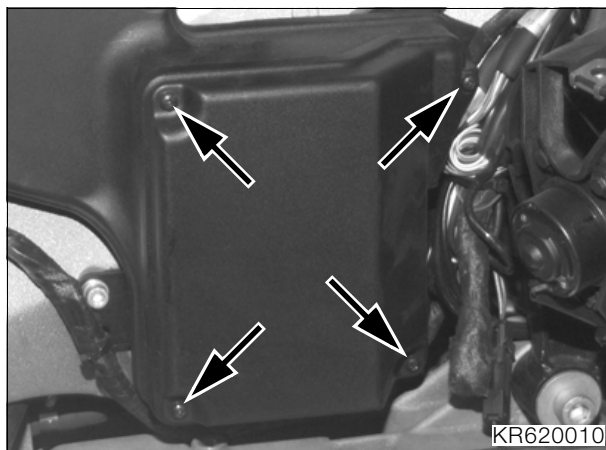
- Remove left and right fairing side sections.
 ➔See Group 46
- Remove upper section of fairing.



Warning:

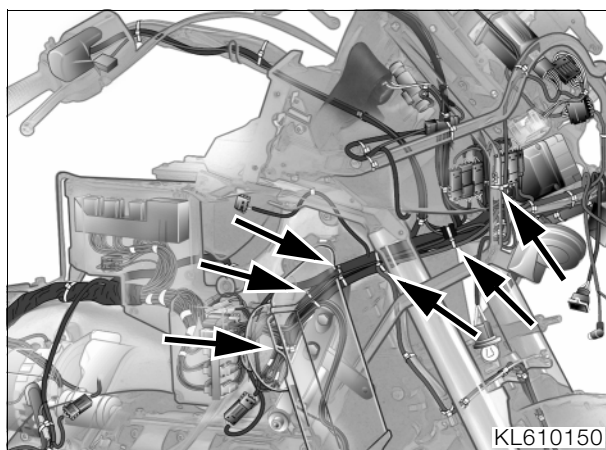
Comply with safety precautions when handling or working with fuel.

- Remove fuel tank.
 ➔See Group 16
- Remove the intake air pipe.
- Remove the air output duct from the right-hand radiator.
 ➔See Group 17
- Press radiator out of holder.



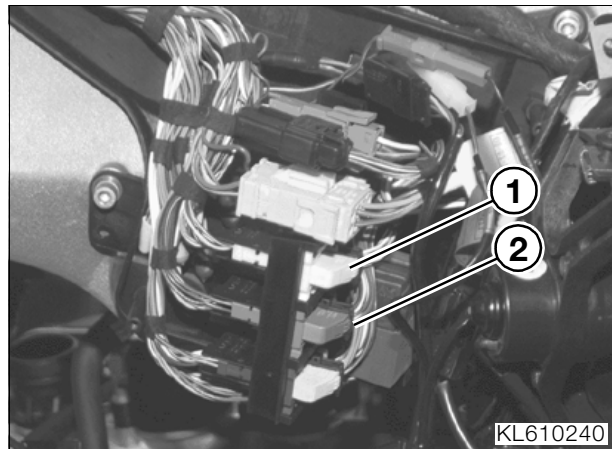
KL620010

- Release the fasteners (arrows) and remove the cover of the electronics box.



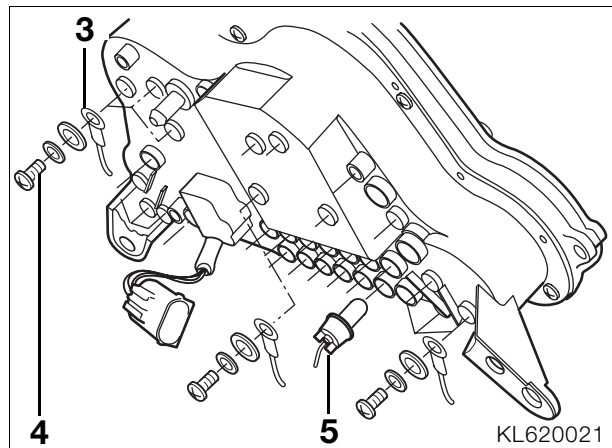
KL610150

- Open the cable ties (arrows).



KL610240

- Disconnect plugs (1, 2) in electronics box.



KL620021



Note:

Fasteners (4) hold the instruments in the housing; loosely reinstall the screws after disconnecting the contacts (3). Make sure they are reinstalled in their original positions.
 If necessary, pull gently on the cables to release the telltale/warning lights (5).

- Remove telltale lights (5) and contacts (3) from the instrument cluster.
- Disconnect the plug for the clock.
- Remove the wiring harness.
- Install the new wiring harness in the correct positions.
- Install contacts and telltale/warning lights in accordance with the cable colours.
- From this point on, installation is the reverse of the removal procedure.





63 Lights

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Vertical adjustment	7
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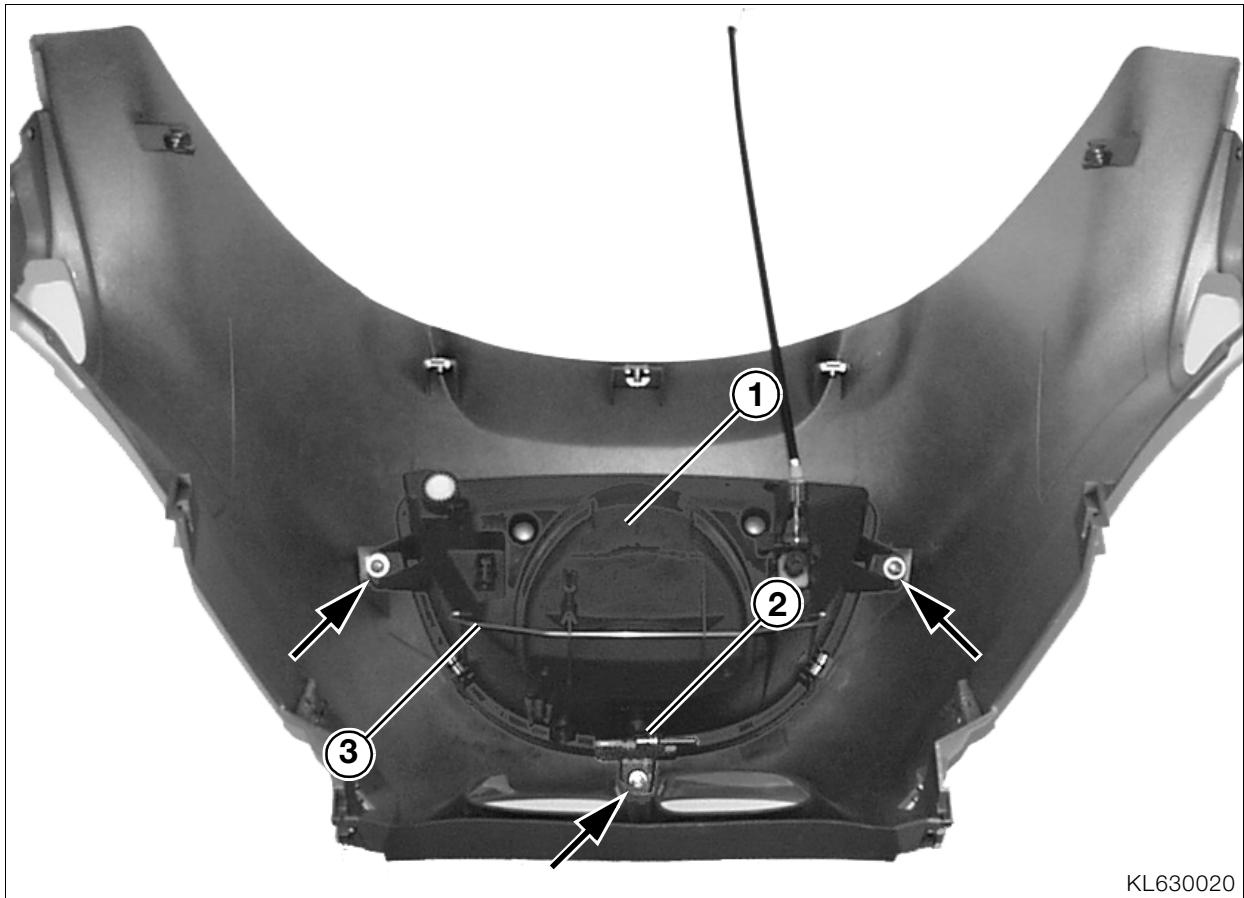




Technical Data	K 1200 LT
Lights	
Headlight	H7 tandem headlight with free-form reflector and manual beam throw adjustment
Bulbs	
High (main) beam headlight	H3 halogen bulb, 12 V 55 W, asymmetric,
Low (dipped) beam headlight	H7 halogen bulb, 12 V 55 W, asymmetric
Parking light	12 V 5 W DIN 72 601 Standard designation W 10/5
Brake light/rear light	12 V 21/5 W DIN 72 601 Standard designation P 25-2
Flashing turn indicators	12 V 21 W DIN 72 601 Standard designation P 25-1
Number plate light	12 V 21/5 W DIN 72 601 Standard designation P 25-2







KL630020

Removing and installing headlight

- Remove top section of fairing with headlight.
 ➔See Group 46
- Release securing screws (arrows) for headlight on top section of fairing.
- Remove the headlight.



Note:

Do not touch inside of reflector and glass of bulbs with bare hands.

- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Secure the temperature sensor (2) in its original position on the upper part of fairing.



Tightening torques:

Headlight to upper section of fairing..... 2 Nm

Renewing bulbs

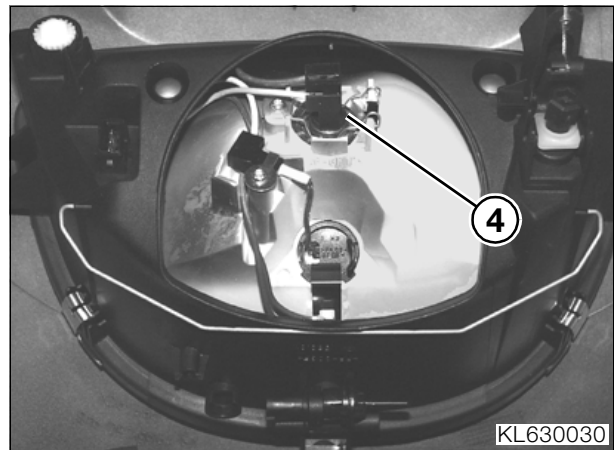


Note:

Do not touch inside of reflector and glass of bulbs with bare hands.

Bulb for low-beam headlight/ high-beam headlight

- Press retaining clip (3) down and remove the housing cover (1).



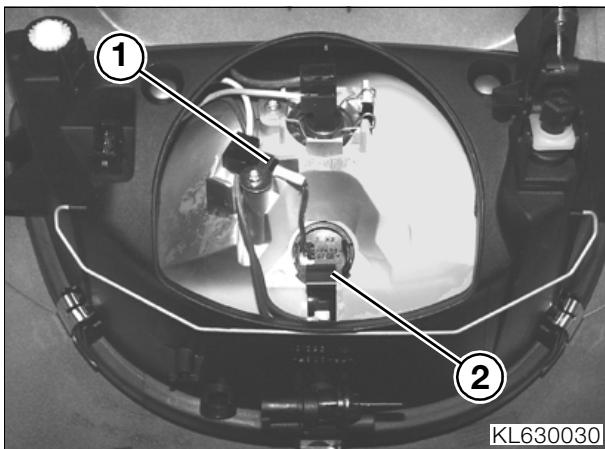
KL630030

Low (dipped) beam headlight

- Disconnect plug housing from bulb for low-beam headlight (4).
- Release spring clamps at top and bottom from retainer and remove the H7 bulb.
- Installation is the reverse of the removal procedure.



High (main) beam headlight



- Disconnect plug (1).
- Bend back the ground clip (2) of the bulb for high-beam headlight and remove the bulb holder.
- Use a screwdriver to press in the retaining lugs on left and right and disassemble the bulb holder.
- Remove the H3 bulb from its ring.
- Installation is the reverse of the removal procedure.

Bulb, parking light



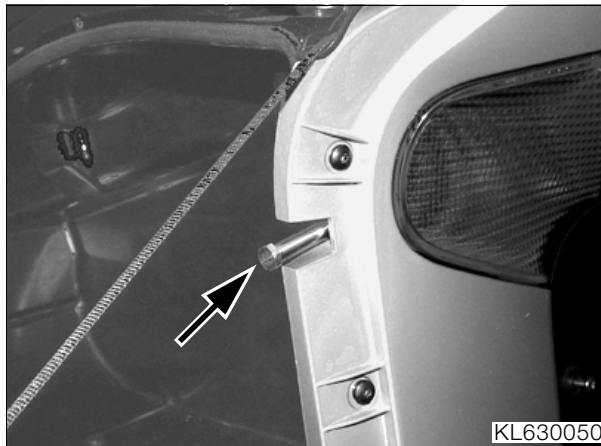
- Working from in front, pull the bulb holder (arrow) down and out of the headlamp housing and replace the bulb.
- Push the bulb holder home into its mount.

Front turn signal

- Release the fastener and remove the turn signal.
- Change the bulb.

Rear lights

- Open side case on left or right, as appropriate.

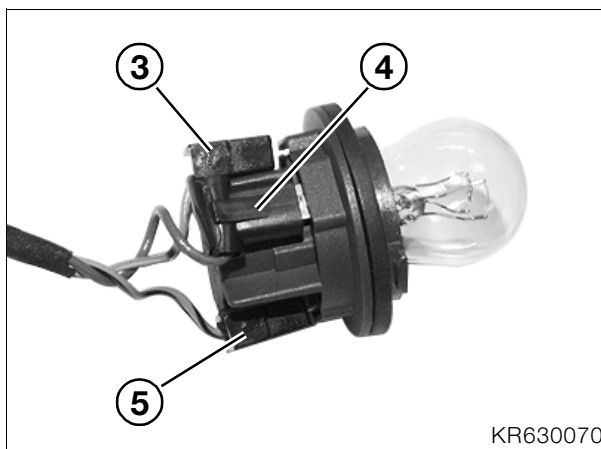


- Release the fastener (arrow) and remove the tail-light unit.
- Replace the appropriate bulb.
- Installation is the reverse of the removal procedure: pay particular attention to the following.



Caution:

When changing the rear and brake light bulbs, do not accidentally confuse their contacts.



Colours of the wires in the socket for tail light/brake light

- grey-yellow (3)
- brown (4)
- grey-blue (5)



Note:

Make sure that the gap between the tail-light unit and the side case on left and right is uniform.

Checking headlight beam angle, adjusting if necessary

Vertical adjustment

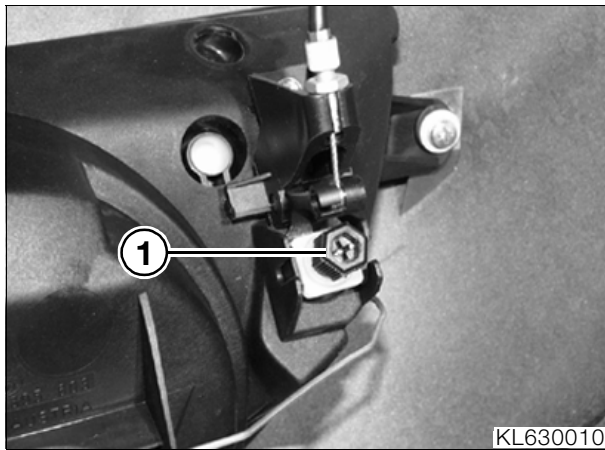
- Set suspension preload to "LOW" (turn counter-clockwise).



Note:

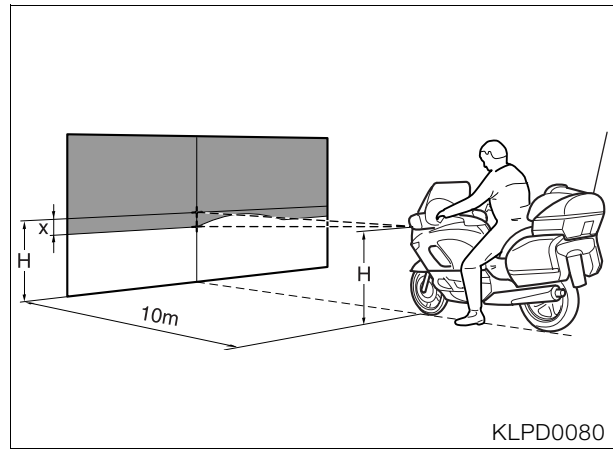
Make sure that the adjuster on the instrument-panel cover is at the "UP" position (turned counter-clockwise as far as it will go).

- If necessary, turn the adjuster on the instrument-panel cover counter-clockwise as far as it will go.



KL630010

- Manually adjust the headlight beam throw by turning the adjusting screw (1) beneath the fairing upper section with the aid of the headlight tester.



KLPD0080

Setting for headlight beam angle adjuster

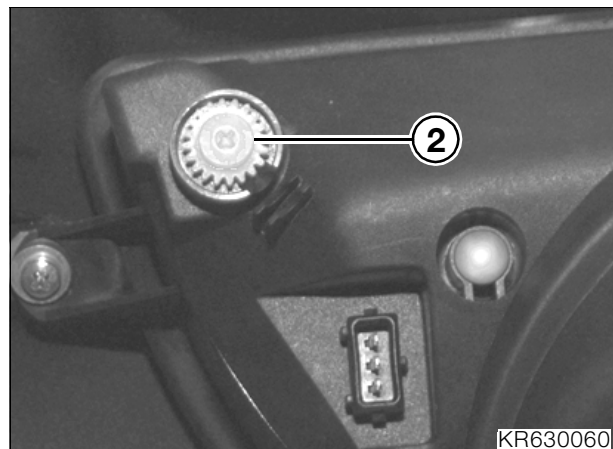
..... -10 cm (-3.94 in) at a distance of 10 m (32.80 ft)

Turned to left..... longer throw/higher

Turned to right shorter throw/lower

- Adjust the suspension preload.

Lateral adjustment



KR630060

- If necessary, laterally adjust the headlight beam angle by turning the adjusting screw (2) at the top left of the headlight with the aid of a cross-recessed screwdriver.





65 Radio and optional extras

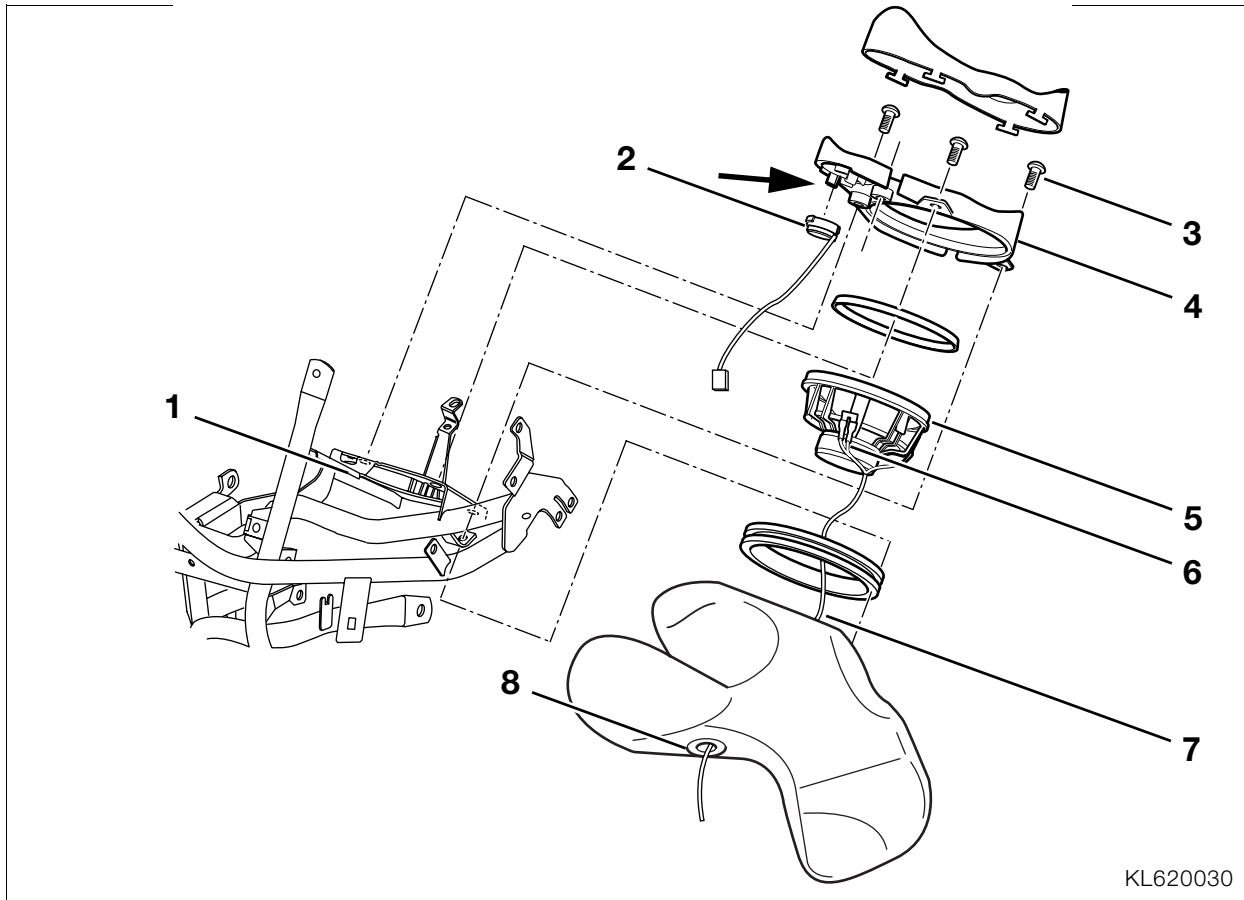
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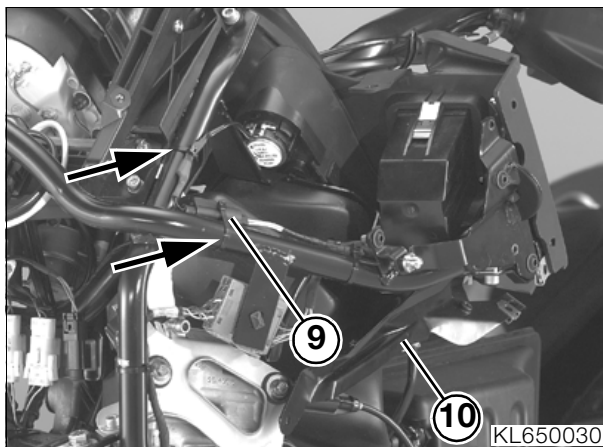
KL620030

Removing and installing speakers

Front speakers

Preparatory work

- Remove upper section of fairing.
- ➡See Group 46
- Remove interior trim.



KL650030

- Release the cable straps (arrows).
- Disconnect plug (9).
- Remove screws (3) and remove speaker bezel (4) together with treble speaker.

Treble speaker

- Carefully straighten retaining lugs (arrow) on speaker bezel (4) and remove treble speaker (2).

Bass speaker

- Carefully lift bass speaker (5) clear of retaining plate (1).
- Disconnect plug (6) and remove speaker.

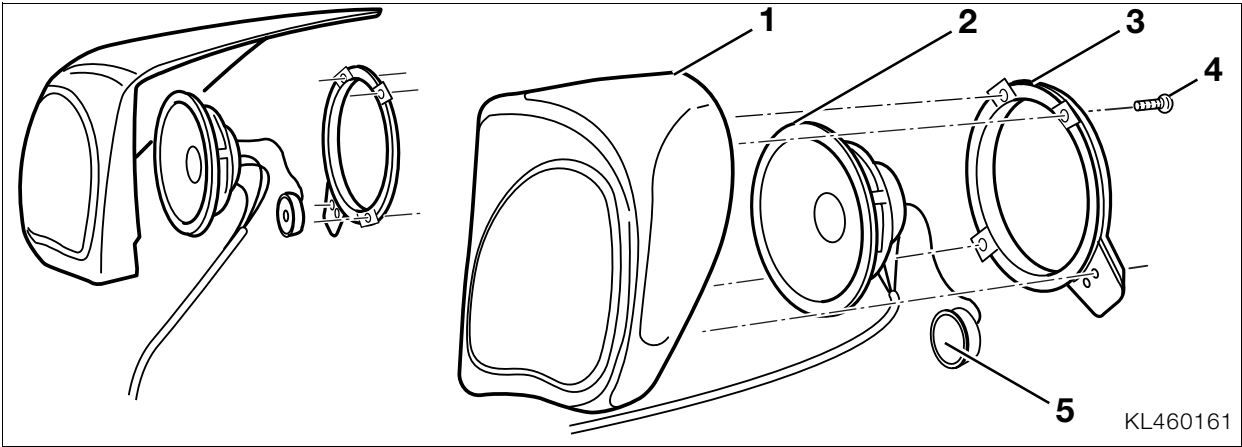
Loudspeaker box

- Carefully lift bass speaker (5) clear of retaining plate (1).
- Pull cable (7) through grommet (8).
- Remove bottom reflector (10).
- ➡See Group 46
- **[Left]** Remove control unit for cruise control.
- ➡See Group 65
- **[Right]** Remove intake duct.
- ➡See Group 46
- Remove loudspeaker box.
- Installation is the reverse of the removal procedure.

⚠ Tightening torques:

- Reflector to fairing bracket 9 Nm
- Retaining plate, cruise control control unit to fairing bracket 8 Nm



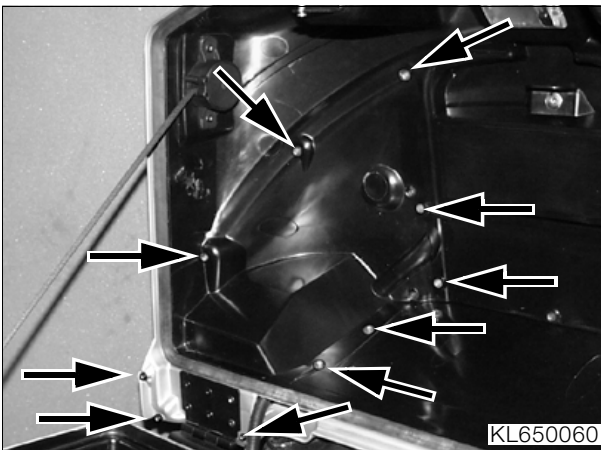


Rear speakers

Removing and installing radio/cassette player

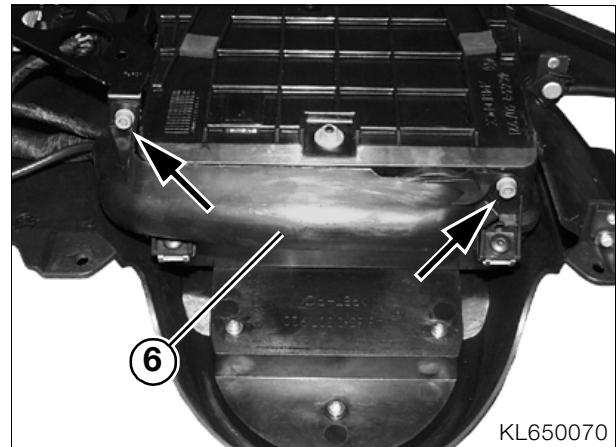
Preparatory work

- Remove tank cover with the control unit for the radio.
- ➔ See Group 46

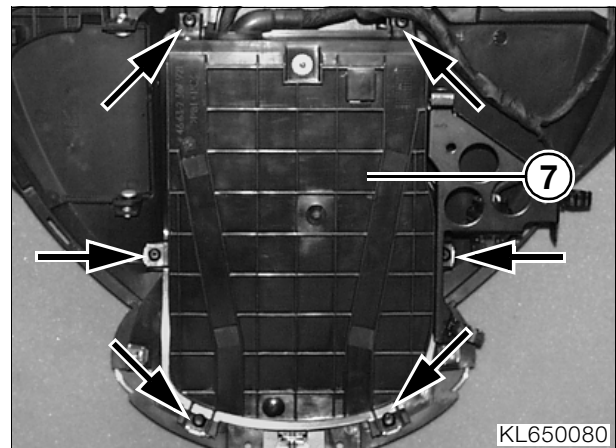


- Disengage retaining strap (6) from lower section of top case.
- Remove screws (arrows) and remove armrest (1) with speakers from top case.
- Disconnect contacts from speakers (2).
- Remove fasteners (4) and remove retainers (3).
- Remove treble loudspeaker (5), if necessary.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Position treble loudspeaker over small aperture in armrest (1).

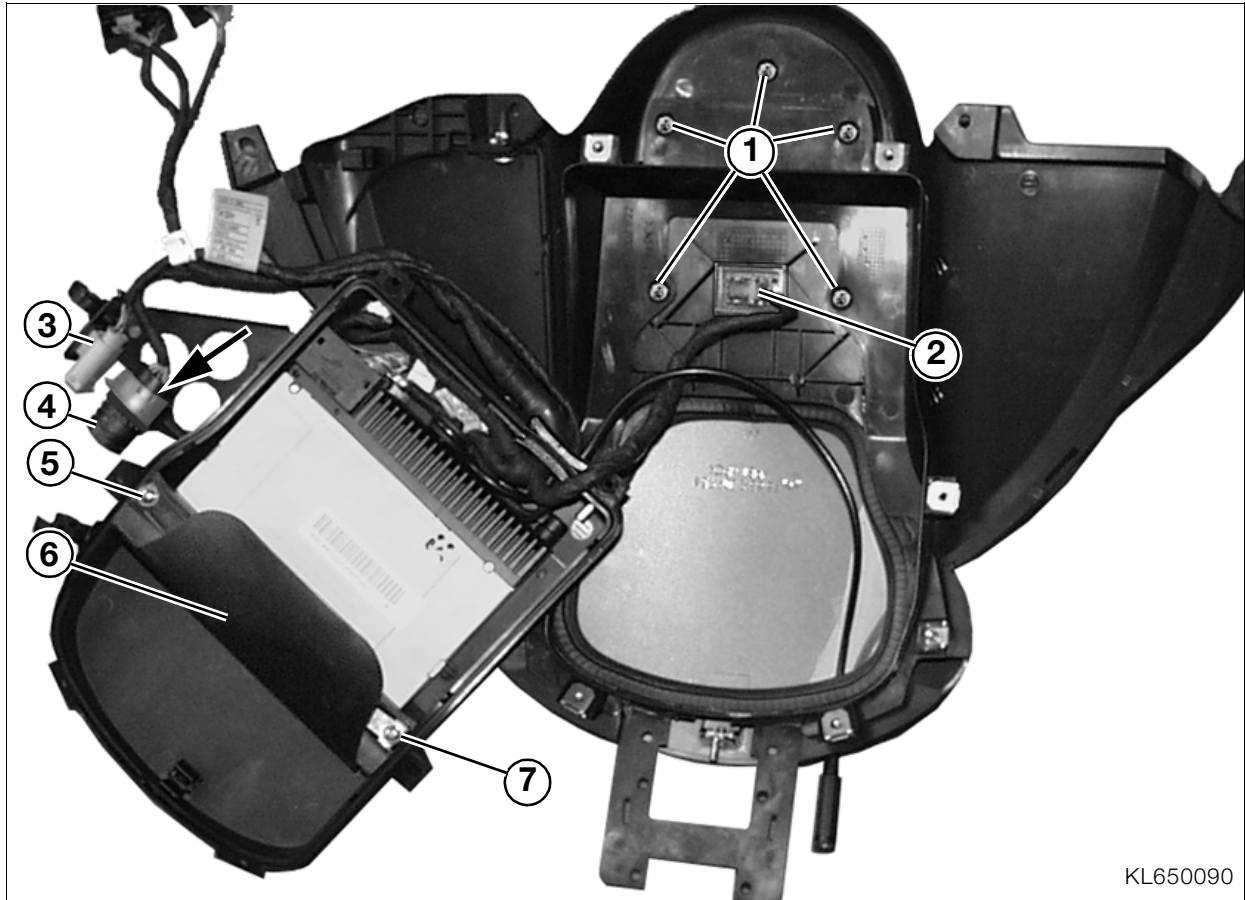
Tightening torque:
 Armrest to top case..... 1 Nm



- Remove fasteners (arrows) and remove wiring-harness cover (6).



- Remove fasteners (arrows) and remove lower section of tank cover (7) with radio/cassette player.



KL650090

- Disconnect plug (2) of radio control unit.

Removing radio control unit

- Remove fasteners (1) and remove radio control unit from tank cover.

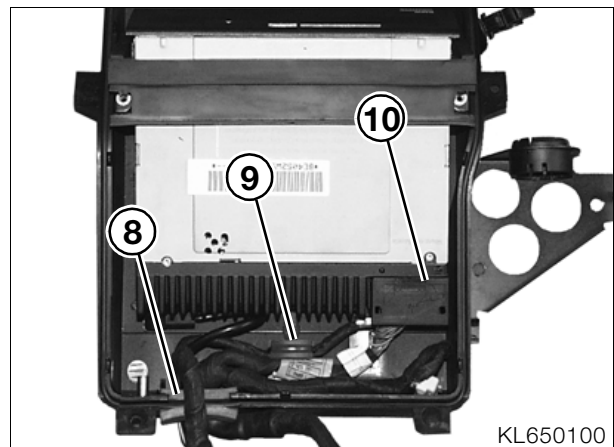
Removing radio/cassette player and wiring harness



Note:

Straighten the retaining lugs (arrow) before disconnecting round connector (4).

- Disconnect plugs (3, 4) from holder.
- Remove fasteners (5, 7) and remove trim panel (6).



KL650100

- Pull radio/cassette player forward out of its holder (9) and then lift to remove.
- Pull seal at grommet (8) out of its groove and remove radio/cassette player complete with wiring harness.
- Use a screwdriver to disengage latch (10) of plug connector.
- Disconnect plugs from radio/cassette player and remove wiring harness.
- Installation is the reverse of the removal procedure.



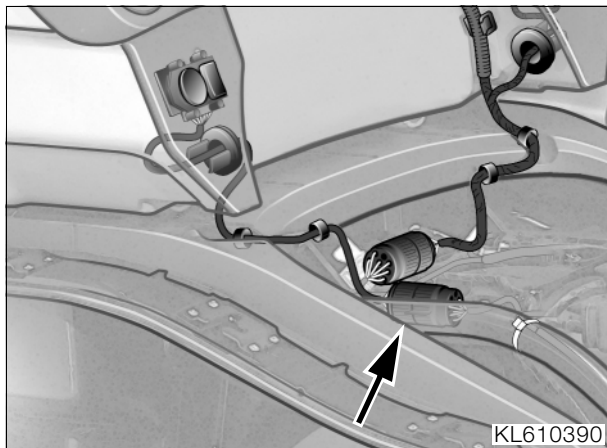
Removing and installing radio remote control unit

Removing and installing front radio remote control unit

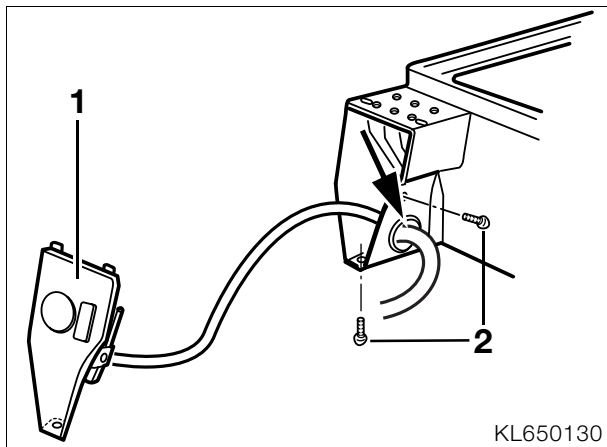
See Group 61, Removing and installing radio control unit

Removing and installing rear radio remote control unit

- Remove rear seat.
 ↳See Group 52



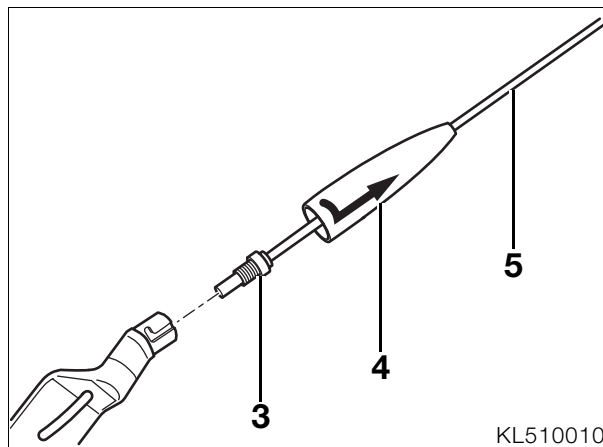
- Disconnect plug (arrow).



- Remove screws (2).
- Remove remote control unit (1) and pull cable with plug through grommet (arrow).
- Installation is the reverse of the removal procedure.

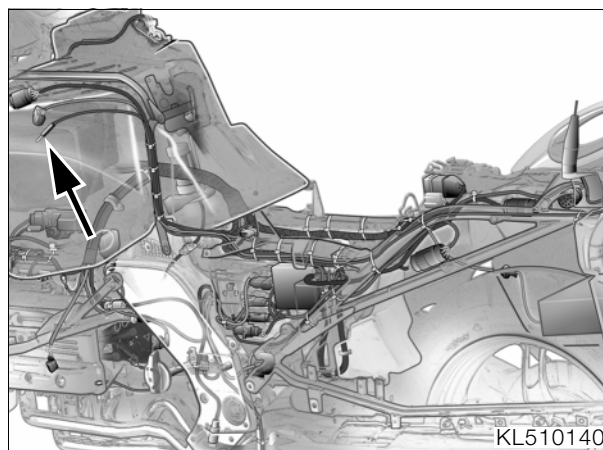
Tightening torque:
 Seat, rear, to rear frame 9 Nm

Removing and installing aerial holder

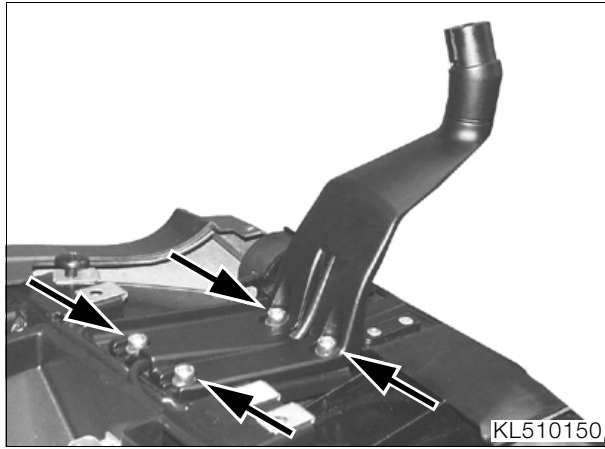


Caution:
 Cap (4) can be damaged as you attempt to remove it.

- Turn cap (4) 1/8 of a turn to release bayonet lock and remove cap (4).
- Remove the clamping nut (3).
- Remove the rod antenna (5).
- Remove rear seat.
 ↳See Group 52
- Remove top case.
 ↳See Group 46
- Remove cover for rear carrier.
- Remove left side section of fairing.
- Remove the left-hand battery cover.



- Disconnect plug (arrow) of radio control unit.
- Open cable ties, pull cable toward rear and remove.



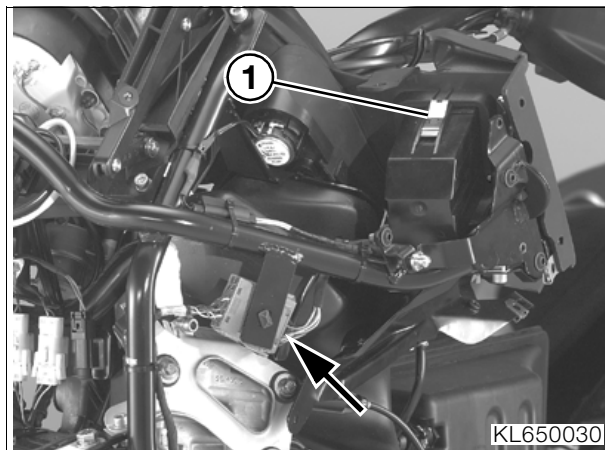
- Remove fasteners (arrows) and remove aerial holder.
- Installation is the reverse of the removal procedure: pay particular attention to the following.
- Prior to installation, clean contact faces of aerial holder and rear frame.

Tightening torques:

Aerial holder to rear frame 9 Nm
 Rod antenna clamping nut 3 Nm

Removing and installing on-board computer

- Remove left and right fairing side sections.
 ➡ See Group 46
- Remove upper section of fairing.



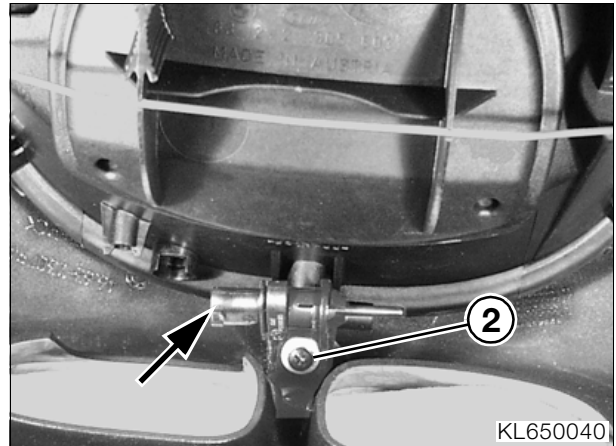
- Disconnect plug (arrow).
- Press together clips (1) at top and bottom and remove on-board computer.
- Installation is the reverse of the removal procedure.

Removing and installing temperature sensor on upper section of fairing

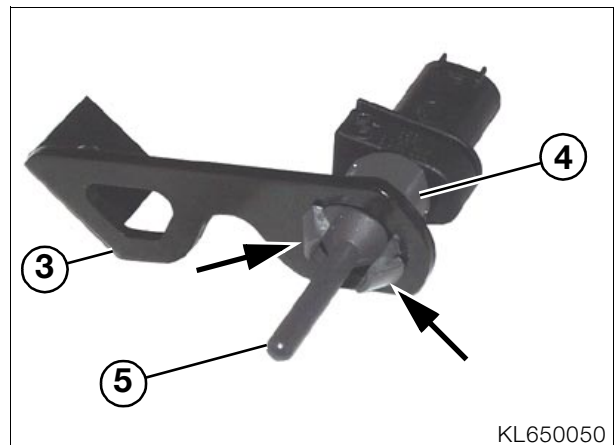


Note:

The temperature sensor on the upper fairing measures the outside temperature for display by the on-board computer.



- Disconnect plug (arrow).
- Remove screw (2) and remove temperature sensor complete with holder.



- Press together lugs (arrows) and remove retaining plate (3).
- Remove sleeve (4) from temperature sensor (5).
- Installation is the reverse of the removal procedure.



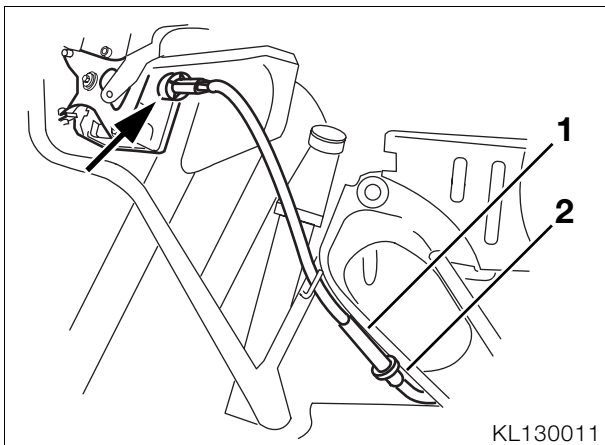
Tightening torques:

Holder to upper section of fairing 2 Nm

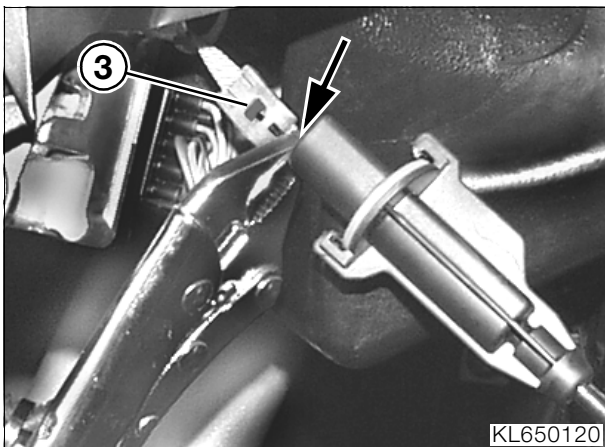


Removing and installing control unit of cruise-control system

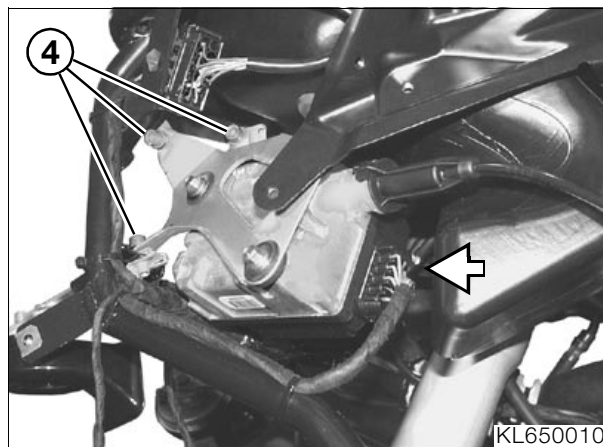
- Remove left side section of fairing.
- ➔See Group 46
- Remove upper section of fairing.



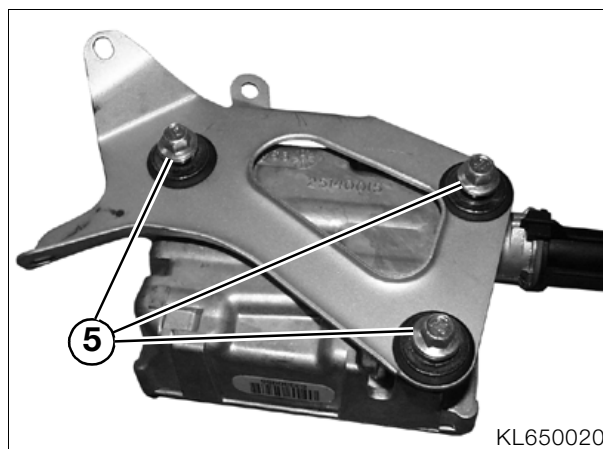
- Carefully pull Bowden cable at sleeve (1) and remove insert (2).
- Disconnect bayonet-type plug (arrow) of control unit.



- Pull Bowden cable away from control unit until approx. 1 cm (0.4 in) of cable is visible and secure Bowden cable in this position with clamp (arrow).
- Disengage nipple (3), move Bowden cable with clamp clear.



- Disconnect plug (arrow).
- Remove screws (4) securing retaining plate to fairing bracket.
- Remove retaining plate with control unit for cruise control system.



- Remove screws (5) and remove control unit.
- Installation is the reverse of the removal procedure.

Tightening torques:
Retaining plate to fairing bracket..... 8 Nm